Towards Revamping Power and Energy Sector: A Road Map

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Finance Division
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Preface

"Vision-2021" of the Election Manifesto of the ruling party has inspired the entire nation towards fulfillment of a dream for a prosperous Bangladesh. This Vision consists of a number of innovative initiatives to lead the country towards higher economic growth. A commitment for achieving 8 percent growth in National Income by 2013, then raising it to 10 percent by 2017 and maintaining it there has been expressed. However, insufficient physical infrastructure facilities such as power and energy shortage are creating obstacles to reach this goal.

After assuming office, the present government has taken a number of steps to make the economic development plan more comprehensive, dynamic and pragmatic. Meanwhile, by revising the National Poverty Reduction Strategy-2, policy and strategy for rapid poverty alleviation have been made consistent with the Charter for Change. In addition, the Government is in the process of finalising of a ten-year long (2010-2021) Perspective Plan. And, to implement this plan, formulation of the Sixth Five-Year Plan (2011-2015) has also been taken up. Initiatives have been taken to enhance the period of Medium Term Budget Framework from 3 to 5 years.

In the past years, insufficient supply of power and energy impeded the achievement of higher growth in Bangladesh. Keeping this in view, the Government has identified power and energy sector as one of the five medium term priority sectors in the light of the Perspective Plan.

We assumed office at a time when the country was reeling from acute shortage of power and energy. The supply of power vis-a-vis demand is a disgraceful legacy of inefficiency and corruption of five long years and it is totally unacceptable. Gradual and fast development of this sector is a basic requirement for the economic progress of the nation. In order to improve the prevailing situation the Caretaker Government took some steps which we have continued without interruption. In order to meet the serious crisis of power shortage, from the outset, we have given the highest attention to attracting investment in the power and energy sector and increasing generation and distribution of Power risking substantial subsidy. I am confident that we shall be able to bring down this shortage problem to some tolerable level within a year and half and thus atone for the inherited sin of past inaction and negligence. In order to generate this additional power the Government has also taken various steps to develop the sources of primary energy. The coal fields will be exploited and developed. Import of Liquefied Natural Gas will be arranged. And existing gas fields will be developed and new exploration for Natural Gas will be intensified. Non-traditional sources and renewable energy sources will also be harnessed more.

At present, 47 percent of the entire population has access to power supply. The per capita power consumption is only 220 kwh in the country which is much lower than that of other developing countries of the world. Under the circumstances, Government has taken up plans to set up new power plants having 9364 MW capacity in the period

2011-15. Moreover, actions are being taken by the Government to formulate and implement new policies in order to explore alternative sources such as atomic power, solar energy, biodigestor and mini hydro power. I am hopeful that with the added power generation, we can meet the growing demand of electricity arising out of advancement of agriculture, industry and service sectors.

Energy and power are capital intensive sectors. Involvement of the private sector along with Government in this sector is the need of the hour. For this purpose, the present Government has already arranged several "road-shows" at home and abroad to attract private and foreign investment. An infrastructure investment fund has just been launched with a seed money of Tk.16000 million in order to attract domestic and foreign investors.

This booklet is an effort to make the nation aware of various immediate, medium term and long term steps taken by the Government in power and energy sectors. I am very pleased to place it before this august Parliament as part of budget presentation. I firmly believe that, with the efforts of the Government along with domestic and foreign entrepreneurs of private sector, development-partners and the people at large, development of the power and energy sector will accelerate. We do not want power and energy sector to create any impediment in the march of Bangladesh toward a peaceful, progressive and prosperous country.

I take the opportunity to extend my sincere thanks to the Ministry of Power, Energy and Mineral Resources, Power Development Board and the officers of Finance Division who worked relentlessly to prepare this booklet. I would like to express my deep gratitude to the Honourable Adviser for Power and Energy Dr. Toufique-E-Elahi Chowdhury, Bir Bikram and the Honourable State Minister for Power, Energy and Mineral Resources Mr. Muhammad Enamul Huq.

(Abul Maal A. Muhith)
Honourable Minister
Ministry of Finance

Towards Revamping Power and Energy Sector: A Road Map

1.0 Introduction and Background

1.1 The present Government is committed to implement "Vision 2021" for building Bangladesh as a happy, prosperous country of medium income through maintaining macro economic stability and achieving rapid economic growth by 2021. In the outline of Bangladesh Perspective Plan (2010-2021) projections of raising the existing 6 percent growth rate of GDP to 10 percent by 2021 and increasing the per capita income of US$ 690 to around US$ 2000 have been set up. A prerequisite for achieving this growth is the ensuring of adequate investment in National Priority Sectors.

1.2 According to the Perspective Plan of the Government, a preliminary estimate of expected increase in investment in order to reach the projected GDP growth rate requires investment to be 32 percent of GDP by 2015 and 38 percent of GDP by 2021. Analyzing the investment situation of past years, it is observed that the contribution of public investment in the total investment has comparatively declined while the function of private sector has augmented. In the Fiscal year 2008-09, investment in public and private sector was respectively 19.6 and 4.6 percent of GDP. It is projected that this rate will increase to respectively 25.9 and 6.1 percent by 2015. The lion's share of the mentioned investment will be achieved through Public-Private Partnership, Private Sector investment and Foreign Direct Investment. It need not be over emphasized that a strong infrastructure is necessary to attract private and foreign investment. The energy and power supply deficit in the existing infrastructure has become an impediment to achieve development goals. The Government is firm to create an investment-friendly atmosphere to attract private ventures according to the set target. The Government has given priority to infrastructure development especially in power and energy sector as means of attaining higher growth.

1.3 Currently, the shortage in electricity production is about 1500-1800 MW as per the demand of peak hours. As the concept of applying Energy Mix has not been given due consideration there is an overwhelming dependence on natural gas as primary fuel for power generation. At present, 88 percent of the power plants are run by natural

gas. Due to limited gas extraction, these power plants cannot generate enough power. Moreover, around 63 percent of total production comes from public sector while private enterprises contribution is inadequate. In addition, there are also problems relating to management of the growing demand. The Government has already adopted a comprehensive plan to resolve the prevailing difficulties. According to the plan, the shortage of electricity production will be overcome through PPP (Public Private Partnership) and private investment alongside government investment by 2012, and electricity for all will be ensured by 2021. Besides, use of coal and other fuels will be enhanced in order to reduce dependence on natural gas for power generation. The demand for electricity will also be addressed through the use of renewable energy and regional cooperation. Initiatives have been taken to bring qualitative change in demand side management and use of fuels in order to save power and energy. In future, such initiatives will continue and will be well-arrayed.

1.4 When the present Government assumed office, the power generation was 3525 MW which has now been increased to 4020 MW currently. The production capacity will be enhanced to 11,500 MW by 2015 and it requires USD 9.00 billion investment out of which USD 8.00 billion is expected to be provided by private sector. Development and investment in the power and energy sector is different from other sectors due to the sector specific characteristics. Huge primary asset accumulation and procurement are required for investment in the power and energy sector. Strategies have been made to meet this need by involving private sector with Government. Keeping this in view, the importance of external investment is infinite. On the other hand, consumer's economic consideration is given priority over commercial interests in price calculation of electricity, gas and other fuel oil. Efforts are continued to attract private ventures considering the risks in large primary investment and profit. However, estimation and reevaluation of power and other energy is required price is to be made more with commercial consideration in order to involve the private sector.

1.5 The existing problems and solutions in power and energy sector are enumerated in Bangladesh Perspective Plan outline (2010-2021). The total production of power is targeted at 8,500MW by 2013, 11,500MW by 2015 and 20,000MW by 2021. To reach these goals the Government has taken immediate, short, medium and long term work-plans for enhancing power generation in order to ensure overall and balanced development of this sector.

1.6 A modest effort has been made through this brochure to reveal the adopted plans and their implementations by the persistent efforts of the Government in order to resolve the prevailing situation of power and energy sectors before the Nation through the Parliament. The power shortages in Bangladesh along with reasons for lower per capita electricity consumption compared to other developing countries have been analyzed in this pamphlet. At the same time, in order to overcome the problems of power sector after identifying those, the steps taken so far and steps to be taken are discussed here. Priority has been given to arrange enhanced power generation, renovate and extend the infrastructure facilities for transmission and distribution, attract investors through private sector and PPP initiatives, encourage the use of renewable energy, create multifarious fuels, demand side management etc. to the develop power sector. Besides, plans, targets and possible achievements of the Government concerning regional cooperation have been represented separately in this booklet.

Power Sector

2.0 Shortage of electricity

2.1 Shortage of electricity may be considered in two forms. Firstly, reviewing the scenario of per capita electricity consumption and percentage of population having access to electricity in Bangladesh compared to other countries and; secondly, determining gap between demand and supply of electricity in perspective of country's economic situation and GDP growth.

2.2 Per capita electricity consumption

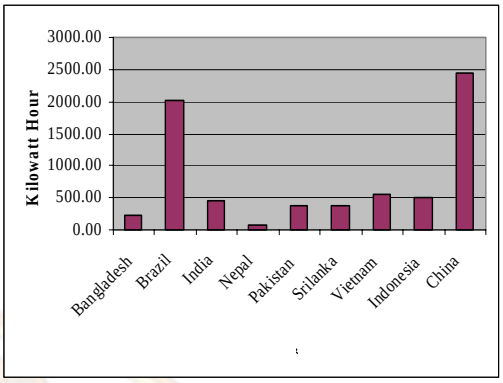
2.3 While analyzing the cause of electricity shortage it transpires that, at present our per capita electricity production is only 220 kw/hour. From table 1 and chart 1 it is seen that comparing with the per capita electricity consumption of BRICS countries (Brazil, Russia, India, China, and South Africa) as well as SAARC (South Asian Association for Regional Cooperation) countries such as Pakistan, Srilanka the per capita consumption of Bangladesh is very low.

Table 1: Per Capita Electricity Consumption 2009 (Kwh)

Bangladesh	220.00
Brazil	2023.76
India	443.54
Nepal	79.68
Pakistan	388.10
Srilanka	388.09
Vietnam	552.85
Indonesia	504.43
China	2443.57

Source: CIA World Factbook, 2009

Figure 1: Per Capita Electricity Consumption



2.4 Access to Electricity

2.5 Only 47 percent of the total population has access to electricity. Presently (April 2010) the quantity of transmission and distribution line are respectively 8,359 Line Kilometer and 2,66,460 Line Kilometer. Besides the urban areas 53,281 villages have been brought under electricity coverage. In order to bring the total population under electricity coverage emphasis should be provided to produce electricity from renewable sources besides using non-renewable energy.

2.6 Projection of demand for electricity

2.7 One of the aspects to the demand for electricity is the tremendous rise of intensity of electricity use with the pace of economic development. In 1980, there was electricity demand of 30 Gigawatt (GW) per 1000 crore taka of GDP which increased into 80 GW in 2002. With an economic growth of 12 percent on an average the capacity for electricity generation should double every six years. Considering the projection of economic growth the generation of electricity should increase 4 times to 20,000 MW by 2021.

2.8 Power Sector: An update (April 2010)

Installed Capacity	**6,033 MW**
Derated Capacity	**5,480 MW**
Production	**3,900-4300 MW**
Highest Production	**4,606 MW (14 April 2010)**
Electricity Demand (Peak Demand)	**5,800 MW**
Access to electricity	**47 percent**
Per capita electricity consumption	**220 KWh**

Source: Power Division

2.9 Demand for electricity is increasing with the improvement of living standard, increase of agricultural production, development of industries as well as overall development of the country; but due to the failure in the last few years to increase electricity generation capacity proportionately to the demand, there exists 1500-1800 Megawatt electricity shortage at present. Especially a huge shortage exists during the evening peak demand. Due to the crisis of gas supply, lack of necessary maintenance and rehabilitation of old power plants, it is not possible to utilize the total installed capacity. The shortage of electricity can be from the load-shedding made during the peak demand (5800 MW) of summer which is about 1800 Megawatt each day.

2.10 Electricity Generation Structure

2.11 Bangladesh Power Development Board (BPDB), Ashuganj Power Station Company Limited (APSCL), Electricity Generation Company of Bangladesh (EGCB) are producing electricity in the public sector. On the other hand, through IPP (Independent Power Producer) and through Rental electricity is produced in the private sector which is purchased by the Government at a fixed rate. Besides that big industries produce 1200 MW electricity for their own use from which additional 88 MW is supplied to the national grid. At present nearly 63 percent of total electricity production is produced from public entities. BPDB alone produces 46 percent of total electricity production. Statistics related to electricity generation from public and private sector is given in the following table 2 and Graph 2,3,4:

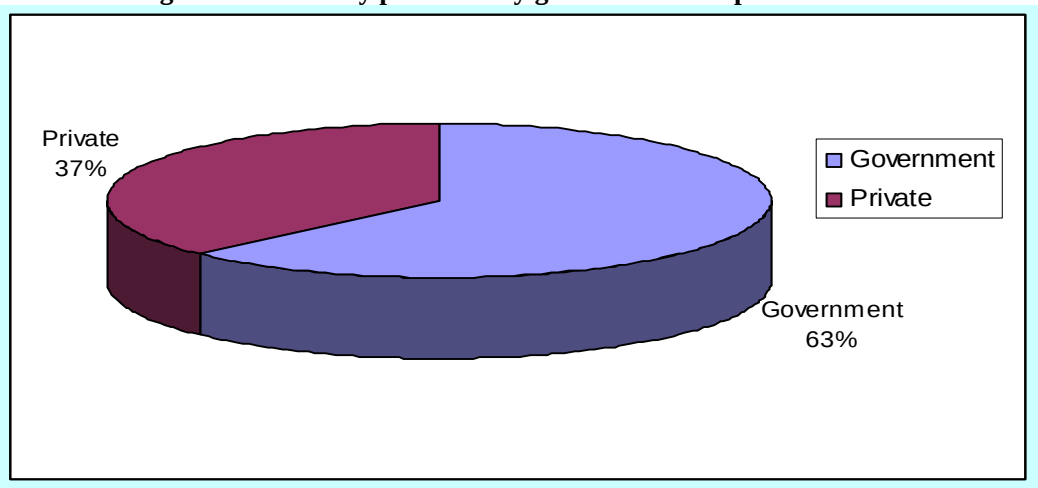
Table 2: Statistics of electricity produced by government and private sectors (2010)

Sectors	Government			Private			
	BPDB[1]	APSCL[2]	EGCB[3]	SIPP[4]	SIPP (BPDB)	SIPP (REB)[5]	Rental
Production Capacity (Derated) (MW)	2522	606	310	1271	99	226	446
Total (MW)	3438			2042			

Source: Power Division

[1] Bangladesh Power Development Board
[2] Ashuganj Power Station Company Limited
[3] Electricity Generation Company of Bangladesh
[4] Small Independent Power Producer
[5] Rural Electrification Board

Figure 2: Electricity produced by government and private sectors



Source: Power Division

Figure 3: Electricity produced by private producers

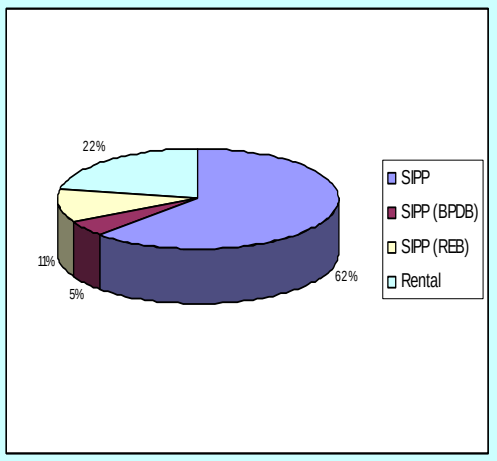
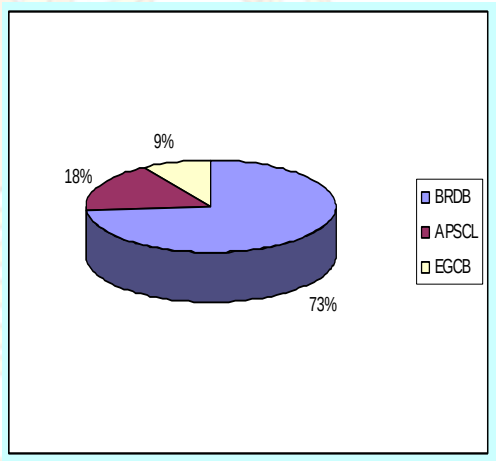


Figure 4: Electricity produced by the Government



2.12 Use of different types of energy

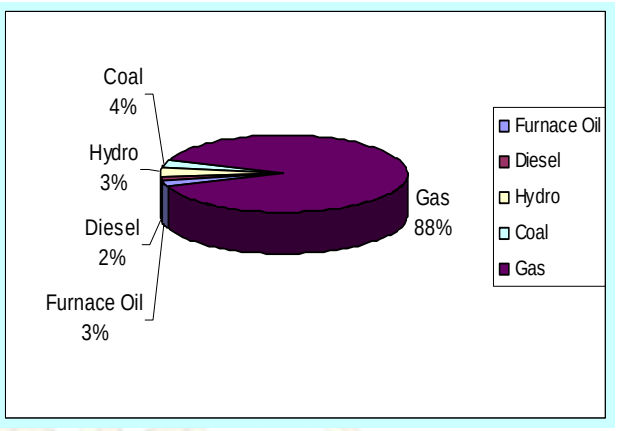
2.13 Natural Gas is used as primary energy in most of the existing power plants. 88 per cent of total electricity is produced from gas-based power plants. Besides gas, a small amount of electricity is produced using diesel, furnace oil and coal. In addition, almost 3 percent of total electricity is produced from Karnafuly Hydro Power Plant. Due to the increase of multiple use of gas in fertilizer, industries, factories and other sectors it is not possible to supply adequate quantity gas (extracted from the existing gas fields) to meet the demand of the power plants. Due to insufficiency of gas supply at present approximately 500MW less electricity is produced from existing power plants.

Table 3: Rate of Use of different types of Energy in producing electricity

Fuel	Percentage of use (2010)
Furnace Oil	2.81
Diesel	1.75
Hydro	3.39
Coal	3.77
Gas	88.29

Source: Power Division

Figure 5: Rate of electricity produced from different types of fuel



2.14 From the above discussion it is evident that in the power sector the following issues are to be addressed with due importance at the moment:

- Inadequacy of supply of electricity compared to demand
- Dependency on single energy (gas) for electricity generation
- Investment or participation of private sector in electricity generation is at the minimum
- To meet the increasing demand of electricity huge amount of investment is needed, the lion's share of which should come from private sector or from public-private partnership
- Shortage of electricity is not attributed to generation alone but transmission and distribution are also responsible for the existing short fall
- Limited use of renewable energy

2.15 The Perspective Plan of the Government and the Work Plan framed in according to the Perspective Plan towards mitigation of the above mentioned problems are discussed in the following chapters.

3.0 Power Sector in Outline Perspective Plan of Bangladesh

3.1 Following Vision for power sector development has been mentioned in the Outline Perspective Plan of Bangladesh (2010-2021):

- Electricity Generation in the country by 2013 - 8500 MW
- Electricity Generation in the country by 2015 - 11,500 MW
- Electricity Generation in the country by 2021 - 20,000 MW
- Electricity for all by 2021

Source: Outline Perspective Plan of Bangladesh (2010-2021)

3.2 There is a planning of the Government of achieving the following objectives for making the vision a reality:

- To ensure energy security
- Making the power sector financially viable and able to facilitate economic growth;
- Increasing the sector's efficiency;
- Introducing a new corporate culture in the power sector entities;
- Improving the reliability and quality of electricity supply;
- Using natural gas (including imported LNG), coal and oil as the primary fuels for electricity generation;
- Increasing private sector participation to mobilize finance;

3.3 The Following issues have been identified to reach the objectives

- Matching supply and demand for electricity;
- To ensure energy security for all;
- To reduce the consumption of natural gas, thereby releasing gas for use as fertilizer, or to increase the use of coal for electricity production to release gas for alternative use;
- Finalization of the coal extraction plan;
- Reasonable cost-effective price policy for gas, coal and electricity, these being under government control;
- Energy mix for electricity generation;
- Energy conservation;
- Promotion of renewable;
- Efficiency of the power sector; and
- Reduction of system loss.
- Importation of LNG

3.4 To address the issues the following constraints, possibilities and strategies are identified:

Constraints

- Absence of adequate public and private investment in power generation;
- Absence of Cost Reflective Tariffs;
- Absence of Primary Energy Supply Chain.

Possibilities

- Coal-based power plants using domestic and imported coal;
- Rooppur Nuclear Power Plant;
- Availability of new gas both offshore and onshore;
- Public-Private Partnership Projects;
- Prospect pf participation of local investors in the sector.
- Medium-term agreement to import LNG and steps to be taken

Strategies:

- To diversify the use of primary energy, such as gas, coal and liquid fuel, for power generation;
- To have provision for dual fuel in power plants wherever possible;
- To increase power generation through renewable sources, such as solar, wind, small hydro etc;
- To implement nuclear fuel based power plant;
- To finance power generation projects through Public-Private Partnership, government funding for IPP;
- To increase sector efficiency, reform measures must be implemented.

4.0 Work Plan (2010-2015)

4.1 Power Generation

4.2 In the Outline of Perspective Plan of Bangladesh, the main driving force for the Power sector would be the Public Private Partnership (PPP) initiative. Power sector is characterized by time consuming nature of raising fund and requirement of large scale initial investments. To address these limitations through PPP initiative, Independent Power Producer (IPP) policy has been formulated in 1996. Private sector has been drawn in to the power generation through IPP, SIPP, Rental, Quick Rental and Joint Venture policies under the PPP framework. In addition, Road-Shows have been organised in London on 15-16 December, 2009 and in Singapore and USA on 25-29 January, 2010. These initiatives have prompted a huge positive response from the foreign investors.

4.3 Under the yearly power generation plan, Government has taken initiatives to produce 792 MW by 2010, 920 MW by 2011, 2269 MW by 2012, 1675 MW by 2013,

1170 MW by 2014 and 2600 MW by 2015; in total 9426 MW of electricity. In addition to these, as large scale production plants requires 3-4 years of installation time, the Government has taken initiatives to set up 1000-1200 MW Quick Rental Power Stations which can produce electricity in the shortest possible time and help to reduce the power crisis in 2010 and 2011 to a tolerable level.

4.4 Time bound Work Plans

4.5 According to the Outline Perspective Plan of Bangladesh, the time bound work plans for power generation are as follows:

4.6 Immediate

4.7 Under the immediate plan, Quick Rental Stations will be established using liquid fuels and capable to produce electricity within 6-12 months. In the first phase, works are underway to set up plants with total capacity of 360 MW in three locations of the country which are expected to go into production by 2010. In addition, work is under way to set up quick rental power stations that can produce 1000-2000 MW in 2010 and by the first half of 2011 and another 432 MW from the private sector.

Table-4: List of projects that will be implemented in 2010

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
Quick Rental					
1	Khulna	100	Diesel Oil	July 2010	Approved by Purchase Committee
2	Ghorashal	100	Diesel Oil	July 2010	Approved by Purchase Committee
3	Shidhdhirganj	100	Diesel Oil	September 2010	Approved by Purchase Committee
4	Madanganj	100	HFO[6]	December 2010	Agreement Signed
5	Kodda, Gazipur	100	HFO	December 2010	Agreement Signed
6	Khulna	115	HFO	December 2010	Agreement Signed
7	Shikolbaha/ Madanganj/ Syedpur/ Meghnaghat	400- 600	HFO	December 2010	Site selection and Negotiation underway
	Total	1015-1215			
Other Projects					
1	Shikolbaha 150MW Peaking Plant (PDB[7])	150	Gas/ Oil	May 2010	GTGU Testing Started
2	Shidhdhirganj-2*120MW Peaking Plant (EGCB[8])	120	Gas	May 2010 (2nd Unit)	Erection Completed
3	Fenchuganj 90MW Combined Cycle Plant, CCPP (PDB)	90	Gas	July 2010	

[6] HFO: High Sulphur Furnace Oil
[7] PDB: Power Development Board
[8] EGCB: Electricity Generation Company of Bangladesh

continued

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	Private Sector				
4	Ashuganj (3 Year-Rental)	62	Gas	April 2010	Commercial production started since 07/04/2010
5	Fenchuganj (3 Year-Rental)	50	Gas	June 2010	
6	Bogra (3 Year-Rental)	20	Gas	--------	
7	Veramara, New Initiative (Rental)	100	Diesel	June 2010	Contract signed on 04/02/2010
8	Thakurgaon, New Initiative (Rental)	50	Diesel	June 2010	Contract signed on 04/02/2010
9	Nawapara, Jessore, New Initiative (Rental)	100	HFO	November 2010	Contract signed on 04/02/2010
10	Barisal, New Initiative (Rental)	50	HFO	December 2010	Contract signed on 15/02/2010
	Total	792			
	Grand Total	1807-2007			

Source: Bangladesh Power Development Board

4.8 Short-Term

4.9 Under the short term plan, power stations that are liquid fuel based and implementable within 12 to 24 months will be established. Works for setting up power stations with a generation capacity of 920 MW under public sector has been started.

Table-5: List of projects that will be implemented by 2011

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
Public Sector (PDB)					
1	Faridpur Peaking Power Plant	50	HFO	July 2011	Contract signed on 26/04/2010
2	Dohazari, Chittagong Peaking Power Plant	100	HFO	July 2011	Contract signed on 26/04/2010
3	Baghabari Peaking Power Plant	50	HFO	July 2011	NOA[9] Accepted on 31/03/2010
4	Hathazari Peaking Power Plant	100	HFO	July 2011	Contract signed on 26/04//2010
5	Daudkandi, Comilla Peaking Power Plant	50	HFO	July 2011	NOA Accepted on 31/03/2010
6	Katakhali, Rajshahi Peaking Power Plant	50	HFO	September 2011	Contract signed on 04/05/2010
7	Bera, Pabna, Peaking Power Plant	70	HFO	September 2011	Contract signed on 26/04/2010
8	Gopalganj Peaking Power Plant	100	HFO	September 2011	Contract signed on 26/04/2010
9	Santahar, Naogaon Peaking Power Plant	50	HFO	September 2011	Retender floated on 04/05/2010
10	Sylhet 150MW Combined Cycle Power Plant	150	Gas	December 2011	Contract signed on 08/02/2010
11	Chandpur 150MW Combined Cycle Power Plant	150	Gas	December 2011	Construction work underway
	Total	**920**			

Source: Bangladesh Power Development Board

[9] NOA: Notice of Acceptance

4.10 Medium Term

4.11 Under the medium term plan, initiatives have been taken to set up power plants with a total generation capacity of 7714 MW that are implementable within 3 to 5 years time of which, 2600 MW will be coal based.

Table-6: List of projects that will be implemented by 2012

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	Public Sector				
1	Ghorashal Peaking Power Plant (PDB)	200-300	Gas/ Diesel	June 2012	Retender floated on 22/04/2010
2	Khulna 150MW Gas Turbine (GT) (NWPGC[10])	150	Gas/ Oil	June 2012	Evaluation of financial proposal underway
3	Shirajganj 150MW Gas Turbine (PDB)	150	Gas/ Oil	June 2012	Tender evaluation in final stage
4	Kaptai Solar Plant (PDB)	5	Solar	June 2012	Under scrutiny of the Ministry
	Private Sector				
5	Katakhali, Rajshahi Peaking Power Plant, IPP (PDB)	50	HFO	April 2012	Evaluation of PQ[11] underway
6	Syedpur Peaking Power Plant, IPP (PDB)	100	HFO	April 2012	Evaluation of PQ underway
7	Jamalpur Peaking Power Plant, IPP (PDB)	100	Gas/ HFO	May 2012	PQ announced on 05/04/2010
8	Chapainawabganj Peaking Power Plant, IPP (PDB)	100	HFO	May 2012	PQ announced on 28/03/2010
9	Comilla Peaking Power Plant, IPP (PDB)	50	Gas/ HFO	May 2012	PQ announced on 28/03/2010
10	Khulna Peaking Power Plant, IPP (PDB)	100	HFO	May 2012	PQ announced on 28/03/2010
11	Wind Power Plant, IPP (PDB)	100	Wind	June 2012	PQ announced on 12/04/2010
12	Solar Power Plant, IPP (PDB)	9	Solar	January 2012	PQ announced on 07/04/2010
13	Tangail 20MW, IPP (REB[12])	20	HFO	June 2012	
14	Chandpur 15MW, IPP (REB)	15	HFO	June 2012	
15	Bhola 150-225MW, CCPP(2nd unit, SC[13])(GT[14])	100	Gas	June 2012	Evaluation of PQ underway
16	Keraniganj 150-225MW, CCPP, SC (GT)	100	Gas/ HFO	July 2012	PQ announced on 05/04/2010
17	Madanganj 150-225MW, CCPP, SC (GT)	100	Gas/ HFO	July 2012	PQ announced on 05/04/2010
18	Bibiana 300-450MW (1st unit), CCPP, SC (GT)	200	Gas	August 2012	RFP[15] given
19	Bibiana 300-450MW (2nd unit), CCPP, SC (GT)	200	Gas	October 2012	Evaluation of PQ underway
20	Meghnaghat 300-450MW Combined Cycle(2nd unit), Duel Fuel: GT unit	200	Gas/ HFO	October 2012	Evaluation of PQ underway

[10] NWPGC: Northwest Power Generation Company
[11] PQ: Pre Qualification
[12] REB: Rural Electrification Board
[13] SC: Simple Cycle
[14] GT: Gas Turbine
[15] RFP: Request for Proposal

continued

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	Both Public and Private Sector				
21	Mymensingha Peaking Plant, (PDB and RPCL[16])	150	Gas/ HFO	June 2012	
22	Gazipur (RPCL)	50	Gas/ HFO	June 2012	
23	Rauzan, Chittagong (RPCL)	20	Gas/ HFO	June 2012	
	Total	**2269**			

Source: Bangladesh Power Development Board

Table-7: List of projects that will be implemented by 2013

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	Public Sector				
1	Shidhdhirganj 2*150MW GT (EGCB)	300	Gas	June 2013	Tender evaluation report sent to World Bank
2	Bhola 150MW CCPP (PDB)	150	Gas	June 2013	Feasibility study underway
3	Barapukuria 125MW (3rd unit) (PDB)	125	Coal	June 2013	Preparation of DPP[17] underway
4	Ashuganj 150 MW CCPP (APSCL[18])	150	Gas	June 2013	Preliminary study underway
	Private Sector				
5	Savar Peaking Power Plan	100	Gas/ HFO	January 2013	Preparation of PQ underway
6	Kaliakoir Peaking Power Plan	100	Gas/ HFO	January 2013	Preparation of PQ underway
7	Bibiana 350-450MW CCPP (ST)	100	Gas	August 2013	RFP issued
8	Srirajganj 300-450MW CCPP	300	Gas	June 2013	Purchase process will start shortly
9	Bhola 150-225 MW CCPP (2nd unit) (SC) (GT)	50	Gas	June 2013	Evaluation of PQ underway
10	Keraniganj 150-225 MW CCPP (ST)	50	Gas/ HFO	July 2013	PQ announced on 05/04/2010
11	Madanganj 150-225 MW CCPP (ST)	50	Gas/ HFO	July 2013	PQ announced on 05/04/2010
12	Bibiana 300-450MW (2nd unit, ST)	100	Gas	October 2013	Evaluation of PQ underway
13	Meghnaghat 300-450 MW (2nd unit) (ST)	100	Gas/ HFO	October 2013	Evaluation of PQ underway
	Total	**1675**			

Source: Bangladesh Power Development Board

[16] RPCL: Rural Power Company Limited
[17] DPA: Development Project Proposal
[18] APSCL: Ashuganj Power Station Company Limited

Table-8: List of projects that will be implemented by 2014

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	Public Sector				
1	Haripur 360 MW CCPP (EGCB)	360	Gas	June 2014	Evaluation of PQ underway
2	Bheramara 360 MW CCPP (NWPGC)	360	Gas	June 2014	Scrutiny of DPP in the Ministry underway
3	Shidhdhirganj 450 MW CCPP (EGCB)	450	Gas	June 2014	
	Total	**1170**			

Source: Bangladesh Power Development Board

Table-9: List of projects that will be implemented by 2015

Sl No.	Name of the Power Station	Capacity (MW)	Fuel	Expected time of Completion	Current Status
	PPP/ IPP				
1	Chittagong, PPP (Joint Venture)/IPP	1300	Coal	March 2015	Feasibility study will start soon
2	Khulna (South), PPP (Joint Venture)/IPP	1300	Coal	March 2015	Draft contract with NTPC under process
	Total	**2600**			

Source: Bangladesh Power Development Board

4.12 Long Term

4.13 To achieve the targets mentioned above under the Outline of Perspective Plan of Bangladesh, growth of power generation capacity is estimated to be 10% every year and by the year 2012 the total generation capacity will be 20000 MW with a per capita electricity usage of 600 Kwh.

4.14 Diversification of Energy Sources

4.15 According to the plan, high dependency on gas based power generation has been reduced in the short and medium terms and the plants that will be newly built are designed to be dual-fuel based. In addition, emphasis has been given to various power saving efforts so that the saved power can be transmitted to the other thrust areas. CFL (Compact Fluorescent Lamp) Distribution Program is due to start on June 19, 2010 through which a total of 200-350 MW of electricity can be saved.

4.16 According to the energy source diversification plan, there is a continued effort to produce and buy captive power from renewable and non renewable sources. So far, contracts have been signed to purchase 88 MW of electricity from captive generation sources. Initiatives have been taken to import electricity from the neighboring countries and export (in future) through the sub-regional cooperation. According to a

decision at the Prime Minister level with India, works have already been started to build 400 KV transmission line and HVDC (High Voltage Double Circuit) sub stations through Regional Grid Interconnection. India has made the commitment to supply 250 MW of electricity from their "Unallocated Resource".

4.17 The use of renewable energy has risen considerably in the recent times in developed and developing countries. In Asia, India and China have achieved considerable success in innovating and using the technology of renewable energy. Although the initial installation cost of renewable energy is higher, but it will gradually decline and will come down within the purchasing capacity of the people. As the global reserve of fossil fuel is gradually decreasing, the Government has taken steps to extend and develop the use of renewable energy to ensure the future energy security. Under this plan, targets have been set to produce electricity from renewable sources as 5% of total production by the year 2015 and 10% by 2020. Renewable Energy Policy has also been adopted to attract and encourage the private sector. In addition, the Government is going to set up Sustainable Energy Development Authority (SEDA) has been set up to expand and develop renewable energy, to promote energy saving and energy efficiency and to create awareness among the users of electricity.

4.18 Power Tariff

4.19 The per unit production cost of electricity is expected to rise (20%-30%) in the upcoming 2-3 years due to the installation of high cost liquid fuel based peaking plants which are implementable in 18-24 moths. Accordingly, the Energy Regulatory Commission may increase the tariff of power step by step. However, power tariff will come down after 2014 as the implementation of gas and coal based power plants will be completed.

4.20 Transmission and Distribution

4.21 In addition to power generation, it is very important to develop a dependable and quality power transmission and distribution network to ensure quality and uninterrupted power supply to the consumers. To transmit the newly produced power to the doorsteps of the consumer, it is urgently needed to build new transmission and distribution infrastructure in addition to renovation and preservation of old distribution networks.

4.22 For resolving the electricity crisis, government has some plans for increasing electricity generation and at the same time has undertaken massive development plans for efficient and uninterrupted transmission and distribution system. At present total length of 230 KV electric line has been upgraded at 2644.5 circuit kilo meters and for 132 KV electric lines, the length is 5715 circuit kilometer. For strengthening the electricity transmission system and for meeting up the gradual increasing future demand for electricity, government has set a target of "Providing Electricity in every house by 2021". As part of achieving this target, government has already undertaken a priority based investment plan (Three year road map for power sector reform) for the year 2007-09 under which massive work plan has been chalk out for building an additional 3000 kilo meter of transmission lines by 2015. In this regard, PGCB has undertaken activities for building concerned transmission lines for supplying electricity through regional cooperation.

4.23 Up to December, 2009, about 117 lakhs customers have been provided with electricity connections through building 2,66,460 kilo meter distribution lines with necessary infrastructure. New projects are being undertaken for expanding the electrification program as well as for the development and capacity enhancement of the existing transmission and distribution system. Through these programs, initiatives have been made for building an additional 60,000 kilo meter distribution lines by 2015.

4.24 Providing electricity in rural areas is an important feature of the distribution system. Up to December, 2009, Rural Electrification Board through their 70 associations has given a total number of 79,55,881 connections in 53,281 villages by building 2,21,749 kilo meter distribution lines. Out of the total connections, 68,75,627 nos are residential, 1,49,581 nos are irrigation, 7,87,844 nos are commercial, 1,29,218 nos are industrial and 13,611 nos are other types of connections. About half of the total power is provided by REB in the country. They mostly obtain this from Power Development Board since their own capacity for production in very little. Compared to the demand, their ability for transmission and distribution is limited. Their efficiency is also not beyond doubt. It is necessary to restructure this institution to turn it into a strong and professional body.

4.25 Government has undertaken time-based work plan for generating electricity. For implementing these work plans, attempts have been undertaken by PGCB for constructing transmission lines and sub stations in order to supply the generated electricity in the load centers at different voltage level. Description of some major transmission projects are as follows:

Table 10: Possible important transmission projects

Transmission Line	Voltage Level	Length (KM)	Possible Date of Completion	Present Situation
Bibiana- Kaliakoir	400 KV	194	2011-2012	DPP is sent to the Ministry
Chittagong- Meghnaghat	400 KV	260	2014-2015	Soon the preparation of PDPP will be started
Aminbazar-Maoa-Khulna	400 KV	200	2014-2015	Soon the preparation of PDPP will be started
Fenchuganj-Bibiana-Comilla	230 KV	160	2011-2012	PDPP is sent to the Ministry
Bheramara-Bahrampur-(India) Rigional Interconnection transmission line and HVDC Sub-station (600 MVA)[19]	400 KV	30	2012-2013	Evaluation of Tender Documents is going on
Barisal-Bhola	230 KV	60	2012-2013	Evaluation of Tender Documents is going on
Construction of Transmission line for Evaquation of power from rental power station implementing at a short term basis and picking power station at the government sector	-	-	2010-2011	In the implementation process

Source: Bangladesh Power Development Board, Power Division

5.0 Year-wise power generation considering planned implementation

5.1 Year-wise power generation statistics

5.2 Year-wise power generation statistics is shown below on the basis of the plan that will generate around 9426 MW extra power to the national grid by 2015.

Table 11: Year wise power generation statistics

Year	Government Sector	Private Sector	Total (Megawatt)
Year 2010	360	432	**792**
Within 2011	920	--	**920**
Within 2012	505	1764	**2269**
Within 2013	725	950	**1675**
Within 2014	1170	--	**1170**
Within 2015	--	2600	**2600**
		Total Extra Generation	**9426**

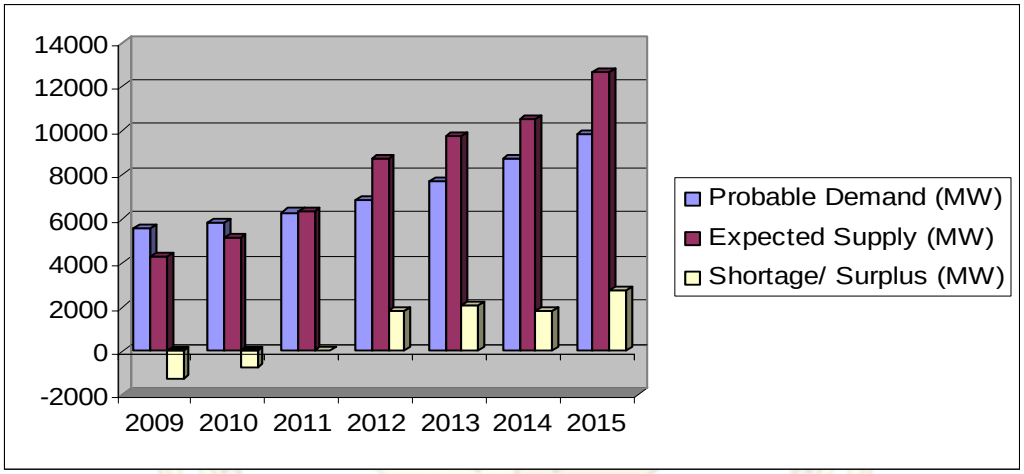
Source: Power Division

[19] Mega Volt Ampire

5.3 Year-wise expected Power Demand and Supply

5.4 It will be possible to meet the prevailing power deficit by 2011 through the plan of generating 2800 MW excess electricity into the system within 2011 to resolve the power scarcity problem. Currently there is a shortage of 1250 MW electricity supply as compared to demand. The probable power shortage from the year 2009 to 2010 and the probable power surplus from the year 2011 to 2015 is shown in graph 6:

Graph 6: Probable Power Shortage/ Surplus (2009-2015)



Source: Power Division

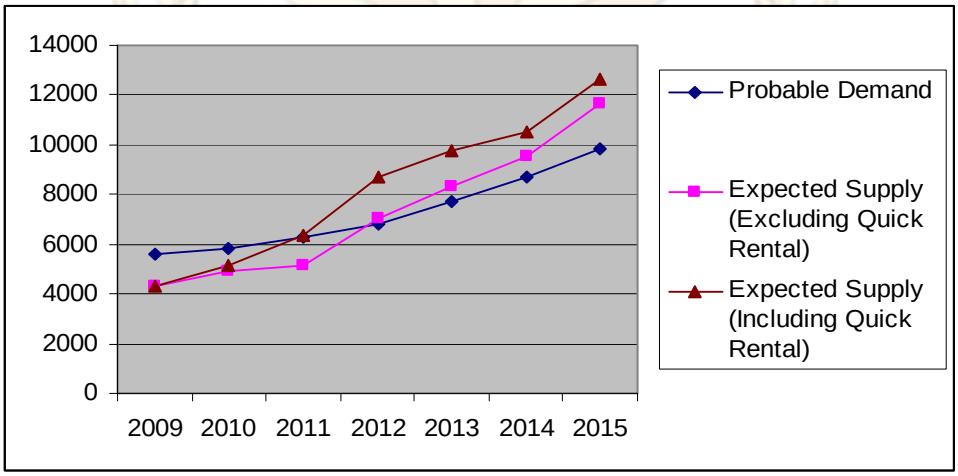
5.5 The Government has formulated plans regarding production as well as supply considering the increased growth in power demand resulting from economic development along with the ongoing rising demand in electricity. Following the plan, although around 9426 MW extra power will be added to the national grid by 2015, in total power supply capacity will reach to 11500 MW due to the retirement of some existing old power plants. On an average, the demand for electricity is assumed to enhance by 10.5 percent each year starting from 2009 to 2015. On the contrary, the capacity for power generation will be augmented at 18.5 percent to achieve the ability of producing surplus electricity by 2011. Considering the growth in power demand, an overall scenario of expected power demand and supply after increasing electricity production according to plans has been shown in the following Table-12 and Graph-5 respectively.

Table 12: Year-wise Possible Power Demand and Supply
(Considering sufficient supply of energy according to demand)

	2009	2010	2011	2012	2013	2014	2015
Probable Demand (MW)*	5566	5808	6298	6832	7709	8699	9812
Capacity Retired (MW)*	-	48	-	-	448	378	-
Expected Supply Excluding Quick Rental (MW)*	4289	4956	5177	7029	8326	9545	11625
Expected Supply Including Quick Rental (MW)*	4289	5109	6363	8683	9764	10527	12601
Deficit/ Surplus Excluding Quick Rental (MW)*	-1277	-852	-1121	197	617	846	1813
Deficit/ Surplus Including Quick Rental (MW)*	-1277	-699	65	1851	2055	1822	2789

*In view of demand management
Source: Power Division

Graph 7: Year-wise Possible Power Demand and Supply up to 2015



Source: Power Division

6.0 Power Saving Activities

6.1 To ensure energy conservation and efficient use of electricity under load management and system supervision, it has been possible to save around 350 MW of electricity by undertaking actions like keeping Shopping –malls and Shopping centers

closed after 8 p.m. Establishing Solar Panels in government, semi-government, autonomous bodies and industries have been initiated. The relevant consumers are encouraged to keep the temperature of Air-cooler at 25^0 Celsius or higher and are prohibited to use Air-cooler in the evening peak hours. Initiatives have been underway to establish 20.0 lakh pre-paid meters countrywide to facilitate electric bill payment for consumers and to control and determine power load by distributing institution. A number of steps have been taken to control electricity demand on the receiving end by using power saving handy equipments. Steps have been taken to replace around 4 crore ineffective electric lamps by power saving Compact Fluorescent Lamps (CFL) under Efficient Lighting Initiatives for Bangladesh (ELIB) programme. It will be possible to install 1.05 crore power saving CFL bulbs by 2010. this will also ensure Clean Development Mechanism (CDM) facilities.

7.0 In order to overcome the present power deficit situation, targets are fixed up in the outlines of Bangladesh Perspective Plan and on reaching these goals it will be possible to have access to power by all citizens within 2021.A huge investment is required to go towards the preferred level from the prevailing power deficit situation. Initiatives have been on to ensure public as well as government-patronized private investments and Foreign Direct Investments. In this sector investment to amount of taka USD 9.00 billion is required out of which USD 8.00 billion is expected to come from private sector in order to raise power generation to 11,625MW within 2015.Initiatives have been taken in this comprehensive plan to transmit, distribute, adopt demand side management, use renewable fuels, rationalize prices separately at private investment and consumers' level due to the existing difficulties of transmission, distribution, power supply and sources along with production in power sector .The prevailing power crisis will be reduced in 2012 if this plan is implemented on time and every citizen will have access to power in 2021.

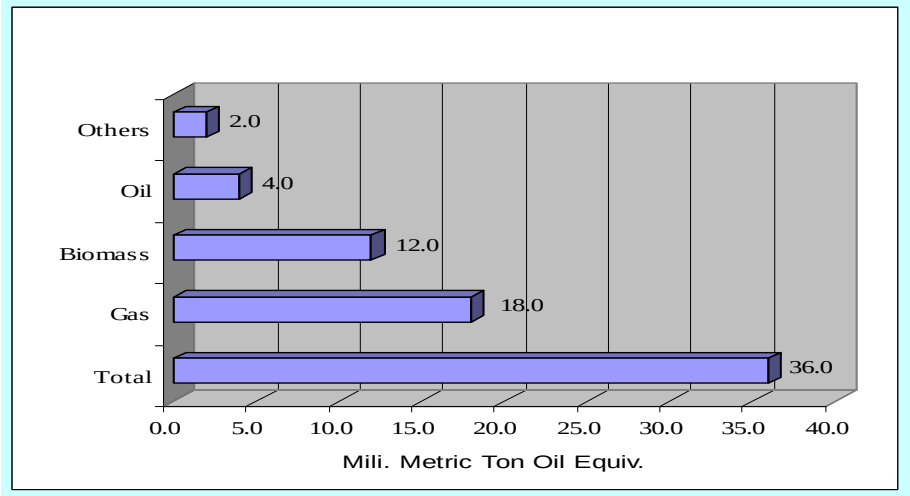
Energy Sector

8.0 In recent times, establishment of important physical infrastructures, setting up of new power plants and the pace of industrialization in the country has slowed down due to energy supply shortage. The sluggish industrialization which has hindered development activities is apprehended to create a negative impact on employment and consequently on the people's livelihood. This dismal state of energy sector has resulted from lack of initiatives and insufficient investment in the sector during the past years. Realizing the necessity for its improvement, the present government has indicated energy sector as a priority sector.

9.0 Current Position of Energy Sector

9.1 At present, Bangladesh has energy supply from both renewable and non-renewable sources, 38 percent of which comes from biomass. However, 75 percent of commercial energy is provided from natural gas. Currently, gas production per day is 2000 MMCF in our country. Use of imported oil accounts for the lion's share of the rest of the energy requirement. Our annual requirement of fuel is approximately 3.7 million metric ton. Apart from natural gas and crude oil, coal is mainly used as fuel in the brick-fields and at the Boropukuria Thermal Power Plant. Moreover, power is also being generated by using solar home system in off grid areas. In addition there are some poultry and dairy farms in which bio-gas plants are being set up and with this energy, power can be generated and is also used for cooking. The amount of power generation from such plants is currently about 1 MW. Steps have been taken to generate electricity by Bio-Mass Gasification Method in the country. We also have a bright potential to produce electricity from wind and mini-hydro or wave-energy. Recently, solar power based irrigation pump has been used in a number of areas of the country. Its wide use will lessen the pressure on diesel and electricity.

Figure 8: Annual Energy Consumption (2009)



Source: Energy and Mineral Resources Division

9.2 Non-renewable energy

9.3 The proven reserve of natural gas which is the principal source of non-renewable energy of the country is gradually depleting. The supply of gas as a primary source of energy will be dried out soon if immediate steps are not taken for exploration of new gas fields and extraction therefrom. In the use of commercial energy, the notable ones include the following:

- Natural gas
- Oil from minerals and other sources
- Coal and coal like substance
- Compressed natural gas (CNG)
- Natural Gas Liquid (NGL)

9.4 Renewable Energy

9.5 In our country renewable energy such as biomass, solar power and wind power are being used since time immemorial. Especially in areas which are outside gas coverage, usage of biomass for cooking and solar power and wind for drying of different grains as well as clothes are known to all. However, we are still lagging far behind in the scientific use of such energy. Moreover, the use of renewable energy has become popular world wide in view of depleting reserve of non-renewable fossil fuel. Renewable energy is environment-friendly. At present, the different categories of renewable energy that are being used in limited ways in our country are as follows:

- Hydro-electricity
- Solar power generation using solar rays
- Wind-mill power generation using wind power
- Production of bio-gas using waste
- Electricity produced by Biomass Gasification Method using wood, rice husk, etc.

10.0 Natural Gas

10.1 Major Source of our primary energy is natural gas. It is considered as one of the driving forces of the economy of our country as three-fourths of the total commercial energy is provided by natural gas. As many as 23 gas fields have been discovered since 1955 when the first gas field was found in Sylhet. In the past, in order to export gas, different initiatives were taken by exaggerating the actual reserve of natural gas and being over-enthusiastic about exploration of new gas fields.

Meanwhile, exploration of new gas fields and extraction activities by the native organization, BAPEX slowed down. At the same time, the propaganda about exaggerated gas reserve created a delusion among the people and ultimately hindered economic use and conservation of the valuable resource.

10.2 Present Reserve and Production Levels of Natural Gas

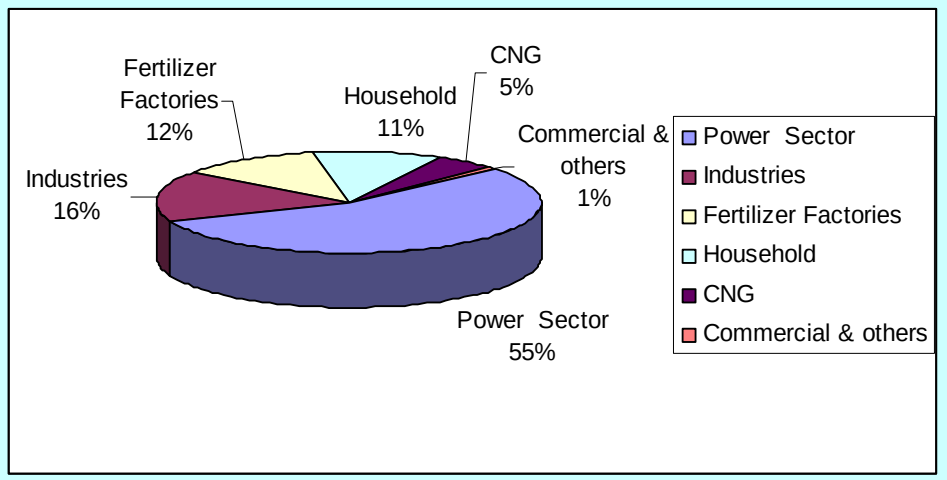
10.3 The existing natural gas is mainly used in electricity, fertilizer, industry, transport and housing sectors. The reserve and production situation of gas up to 2010 are as follows:

- Total number of gas fields- 23
- Number of gas fields which are in production- 17 (number of wells-79)
- Total reserve of extractable gas (proven and probable)- 20.5 TCF (Trillion Cubic Feet)
- Total consumption of gas up to April 2010- 8.5 TCF
- Total reserve remaining- 12 TCF
- Daily gas exploration- about 2000 MMCF (Million Cubic Feet)
- Production by Petrobangla- 960 MMCF
- Production by International Oil Companies- 1004 MMCF
- Daily demand of gas-2500+ MMCF
- Daily shortage of gas supply- 500+ MMCF
- Gas production increased from January 2009 to January 2010- 208 MMCF

10.4 Consumption and Demand of Natural Gas

10.5 Per capita consumption of energy in Bangladesh is on an average 160 kgoe (Kilogram Oil Equivalent) while it is 530 kgoe in India, 510 kgoe in Pakistan, 340 kgoe in Nepal and 470 kgoe in Sri Lanka. The average consumption in Asia is 640 kgoe. It is evident that per capita average consumption of energy in Bangladesh is significantly lower than the average of Asia. Even it is lower than those of South Asian countries. In recent times per capita energy consumption has been used as an indicator to determine the living standard and stage of development of a country.

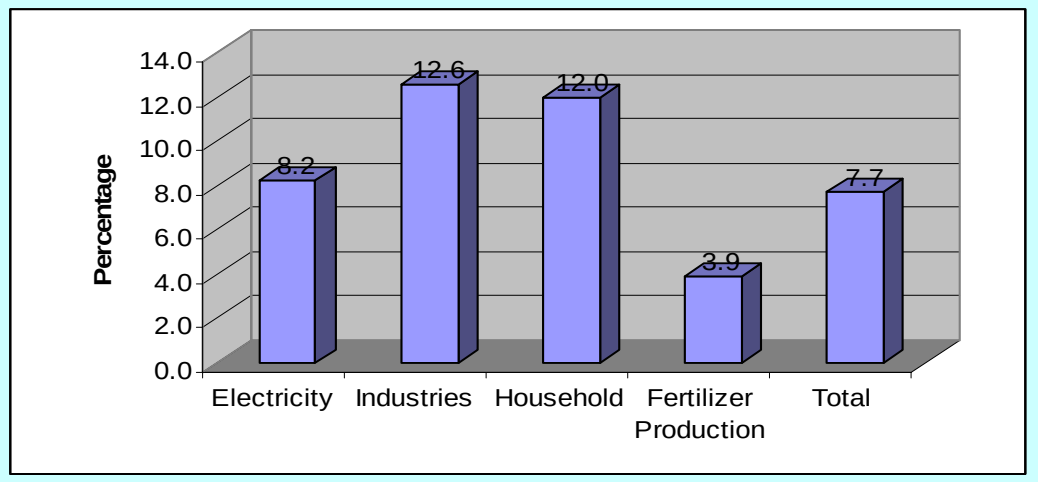
Figure 9: Current Sectoral use of Gas in percent



Source: Energy and Mineral Resources Division

10.6 From the above data it is evident that more than half of the gas is used for electricity generation. Sector wise annual average growth of use of gas as energy is shown in the figure below:

Figure 10: Sector wise annual average growth rate of use of gas in the country from 1991-2007



Source: Energy and Mineral Resources Division

10.7 Considering the average rate of consumption of gas in the country of the last 17 years and in line with Vision 2021, to implement the target of producing 11500 MW new electricity by 2015, a projection has been done according to the sector wise annual demand of gas from 2009 to 2015. Projection for probable demand of gas up to 2015 is shown in the table below:

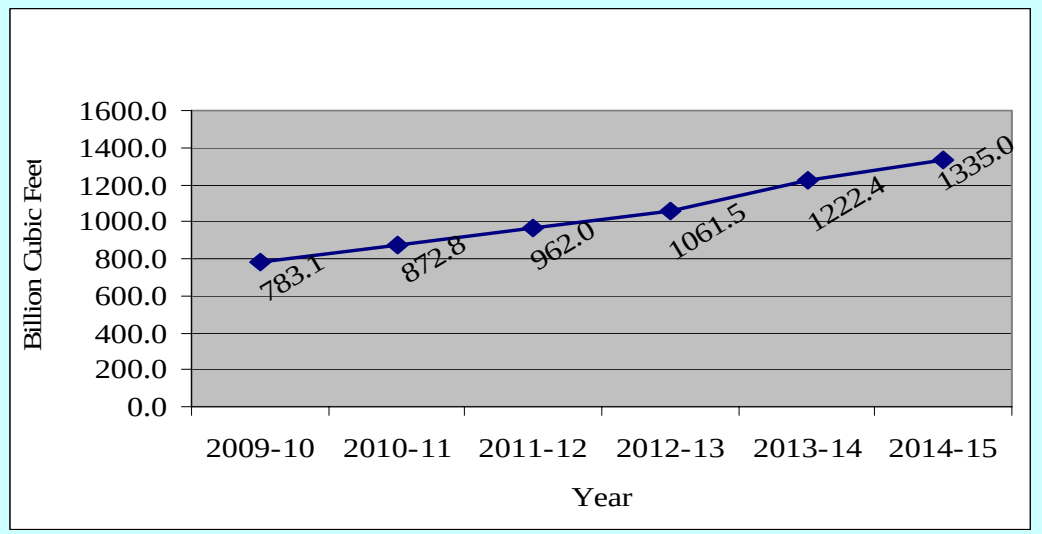
Table 13: A Conservative Estimates of Sectorwise Allocation of Gas

(In Billion cubic feet)

Sector	2009-10	2010-11	2011-12	2012-13	2013-14	20014-15
Power	278.2	300.5	324.5	50.5	378.5	415.8
Captive Power	120.9	142.6	164.0	188.6	216.9	238.6
Fertilizer	94.0	94.0	94.0	94.0	94.0	94.0
Industry	133.9	160.7	184.8	214.4	246.5	271.1
Household	88.9	99.5	111.4	124.8	139.8	153.8
CNG	37.2	44.7	51.4	56.5	113.0	124.3
Others	30.0	30.8	31.9	32.7	33.7	37.4
Total	**783.1**	**872.8**	**962.0**	**1061.5**	**1222.4**	**1335.0**

Source: Energy and Mineral Resources Division

Figure 11: A Conservative Aggregate Supply of Gas (2009-10 to 2014-15)



Source: Energy and Mineral Resources Division

10.8 Supply of Gas and its shortage

10.9 At present, from 79 wells of the existing 17 gas fields, only 730 BCF (Billion Cubic Feet) gas is being supplied against the average annual demand of 912 BCF. As a result, there exists a shortage of 182 BCF of gas annually. According to the projections mentioned in the table, in 2014-15, total annual demand for gas will stand at 1335.0 BCF. If the present supply of 2.0 BCF per day remains unchanged then daily shortage may stand at 1.66 BCF on the basis of the projected demand. Hence, it

is not possible to meet this shortage with the existing reserves. If the reserve capacity does not enhance according to the estimation of the Gas Sector Master Plan, then after 2011 there would be huge difference between demand and supply and the present reserve may decrease to a greater extent by 2015.

10.10 Investment in Gas Sector

10.11 For overcoming the existing as well as projected shortage of gas supply for the later years, discovering new gas fields and enhance gas reserve by re-assessing the present reserve of the existing gas fields is the best approach. In addition to these, attempts should be taken for increasing the supply by drilling good number of wells. However, implementing these initiatives needs huge investment and a high level of technical, technological and professional expertise. Exploring and discovering oil and gas is a capital intensive and risky investment. It can be seen from various reports that for discovering a gas field, it needs an investment of about Taka 700 crore, whereas the rate of success is only 20-25 percent. So, although gas fields may exist in developing countries, it is not possible for them to invest such a huge amount for exploring and discovering those gas fields. An alternative to this may be involving the private sector especially the International Oil Companies (IOC) which are financially, technically and technologically very sound. In this case, national interests should be ensured while production sharing agreements are signed for the development of energy sector including gas.

10.12 Action Plan for the Development of Natural Gas Sector

10.13 Government has identified the Power and energy sector as the top priority sector with the aim of ensuring long term energy security of the country. In this regard, Government is determined to overcome the critical situation prevailing in the gas sector to ensure the availability of energy. Salient features of the planned policy strategy of government in overcoming the energy shortage are as follows:

Policy Strategy

- Adoption of time based action plan for discovering new gas fields
- Make BAPEX more effective in exploring oil and gas
- Speedy processing of tenders and signing agreements for offshore blocks
- Approval for importing liquefied natural gas by private sector as an alternative to natural gas and building necessary infrastructure
- Reduce the supply of natural gas to those sectors where alternative energy can be used and encourage them for using alternative energy
- Finalizing National Energy Policy and Coal policy to create opportunity for using energy from multiple sources
- Increasing financial capacity of BAPEX by forming Gas Development Fund

10.14 Action plan for exploration and increased generation of Natural Gas

10.15 Present government assuming power has taken time befitting plan to explore, discover and improve new gas field and also for gas extraction and supply. The salient features of implementable and on going programs under short, medium and long-term plans are as follows:

10.16 Short Term Plan (to be completed by December 2010)

10.17 In order to increase gas exploration the following actions have been taken and are continuing according to plan. As a result it is expected that an additional 158 MMCF gas will be supplied to the national grid by December 2010. The gas field wise detailed description is given below:

Table 14: Short Term Plan to be completed by December 2010

Under Implementation by National Gas Companies						
Sl. No.	**Programme**	**Time Schedule**		**Increase in Production (MMCFD)**[20]	**Agency**	**Activity**
		Start	**Completion**			
1	Sylhet 7	December 09	January 10	8	SGFL[21]	Workover
2	Mehna 1	April 10	June 10	15	BGFCL[22]	Workover
3	Habiganj 11	April 10	June 10	20		Workover
4	Titas 12	May 10	June 10	20		Workover
5	Semutang 1, 5	August 10	December 10	15	BAPEX[23]	Workover
6	Sundapur 1	August 10	October 10	15		Exploration
7	Fenchuganj 4	July 10	October 10	20		Appraisal Well
8	Shalda 3	August 10	November 10	15		Appraisal Well
9	Sangu (South)		December 10	30	CAIRN	Exploration/ Development
			Total	**158**		

Source: Energy and Mineral Resources Division

10.18 Actions taken

10.19 Actions have been taken to increase 78 million cubic feet gas in total by rehabilitation (work over) of five wells and 35 million cubic feet by digging two evaluation/development wells at Shalda River and Fenchuganj gas fields. Moreover actions have been taken to explore 15 million cubic feet gas daily from one exploration well at Sundalpur in Noakhali District. In addition to that, 30 MMCFD gas may be produced from exploration/ development well in southern part of Sangu gas field.

[20] Million Cubic Feet Per Day
[21] Sylhet Gas Field Limited
[22] Bangladesh Gas Field Company Limited
[23] Bangladesh Petroleum Exploration Company

10.20 Medium Term Plan (to be completed by June 2013)

10.21 Necessary actions have been taken to import LNG and supply it to the national grid by converting into gas. Actions have been taken to dig 17 exploration and development wells under the medium term plan. By implementing this programme, it will be possible to supply an additional 585 MMCF gas daily to the national grid by 2013.

10.22 Due to the shortage of gas, supply of gas to some power plants and fertilizer factories had to be temporarily stopped. As a result the production of electricity and fertilizer was interrupted severely. Consequently the pace of economic growth became slower. To combat the issue LNG import can be a viable option. A plan has been taken to supply at least 500 million cubic feet additional gas to the national grid by 2012. In this process it will be possible to supply 1085 million cubic feet gas to the national grid by 2013. The detailed description is given bellow:

Table 15: Medium Term Plan to be completed by June 2013

Sl. No.	Programme	Completion	Increase in Production (MMCFD)[24]	Agency	Activity	Remarks
A) Under Implementation by National Gas Companies (by 2011)						
1	Kapashia 1	March11	15	BAPEX[25]	Exploration	-
2	Shrikail 2	February 11	15		Exploration	
3	Mobarakpur 1	September 11	15		Exploration	
4	Shalda 4	March 11	15		Development well	
5	Fenchuganj 5	August 11	20		Development well	
6	Titas 17	June 11	25	BGFCL[26]	Development well	
7	Titas 18	November 11	25		Development well	
Total (A)			**130**			
B) Under Implementation by International Gas Companies (by 2011-13)						
1	Moulavibazar	2011-12	100	Chevron	3 Development Wells	Subject to Evaluation
2	Kajal	-	-	Chevron		Excavation of Exploration Well
3	Bibiyana	2013	200	Chevron	Development well	
4	Magnama		-	Cairn		Excavation of Exploration Well
Total (B)			**300**			

[24] Million Cubic Feet Per Day
[25] Bangladesh Petroleum Exploration Company
[26] Bangladesh Gas Field Company Limited

continued

Sl. No.	Programme	Completion	Increase in Production (MMCFD)[27]	Agency	Activity	Remarks
C) Under Implementation by National Gas Companies (by 2012)						
1	Bakhrabad 9	January-April 12	20	BGFCL[28]	Development Wells	
D) Under Implementation by National Gas Companies following Fast Track Method (2010-12)						
1	Titas 19, 20, 21, 22	January 10 – June 12	100	BGFCL	Excavation of Development Wells	
2	Rashidpur 8	January 10 –June 12	20	SGFCL[29]	Excavation of Development Wells	
3	Rashidpur 5	January 10 – June 12	15		Workover	
Total(D)			**135**			
E) LNG Import (2010-12)						
1	LNG	2012	500			
Grand Total (A+B+C+D+E)			**1085**			

Source: Energy and Mineral Resources Division

10.23 Actions taken

10.24 National Gas Company

10.25 Actions have been taken to supply 105 MMCF gas to the national grid by drilling 5 appraisal/development wells at Shalda River, Titas, Fenchugonj and Bakhrabad gas fields. The sites have been selected for drilling exploration wells by seismic survey and data analysis at Kapasia, Srikail and Mobarakpur. The target has been fixed up to explore 45 MMCF gas daily from these three exploration wells. More over considering the increasing demand of gas, Fast Track Programme has been taken to explore gas on emergency basis. Under the programme target has been fixed up to supply 135 MMCF gas daily to the national grid by drilling one development well in Titas and Rashidpur Gas fields respectively and drilling one appraisal well in Rashidpur gas field. Under the same programme actions have been taken to identify the site for digging new development wells by data collection, processing and analysis by 2-D seismic survey of 3100 line kilo metre. If the exploration programme becomes successful it is expected that the reserve of gas will be increased in one hand, and by drilling new wells the production of gas will be increased in future on the other.

[27] Million Cubic Feet Per Day
[28] Bangladesh Gas Field Company Limited
[29] Sylhet Gas Field Limited

10.26 International Oil Company

10.27 Target has been set to supply 100 MMCF of gas to the national grid daily through drilling of 3 development wells by Chevron in Moulvibazar gas field (Block 14) under PSC. Besides, initiatives have been undertaken for drilling of exploratory wells by Cairn at Magnama is Block 16 and by Chevron at Kajol in Block-7 under shallow sea areas. More gas will be produced if the initiative of drilling of exploratory wells becomes successful.

10.28 Long Term Plan (to be completed by December 2015)

10.29 In the long term plan, through drilling and development of exploratory wells an additional gas production of 180 MMCFD by local companies and 900 MMCFD by international oil companies (total 1080 MMCFD) will be added to the national grid by December 2015.

Table 16: Long Term Plan to be completed by December 2015

Sl. No.	Programme	Completion	Increase in Production (MMCFD)[30]	Agency	Activity	Remarks
A) Under Implementation by National Gas Companies						
১	Titas Well 23, 24, 25 I 26	To be completed by 2015	100	BGFCL[31]	Appraisal well	
২	Excavation of 5 Wells in Sylhet, Koilashtila and Rashidpur Fields	To be completed by 2015	80	SGFL[32]	Appraisal well	
Total(A)			**180**			
B) Under Implementation by International Gas Companies						
১	Moulavibazar	To be completed by 2015	200	Chevron	3 Appraisal wells	Subject to Assessment
২	Bibiana	To be completed by 2015	250		3 Development Well	Subject to Assessment
৩	Jalalabad	To be completed by 2015	250		3 Development Wells	On the basis of the 3 Sismic Survey Result
৪	Offshore Building Round 2008	To be completed by 2015	200			
Total (A)			**900**			
Grand Total (A+B)			**1080**			

Source: Energy and Mineral Resouces Division

[30] Million Cubic Feet Per Day
[31] Bangladesh Gas Field Company Limited
[32] Sylhet Gas Field Limited

10.30 Actions taken

10.31 National Gas Company

10.32 Initiatives have been undertaken to supply 180 MMCFD gas to the national grid through drilling of 9 development wells of which 5 are in Sylhet, Kailastilla and Rashidpur gas field, and 4 in Titas gas field.

10.33 International Oil Company

10.34 Target has been set to supply 700 MMCF gas to the national grid daily through drilling of 12 development wells in Bibiyana, Jalalabad and Moulvibazar gas fields in Block 12, 13 and 14 under PSC. Besides, after evaluation of proposals received through offshore bidding round-2008, signing of agreement with 2 companies for 3 blocks is under process. Subject to signing of production sharing contract (PSC), a target has been set to produce 200 MMCF gas daily through exploratory activities. If the initiatives of drilling exploratory wells by Cairn at Magnama in block 16 and by Chevron at Kajol in block 7 under shallow sea areas become successful more similar ventures will be made to produce more gas.

- **Target has been fixed up to increase supply of 2323 MMCFD gas to national grid of which 1823 MMCFD will come from the additional production under the short, medium and long term plan and 500 MMCF through importing LNG (July 2009- December 2015)**

10.35 Steps to be taken for increasing the supply of Natural Gas

10.36 Through the implementation of aforesaid plan, although it is possible to add additional estimated gas to National Grid, it will not be possible to fulfill the gas demand in full. In that case, in order to increase the supply of Natural Gas together with the short, medium and long term plans of the government, the following steps are necessary to be taken:

- Ensure fund provision as per plan.
- Make quick arrangement for the bidding procedure of the blocks located at offshore
- Purchase higher quality machineries of advance technology and technicalities as well as build up efficient manpower within short period to strengthen BAPEX.
- Ensure the drilling and development of well as per plan through the uninterrupted work procedure and effective monitoring of the international oil companies.
- Quick accomplishment of demarcation of maritime boundary with India and Myanmar for bidding the blocks located at deep sea area.

11.0 Import of Liquified Natural Gas

11.1 Acuteness of the gas supply shortage can be mitigated through importing LNG by the next one and half or two years. Steps needed to be taken in this case are as follows:

Steps to be taken

- Providing opportunity to the private sector to import LNG.
- Along with other necessary facilities, at least the infrastructure of two terminals of 500 MMCFD has to be built up to receive the imported liquid gas from the ship.
- Involving the private Sector with planning of import LNG and establishment of the terminals.

12.0 Coal

12.1 The diversification of sources of energy has created ample opportunity for our coal. By establishing power plant based on coal and using it in the industries as a source of energy we can ensure the proper use of extracted coal. It is notable that the coal of Bangladesh is considered to be high quality due to its high level of hit generation capacity.

12.2 Coal: Reserve and Usage

12.3 High quality Bituminous coal mines have been discovered at Khalashpur of Rangpur, at Boropukuria, Fhulbaria, Dighipara of Dinajpur and at Jamalganj of Bogra in the north-western zone of the country. The total reserve is around 2797 MT of this 5 coal mines and the hit generation capacity is equivalent to 37 TCF of gas approximately. If initiatives are taken for exploration all over the country, there is enough possibilities to discover more coal mines. The coal reserves of existing 5 coal mines are shown in the table below:

Table 17: Coal Reserves of Five Coal Mines

Sl.	Exploration Year of location	Depth (Meter)	Magnitude of mine area (Sq. km.)	Actual Reserve (Million Ton)
1	Boropukuria, Dinajpur (1985)	119-506	6.88	390
2	Khalashpur , Rangpur (1995)	257-483	12.0	143 (GSB)[33], 685 (Hosaf)
3	Fhulbaria, Dinajpur (1997)	150-240	30.0	572
4	Jamalganj, Bogura (1965)	900-100	16.0	1050
5	Dighipara, Dinajpur(1995)	327	Not Available	200 (Partial Evaluation)

Source: Energy and Mineral Resources Division

[33] Geological Survey of Bangladesh

12.4 Among the 5 coal mines, Boropukuria coal mine in Dinajpur has started commercial production by using underground mining method from September, 2005 with the annual target of 10 lac MT of coal extraction. A 250 MW power plant has been running by using the extracted coal of Boropukuria through which power is being supplied to the National Grid. 7 lac MT coal, extracted from Boropukuria coal mine, is being used daily in this power plant.

12.5 Steps to be taken for removing the problem of Coal Sector

12.6 Although there are enough reserves of coal in the country, there remains anxiety for the extraction methods and the technological security. At the same time, there are also expert opinions regarding the quick solution of energy problem through the importation of coal. To turn down this situation, Government's activities are as follows:

- Quick finalization of coal policy.
- Formation of coal extraction plan consistent with the demand of the country.
- Build up the mass awareness and mass involvement regarding the extraction procedure of coal especially for the open extraction method.
- If the coal extraction by open method from a coal mine is economically viable, a plan has to be prepared about the rehabilitation of the people of that area and ensure their livelihood, preserve the environment and infrastructure as well.
- Clarify the government position regarding coal import.

13.0 Nuclear Energy

13.1 Since 1960s, a plan has been taken to establish a nuclear power plant in the country. But no effective action had taken in the last 50 years except land selection and acquisition for the nuclear power plant. Present Government, with the technical assistance of Russia, has made effective arrangement to establish a nuclear power plant with a capacity of 1000 MW in the pre-determined location at Rooppur. In this respect, Bangladesh government has signed a framework agreement with the Russian National Nuclear Institute. It is expected that the country will be able to enter into nuclear age through the establishment of nuclear power plant by 2016.

13.2 Challenges of Nuclear Energy Sector

13.3 In order to remove energy deficit and build up energy security in the country, the probable challenges are:

- Necessary fund provision.
- Ensure safety of the population and environment.
- Build up the trained and efficient manpower in order to administer and maintain the nuclear plant.
- Build up awareness among general people regarding the risk and prevention of nuclear power centre.

14.0 Production, Usage and Promotion of Renewable energy and Energy Saving Activities

14.1 In order to reduce the reliance on natural gas and import-dependent oil the government has taken a number of steps to spread and develop environment-friendly, renewable energy.

14.2 Benefits to use renewable energy are as follows:

- Supply of raw materials for power generation is infinite
- Management cost is minimum though initial investment is comparatively high
- Technology used is easy and portable
- People living separately in places away from the main land can have access to power and energy facilities
- Future energy security is ensured
- Environment Friendly
- To ensure future energy security

14.3 Actions taken up on priority basis for implementation of energy saving programmes are as follows:

- Formation of Sustainable Energy Development Authority
- Preparation of Energy Conservation Act
- Expansion and development of renewable energy
- Implementation of cost effective energy procedure
- Ensuring of efficient use of energy
- Standardization of energy saving electronic machineries

14.4 It is necessary to encourage the production and use of such energy from a source which is not harmful to environment in order to ensure safe energy supply along with habitable surroundings.

14.5 Steps taken to produce and extend use of renewable energy

- Setting up 14 thousand solar home system by REB
- Setting up a solar panel having capacity of 21.2 kilowatt for Prime Minister's Office
- Installation of around 5.30 lakh solar home system in rural areas with the aid of IDCOL (Infrastructure Development Company Limited) through NGOs
- Power generation by setting up wind-mill run power plants in coastal region of Kutubdia and Feni
- Establishing of a wind-mill run power plant of 100 MW(off-shore) capacity in Anowara of Chittagong and 4 solar power plants of 10-15 MW capacity (connected to grid)
- Actions are underway to implement pilot project as IPP to produce power from waste
- Setting up several solar panel factory by IDCOL

14.6 Public Efforts

14.7 In order to encourage people to use renewable energy, some of the significant steps taken by the Government are:

- The use of Solar Panel in all large public buildings to be mandatory within 3 years
- Solar Panel import made duty-free

15.0 Immediate steps to be taken

- Providing policy-strategic and financial support to wind-mill power generation
- Encouraging setting up of Bio-digester Plant
- Encouraging the establishing of solar panel producing industry
- Providing adequate investment in power sector enterprises
- Fixing maritime boundary with India and Myanmar
- Reducing the tendency of quick withdrawal of invested money of international oil companies under Production Sharing Contract (PSC)
- Determining rational price to ensure sustainable development of energy sector
- Developing and sustaining skilled professionals with knowledge on various sources of energy
- Finalizing of Coal Policy
- Expediting the import of LNG
- Expedite onshore bidding process

16.0 Conclusion

16.1 The target for achieving higher economic growth with power supply deficit has faded other achievements in infrastructural development of the country; therefore, private investors are not showing much interest in investments. Power is one of the significant raw materials for all sorts of industries starting from agricultural industries. Electrification is also necessary for increasing socio-economic activities in rural areas. In order to overcome the present power deficit situation, targets are fixed in the Outline Perspective Plan of Bangladesh. If we go ahead as planned, it will be possible for all citizens to have access to power within 2021. In addition, the use of coal for power generation will be enhanced through reducing the dependence on natural gas and contribution of renewable energy in electricity production will also be increased.

16.2 A six year plan up to 2016 has been adopted to improve power scarcity and provide excess power for future. Vision of increasing economic growth to 8 percent by 2014 and 10 percent by 2017 through industrialization will be a reality with the implementation of this plan. It will ultimately help to reduce poverty and achieve Millennium Development Goals by employment generation in the country.

16.3 It is true that there are some inbuilt uncertainties in the production plan for power or primary energy resources. Power plants are not installed as per schedule, there are inevitable delays. Transmission and distribution capacity does not always match power generation capacity. In producing primary energy resources such as, gas, all programmes are not successful, even development and workover of gas wells may fail. The success rate in exploration activity is unpredictable. Considering all these uncertainties, plan in this sector always needs to be ambitious. Following the theme, this action plan prepared by the Present Government is also ambitious. We will be successful in fulfilling the desire of the nation, InshAllah.