

CHAPTER 3: ENERGY DEVELOPMENT PLAN TO SUPPORT HIGHER GROWTH AND EMPLOYMENT

BACKGROUND AND STRATEGIC CONTEXT

The frequency of power and gas outages is threatening citizen welfare and development prospects. The annual loss to production and income from power outages could well exceed 0.5% of GDP per year. The availability of domestic primary fuel supply is getting so scarce that it is forcing severe measures like shutting down fertilizer factories, rationing gas supplies for household and transport uses, and keeping idle installed power units.

Every 1% of GDP growth is estimated to lead to a growth of 1.4% in electricity demand in a typical developing country. For a 5-6% typical annual economic growth rate, this would imply a need for close to 7-8% growth in electricity supply. Rural electrification ratio expanded rapidly since the early 1990s, growing from 10 percent in 1994 to 37% in 2008. Yet, this is still amongst the lowest in developing world. In the rural economy, low power connectivity is a serious constraint to non-farm sector growth. Against this demand pattern, unfortunately no substantial low-cost and reliable power generation capacity has been added since 2002.

Due to the severity of the power crisis, the Government has been forced to enter into contractual agreements for high-cost, temporary solutions, such as rental power and small IPPs, on an emergency basis, much of it diesel or liquid-fuel based. This has imposed tremendous fiscal pressure, as budgetary transfers are routinely made to the power sector in order to enable it to stay current on payments to power suppliers. The Government is aware that precious resources are being diverted to cover operating losses of the utility that arise from purchasing short-term high cost power which is not sustainable for the financial health of the sector in the long run. Therefore, the longer term strategy embedded in the Sixth Five Year Plan power sector plan is to use budgetary allocations to promote low-cost, sustainable expansion of power generation, transmission, and distribution capacity.

Also, there has been no new capacity addition to fuel sources for power generation. With a power sector that is almost totally dependent on natural-gas fired generation (89.22% of power comes from gas-fired generators), the country is confronting a simultaneous shortage of natural gas and electricity. Other fuels for generating low-cost, base-load energy, such as coal, liquid fuel, or a renewable resource like hydropower, are not readily available, and any policies put in place to access them are likely to have a 3-5 year lead time. Gas supply is dwindling, and the absence of obvious choices for alternative fuels implies that there are no readily identifiable and immediately available options for alternative, new generation sources to meet its base-load power requirements.

ENERGY STRATEGY IN THE SIXTH PLAN

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. On top of this low level of consumption, there is already a serious energy crisis.

Clearly, the situation calls for an urgent but well-crafted sustainable strategy to address the energy crisis and increase the energy supply to support Bangladesh's development. Accordingly, the Government has adopted a comprehensive energy development strategy³. The strategy provides a balanced approach that looks at both supply increases and demand management aspects of the energy market. Energy options from domestic sources needs to be complemented with possible options for energy trade. Specifically, the strategy will address what the government can do about gas and power, and will look at options for diversification of fuels for generation. The strategy will also explore alternative solutions such as increased electricity imports from neighboring countries and LNG trade. Furthermore exploration of domestically available resources, such as coal and oil and gas from offshore drilling will be intensified. The supply side options will be balanced with policies for demand management that conserve energy and discourage inefficient use of electricity.

When the present Government assumed office, the power generation was 3525 MW which has now been increased to 4699 MW (as of June 2011). The production capacity will be enhanced to 11457 MW by 2015 and it requires USD 15 billion investment out of which USD 10 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 substantial. On the other hand, consumer's economic consideration is given priority over commercial interests in price setting of electricity, gas and other fuel oil. However, estimation and reevaluation of power and other energy prices is required in order to involve the private sector.

A part of the reason for the past lack of investment in power is poor pricing policies that kept the publicly owned electricity industry in constant deficit and kept away private investment. It also caused poor maintenance practices, resulting in power losses and frequent breakdowns. Other constraints that have contributed to power crisis include difficult sector governance and inefficient management.

³ Power Sector Future Rolling Plan (draft), Power Division, MOEMR; Sixth Five Year Plan 2011-2015, Energy and Mineral Resources Division, MOEMR.

The international evidence including from Bangladesh is clear that electricity should be treated as a private good and its price must reflect its cost of production and a fair return on investment. This will both ensure that there is efficient use of electricity and the industry generates enough surpluses for re-investment. Social objectives like reaching out to the poor and rural community could be achieved through cross-subsidization as well as explicit budget subsidies. As a result of past reforms, private sector participation in electricity generation has increased; the sector governance has also improved in a number of areas including bill collection and corporatization. However progress on proper pricing of electricity is still inadequate. A key policy reform for the Sixth Plan is to ensure proper pricing of power based on a review of good international practices. The possibility of establishing private electricity distribution companies will also be explored.

Energy trade including electricity trade with neighbors has tremendous potential for unlocking Bangladesh's long-term energy constraints in a cost-effective manner. South Asia's North East Sub-region has tremendous untapped hydro-power potential (See Table 3.1). Through proper grid connectivity and transmission lines, the scope for power trade to relieve Bangladesh energy constraint is tremendous. It is very encouraging that a head start has already been made to initiate power trade with India. In the short-to medium term 250 MW of power flow through Bheramara-Bahrapur grid connectivity is envisaged. Over the longer-term, this could move up to 1000MW of power imports. Importantly, grid connectivity with India opens up possibility for power trade with Nepal and Bhutan. Additionally, opening up of power trade will facilitate new investments from India's private sector into Bangladesh for power as well as primary fuel.

Table 3.1: Hydro-Power Potential in Northeast South Asian Countries

Country	Hydropower potential (MW)	Installed Capacity (MW)	Utilization (%)
Bangladesh	1897	230	12.1
Bhutan	30,000	432	1.4
India	148,701	25,587	17.2
Nepal	42,130	527	1.2
Total	209,008	26,776	12.8

Source: SAREI, USAID

Given the acute shortage of primary energy, the Plan will put special emphasis on its development. In addition to trade with neighbors discussed above efforts will be made to exploit all possible sources of primary and renewable energy (hydro-power, gas, coal and solar energy). This will be pursued in some combination of public investment, PPP, and pure private investment. Proper pricing of primary energy will be critical to attract foreign private investment as well as to ensure efficient use of scarce primary fuel. Social needs for primary fuel will be balanced through cross-subsidies and budgetary transfers with a view to reconciling incentives for private investment and efficient use with social need for ensuring access for the poor.

Key Elements of the Energy Strategy in the Sixth Plan

Against the backdrop of the above broad strategy, the key specific issues, objectives, options and strategies of the energy sector that will be addressed in the Sixth Plan can be summarized as follows.

Issues

- Inadequacy of supply of electricity compared to demand.
- Outdated generation, transmission and distribution system of electricity.
- Need for rationalization of energy and power prices.
- Insufficient maintenance funds.
- Large dependence on single source of energy for electricity generation i.e. gas.
- Minimum participation of private sector in electricity generation.
- Inefficient transmission and distribution lines
- Inefficient management in electricity generation, transmission, distribution and sale.
- Insufficient exploration activities for oil and gas both onshore and offshore.
- Insufficient exploration activities for coal and other minerals in the country.
- Need for decision on coal extraction method.
- Insufficient refining as well as storage capacity of liquid fuel.
- Limited use of renewable energy.
- Inadequate public and private investment both in electricity generation as well as in oil and gas sector.
- Use of PPP model to plug or significantly reduce resource gap.
- Inadequate primary energy supply chain.
- Lack of public awareness.

Core Objectives

- To ensure energy security.
- To make the power sector financially viable.
- To increase generation capacity of electricity.
- To introduce a new corporate culture in the power sector entities.
- To improve the reliability and quality of electricity supply.
- To increase the efficiency of energy use as well as reducing system loss.
- To diversify fuel use in power generation i.e. coal, liquid fuel, etc.
- To make the power sector more efficient in terms of generation, transmission and distribution.
- To increase private sector participation in the form of public-private (national) – private (international)/private (national/international) to mobilize resources in electricity, gas and other energy supply.

- To reduce demand-supply gap both in primary (fossil fuel) and secondary (electricity) sector.
- To conserve both power and energy.
- To intensify exploration activities both in onshore and offshore area to find new oil and gas fields.
- To introduce ‘Energy Manager’ in energy consuming industries and ‘energy auditing system’ with a view to optimizing energy use.
- To introduce labeling system with a view to ensuring the use of energy efficient equipment.
- To appraise the producing gas fields.
- To raise price of gas, liquid fuel and electricity step by step compatible with international price.
- To encourage energy trade including energy cooperation with neighbors
- To develop facilities to enable import of LNG.
- To develop coal fields thereby reducing dependency on natural gas.
- To finalize the coal policy.
- To finalize the coal extraction plan.
- To intensify exploration activities for coal and other minerals especially in the north-western part of the country.
- To increase use of renewable energy by 5% of electricity demand by the Plan period.
- To consider gender dimension in policies, programs/projects in the energy sector.

Energy Options

- Establish Coal-based power plants using domestic and imported coal;
- Installation of Nuclear Power Plant at Rooppur;
- Finding new oil and gas fields in both offshore and onshore through extensive exploration;
- Huge investment in projects in electricity generation and transmission as well as in oil and gas exploration through Public-Private Partnership Projects;
- Participation of local investors in the power sector;
- Import of LNG;
- Engage in energy trade including grid connectivity for power with neighbors
- Development of coal fields;
- Increase refining as well as storage capacity of liquid fuel;
- Develop renewable energy sources.

Specific Strategies

- Increase of power generation to reduce demand-supply gap through public-private partnerships and through power imports from neighbors.

- Energy savings through demand side management i.e. shop closing times, staggering holiday in industries and shopping complex, replacing ‘incandescent lamp’ by CFL and reducing ‘air conditioning’ load;
- Diversification of fuel use in electricity generation i.e. coal, liquid fuel, etc as well as utilization of natural gas to produce fertilizer;
- Provision for dual fuel in electricity generation wherever possible;
- Mobilization of funds for electricity generation projects through private sector participation in the form of public-private/private (national)– private (international)/private (national/international);
- Provision for cheap imports of machineries for power plants as per the Industrial Policy 2010
- Provision for fiscal incentives for setting up new power plants as per the Industrial Policy 2010
- Provision for incentives for FDI into the power sector as per the Industrial Policy 2010
- Reform energy sector to reduce cost and improve service delivery;
- Adjust prices of electricity, gas and liquid fuel step by step to make them compatible with international prices;
- Reducing system loss.
- Intensification of exploration activities for finding new oil, gas and coal fields;
- Import of LNG to supplement the own natural gas resources;
- Development of coal mines;
- Finalize coal policy;
- Finalize coal extraction plan;
- Installation of Nuclear fuel based Power Plant;
- Install solar panel in public and private buildings where applicable in view of harnessing solar energy;
- Increase use of renewable energy by 5% of electricity demand by the Plan period.
- Building public awareness through publicity in electronic and print media and introduce this issue in the Curriculum.
- Encourage women participation in the energy sector

POWER SECTOR

Shortage of Electricity

The issue of shortage of electricity is manifested in two ways. Firstly, reviewing per capita electricity consumption and percentage of population having access to electricity in Bangladesh, compared to other countries and secondly, determining the gap between demand and supply of electricity in the context of the current economic situation and GDP growth.

Per Capita Electricity Consumption

Bangladesh's per capita electricity consumption is only 170 Kwh in FY10. Per capita electricity consumption of electricity in Bangladesh is much lower than the BRICS countries (Brazil, Russia, India, China, and South Africa) as well as that in Pakistan and Sri Lanka (Table 3.2).

Table 3.2: Per Capita Electricity Consumption 2009 (Kwh)

Country	Per Capita Electricity Consumption (Kwh)
Bangladesh	170*
Brazil	2023.76
India	443.54
Nepal	79.68
Pakistan	388.10
Sri Lanka	388.09
Vietnam	552.85
Indonesia	504.43
China	2443.57

Source: CIA World Factbook, 2009

*Bangladesh's consumption data is of FY2010

Access to Electricity

Only 47 percent of the total population has access to electricity. At present, (FY10), the mileage of transmission and distribution lines are 8,500 circuit kilometer and 2,70,000 route kilometers respectively. Besides the urban areas, some 53,837 villages have been brought under electricity coverage.

Demand-Supply Gap for Electricity

One of the aspects to the demand for electricity in Bangladesh is the rise in the intensity of electricity use with the pace of economic development. In 1980, electricity demand was 30 Gigawatt (GW) per 1000 crore taka of GDP, which increased into 80 GW in 2002. Based on current income elasticity, with an average economic growth of 6 percent the capacity for electricity generation would need to double every six years.

In view of the low base, it is hardly surprising that the demand for electricity is increasing rapidly with the improvement of living standard, increase of agricultural production, development of industries as well as overall development of the country. Due to the failure in the last few years to increase electricity generation capacity proportionately to the demand, a serious supply shortage has emerged. Presently, the shortage is estimated between 1500-1800 Megawatts (Table 3.3). Especially, a huge shortage exists during the evening peak demand. Additionally, due to the crisis of gas supply and lack of necessary maintenance and

Table 3.3: Present Power Generation Capacity in Bangladesh (FY10)

Installed Capacity	5823 MW
Generation Capacity	5271 MW
Available Generation	4000-4600 MW
Highest Generation	4606 MW
Electricity Demand (Peak Demand)	6000 MW
Access to Electricity	47%
Per capita electricity Generation	220 KWh
Per capita electricity Consumption	170 KWh

Source: Power Development Board

rehabilitation of old power plants, it is not possible to utilize the total installed capacity. Consequently, the shortage of electricity reaches 1800 Megawatts during the peak demand (5800 MW) of summer causing huge load-shedding.

Sources of Electricity Supply

Electricity supply in Bangladesh comes from both public and private sources. The Bangladesh Power Development Board (BPDB), Ashuganj Power Station Company Limited (APSCCL) and 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 Power, 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. Data on electricity generation from public and private sector is given in the following Table 3.4. At present nearly 61 percent of total electricity is produced from public entities. BPDB alone accounts for 46 percent of total electricity production.

Table 3.4: Electricity Generation Capacity by Public and Private Sectors (FY2010)

Sectors	Public			Private			
	BPDB	APSCCL	EGCB	SIPP	SIPP (BPDB)	SIPP (REB)	Rental
Generation Capacity (MW)	2470	606	150	1271	99	226	449
Total (MW)	3226			2045			

Source: Bangladesh Power Development Board

Use of Different Types of Energy

Natural Gas is used as primary energy in most of the existing power plants (Table 3.5). Some 89 percent 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 2.5 percent of total electricity is produced from Karnaphuli Hydro Power Plant. Due to the increase in the use of gas in fertilizer, industries, factories and other sectors it is not possible to supply adequate quantity of gas for electricity generation. The shortage of gas is therefore a

serious constraint on the supply of electricity. The diversification of primary energy sources away from gas to other alternatives including hydro, coal, oil, solar and nuclear energies is essential for Bangladesh’s power and energy security.

Table 3.5: Primary Energy Use in Power Generation

Primary Energy Type	Percentage of Use
Furnace Oil	3.00
Diesel	1.77
Hydro	2.49
Coal	3.52
Gas	89.22

Source: Bangladesh Power Development Board

Electricity Generation Program in the Sixth Plan Period

The power generation targets for the SFYP emerge from the targets of the Perspective Plan. The Perspective Plan of Bangladesh (2010-2021) calls for “Power for All” by 2021. The associated power generation targets for the SFYP are given below:

- Total Electricity Generation in the country by 2011: 7,349 MW
- Total Electricity Generation in the country by 2013: 11,959 MW
- Total Electricity Generation in the country by 2015: 15,457 MW

Strategy for Power Generation

The power and basic energy needs of Bangladesh are huge. They will require huge investments that will well exceed the ability of the public sector. On the other hand there are plenty of untapped resources in the domestic and foreign private sector for financing power investments in Bangladesh. Accordingly, 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 concerns, the Independent Power Producer (IPP) policy was 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.

Under the yearly power generation plan, Government has taken initiatives to produce 2166 MW by FY11, 1178 MW by FY12, 3176 MW by FY13, 2333 MW by FY14 and 2410 MW by FY15.

Time Bound Power Generation Program

The time bound work plans for power generation are as follows:

Immediate

Under the immediate plan, Quick Rental Power Plants will be installed using liquid fuels/gas and capable to produce electricity within 4-12 months. Total 1753 MW is planned to be generated from rental and quick rental power plants out of which 410 MW has already been commissioned. Another 1343 MW power plants is expected to be commissioned by June, 2011 (Table 3.6).

Table 3.6: List of Projects that will be implemented by 2011

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
	PUBLIC SECTOR				
1	Shikalbaha 150 MW	150	BPDB	Gas	18.08.10
2	Siddhirganj 2X120 MW Peaking Power Plant (2 nd unit)	105	EGCB	Gas	14.10.10
3	Fenchuganj 90 MW CAPP	105	BPDB	Gas	June, 2011
4	Ashuganj 50 MW Power Plant	53	APSCCL	Gas	April, 2011
	Sub-Total (Public)	413			
	PRIVATE SECTOR (Rental & Quick Rental)				
1	Thakurgaon 50 MW Rental	50	Rental (BPDB)	HSD	02.08.10
2	Ghorasal 3 Years Quick Rental	45	Rental (BPDB)	HSD	10.08.10
3	Ghorasal 3 Years Quick Rental	100	Rental (BPDB)	HSD	23.08.10
4	Khulna 3 Years Quick Rental	55	Rental (BPDB)	HSD	10.08.10
5	Pagla 3 Years Quick Rental	50	Rental (BPDB)	HSD	24.11.10
6	Bheramara 110 MW Rental	110	Rental (BPDB)	HSD	31.12.10
7	Siddhirganj Sponsor: Desh Energy	100	Rental (BPDB)	Diesel	-
8	Meghnagat, Sponsor: HPGL	100	Rental (BPDB)	FO	March, 2011
9	Noapara, Jessore, 5 Years Rental	105	Rental (BPDB)	FO	March, 2011
10	Ghorasal Sponsor: Max Power	78	Rental (BPDB)	Gas	March, 2011
11	B.Barua Sponsor: Aggreko	70	Rental (BPDB)	Gas	-
	Ashugonj Sponsor: Aggreko	80	Rental (BPDB)	Gas	April, 2011
12	Modanganj Sponsor: Summit Power	102	Rental (BPDB)	FO	April, 2011

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
13	Meghnagat Sponsor: IEL	100	Rental (BPDB)	FO	April, 2011
14	Khulna Sponsor: KPCL	115	Rental (BPDB)	FO	April, 2011
15	Keranigonj Sponsor: Power Pack	100	Rental (BPDB)	FO	April, 2011
16	Ashugonj Sponsor: United Ashugonj Power Ltd.	53	Rental (BPDB)	Gas	April, 2011
17	Nowapara Sponsor:KhanJahan Ali	40	Rental (BPDB)	FO	May, 2011
18	Amnura, Chapainawabgonj Sponsor: Sinha Power	50	Rental (BPDB)	FO	May, 2011
19	Julda, Chittagong Sponsor: Acorn Infra. Service Ltd	100	Rental (BPDB)	FO	May, 2011
20	Siddirganj Sponsor: Dutch Bangla Power	100	Rental (BPDB)	FO	May, 2011
21	Katakhali,Rajshahi Sponsor: NPSL	50	Rental (BPDB)	FO	May, 2011
	Sub-Total (Private)	1753			
	Total (2011)	2166			

Source: Bangladesh Power Development Board

Short-Term

Under the short term plan, power stations that are liquid fuel based and implementable within 12 to 24 months will be installed. Works for setting up power stations with a generation capacity of 1106 under public sector has been started (Table 3.7).

Table 3.7: List of Projects that will be implemented by 2012

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
	PUBLIC SECTOR				
1	Siddhirganj 2X120 MW Peaking Power Plant(1 st unit) EPC: BHEL	105	EGCB	Gas	July, 2011
2	Faridpur 50 MW Peaking Power Plant (U/C)	54	BPDB	FO	October, 2011
3	Gopalganj 100 MW Peaking Power Plant (U/C)	109	BPDB	FO	October, 2011
4	Dohazari 100 MW Peaking Power Plant (U/C)	102	BPDB	Gas/ FO	November, 2011
5	Hathazari 100 MW Peaking Power Plant(U/C)	98	BPDB	Gas/ FO	November, 2011

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
6	Bera 70 MW Peaking Power Plant (U/C)	71	BPDB	FO	November, 2011
7	Doudkandi 50 MW Peaking Power Plant (U/C)	52	BPDB	Gas/ FO	November, 2011
8	Baghabari 50 MW Peaking Power Plant (U/C)	52	BPDB	FO	November, 2011
9	Gazipur 50MW Power Plant (U/C)	50	RPCL	Gas/ FO	December, 2011
10	Sylhet 150 MW CCPP (U/C)	150	BPDB	Gas	February, 2012
11	Katakhali 50 MW Peaking Power Plant	50	BPDB	FO/ Gas	April, 2012
12	Santahar 50 MW Peaking Power Plant	50	BPDB	FO/ Gas	March, 2012
13	Chandpur 150 MW CC (U/C)	163	BPDB	Gas	March, 2012
	Sub-Total(Public)	1106			
	PRIVATE SECTOR				
1	Solar	7	IPP (BPDB)	Solar	June, 2012
2	Tangail 20 MW	20	IPP (REB)	Gas/ FO	June, 2012
3	Chandpur 15 MW	15	IPP (REB)	FO	June, 2012
4	Narayangonj 30 MW	30	IPP (REB)	FO	June, 2012
	Sub-Total (Private)	72			
	Total (2012)	1178			

Source: Bangladesh Power Development Board

Medium-Term

Under the medium term plan, initiatives have been taken to set up power plants with a total generation capacity of 7919 MW that are implementable within 3 to 5 years time of which 2450 MW will be coal based (Tables 3.8-3.10).

Table 3.8: List of Projects that will be implemented by 2013

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
	PUBLIC SECTOR				
1	Raujan	20	RPCL	Gas/ FO	September, 2012
2	Sirajganj 150 MW GT	150	NWPGC	Gas/Oil	November, 2012
3	Chapai Nababganj	100	BPDB	FO	November, 2012

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
4	Kaptai Solar	5	BPDB	Solar	December, 2012
5	Kodda, Gazipur 150 MW Power Plant	150	BPDB- RPCL Powergen Ltd.	FO	December, 2012
6	Ghorasal 200-300 MW Peaking	290	BPDB	Gas/Diesel	March, 2013
7	Khulna 150 MW GT	150	NWPGC	Gas/Oil	March, 2013
	Sub-Total (Public)	865			
	PRIVATE SECTOR				
1	Shantahar Peaking Plant	50	IPP (BPDB)	FO	July, 2012
2	Syedpur Peaking Plant	100	IPP (BPDB)	FO	July, 2012
3	Jamalpur Peaking	100	IPP (BPDB)	Gas/FO	September, 2012
4	Comilla Peaking	50	IPP (BPDB)	Gas/FO	September, 2012
5	Khulna Peaking	100	IPP (BPDB)	FO	September, 2012
6	Dhaka 100 MW Power Plant	100	IPP (BPDB)	FO	September, 2012
7	Dhaka 50 MW Power Plant	50	IPP (BPDB)	FO	September, 2012
8	Chittagong 100 MW Power Plant	100	IPP (BPDB)	FO	September, 2012
9	Chittagong 50 MW Power Plant	50	IPP (BPDB)	FO	September, 2012
10	Rajshahi 100 MW Power Plant	100	IPP (BPDB)	FO	September, 2012
11	Rajshahi 50 MW Power Plant	50	IPP (BPDB)	FO	September, 2012
12	Khulna 100 MW Power Plant	100	IPP (BPDB)	FO	September, 2012
13	Barisal 50 MW Power Plant	50	IPP (BPDB)	FO	September, 2012
14	Bhola 150-225 MW CCPP (2 nd unit):SC GT Unit	147	IPP	Gas	October, 2012
15	Kaliakair Peaking Plant, Gazipur	100	IPP	Gas/FO	November, 2012
16	Wind	100	IPP (BPDB)	Wind	January, 2013
17	Savar Peaking Plant, Dhaka	100	IPP	Gas/FO	March, 2013
18	Bibiana 300-450 MW CCPP (1 st Unit): SC GT Unit	222	IPP	Gas	March, 2013
19	Bibiana 300-450 MW CCPP (2 nd Unit): SC GT Unit	222	IPP	Gas	April, 2013
20	Meghnaghat 300-450 MW CCPP (2 nd Unit) Duel Fuel: SC GT Unit	220	IPP	Gas/FO	April, 2013
21	Keraniganj 150-225 MW CCPP :SC GT Unit	100	IPP	Gas/FO	June, 2013

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
22	Madanganj 150-225 MW CCPP :SC GT Unit	100	IPP	Gas/FO	June, 2013
	Sub-Total (Private)	2311			
	Total (2013)	3176			

Source: Bangladesh Power Development Board

Table 3.9: List of Projects that will be implemented by 2014

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
	PUBLIC SECTOR				
1	Siddirganj 450 MW CCPP	450	EGCB	Gas	December 2013
2	Bhola 150 MW CCPP	150	BPDB	Gas	December 2013
3	Haripur 360 MW CCPP	360	EGCB	Gas	June 2014
4	Barapukuria 250-300 MW (3 rd Unit)	250	BPDB	Coal	June 2014
5	Ashugonj 150 CCPP	150	APSCL	Gas	June 2014
6	Shikalbaha 150-225 MW CCPP	150	BPDB	Gas/FO	June 2014
	Sub-Total (Public)	1510			
	PRIVATE SECTOR				
1	Bhola 150-225 MW CCPP (2 nd unit): ST Unit	70	IPP	Gas	August 2013
2	Bibiana 300-450 MW CCPP (1 st Unit): ST Unit	119	IPP	Gas	March 2014
3	Bibiana 300-450 MW CCPP (2 nd Unit): ST Unit	119	IPP	Gas	April 2014
4	Meghnaghat 300-450 MW CCPP (2 nd Unit) : ST Unit	115	IPP	Gas/FO	April 2014
5	Keraniganj 150-225 MW CCPP : ST Unit	50	IPP	Gas/FO	June 2014
6	Madanganj 150-225 MW CCPP :ST Unit	50	IPP	Gas/FO	June 2014
7	Sirajganj 300-450 MW CCPP	300	IPP	Gas	June 2014
	Sub-Total (Private)	823			
	Total (2014)	2333			

Source: Bangladesh Power Development Board

Table 3.10: List of Projects that will be implemented by 2015

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Completion Date
	PUBLIC SECTOR				
1	Bheramara 360 MW CCPP	360	NWPGC	Gas	December, 2014
2	Ashuganj 450 MW CCPP	450	APSCL	Gas	March, 2015
	Sub-Total (Public)	810			
	PRIVATE SECTOR				
1	Chittagong 150-300 MW Coal Fired Power Project	150	IPP	Imp. Coal	Sept. 2014
2	Khulna 150-300 MW Coal Fired Power Project	150	IPP	Imp. Coal	Sept. 2014
3	Khulna South 1300 MW Coal Fired Power Project	1300	PPP (Joint Vent.) / IPP	Coal	March, 2015
	Sub-Total (Private)	1600			
	Total (2015)	2410			

Source: Bangladesh Power Development Board

Diversification of Energy Sources

According to the plan, high dependency on gas based power generation will be reduced in the short and medium terms and the new built plants will be designed to be dual-fuel based. In addition, emphasis will be given to various power saving efforts so that the saved power can be transmitted to the other thrust areas. ‘CCF (Compact Fluorescent Lamp) Distribution Program’ is expected to save 200-350 MW electricity per month. There is also 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 500 MW by FY 2013.

The use of renewable energy has risen considerably in 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 high, 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 percent of total production by the year 2015. 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) to expand and develop renewable energy, to promote energy saving and energy efficiency and to create awareness among the users of electricity.

Power Tariff

Proper pricing of primary fuel and electricity is important to conserve energy as well as to generate resources for future investments. Proper energy pricing is also critical to attract foreign and domestic private investment in the energy sector. Accordingly, setting of proper prices is a key element of the Sixth Plan energy strategy. The per unit production cost of electricity is expected to rise (50 percent-60 percent) in the upcoming 2-3 years due to the installation of high cost liquid fuel based peaking plants. Accordingly, the Energy Regulatory Commission may increase the tariff of power step by step. However, power tariff will likely come down after 2014 as the implementation of gas and coal based power plants will be completed that is expected to reduce generation costs.

Transmission and Distribution

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.

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 2647 circuit kilometers and for 132 KV electric lines, the length is 5818 circuit kilometer. For strengthening the electricity transmission system and for meeting up the gradual increasing future demand for electricity, the Government has set a target of “Providing Electricity in every house by 2021”. As part of achieving this target, the Government has already undertaken a priority based investment plan for the year 2007-09 under which massive work plan has been chalked out for building an additional 3000 kilometer of transmission lines by 2015. In this regard, PGCB has undertaken activities for building concerned transmission lines for supplying electricity through regional cooperation.

Up to October, 2010 about 119 lac customers have been provided with electricity connections through 2,69,635 kilometer distribution lines and other 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, steps have been made for building an additional 60,000 kilometer distribution lines by 2015.

Providing electricity in rural areas is an integral feature of the distribution system. The progress with rural electrification is shown in Table 3.11. About half of the total power is provided by the Rural Electrification Board (REB) in the country. The REB mostly obtains its supply from the Power Development Board as its own capacity for production is very little. Compared to the demand, own capacity for transmission and distribution is also very limited. While REB has been a relatively better managed power entity, further efforts are needed to improve efficiency.

Table 3.11: Progress with Rural Electrification Up to June 2010

Indicators	Progress
Total number of connections	81,02,549
Of which: households	69,85,344
Irrigation	1,77,669
Industrial	1,30,965
Commercial	7,94,896
Others	13,675
Number of villages	48,682
Distribution lines (kms)	2,22,780

Source: Rural Electrification Board

To match the time bound increases in generation capacity, the Government has also adopted a time bound plan for constructing transmission lines and sub stations in order to supply the generated electricity in the load centers at different voltage level. Description of major transmission projects is provided Table 3.12.

Table 3.12: Planned Important Transmission Projects

Sl No.	Transmission Line	Voltage Level	Length KM	Expected Date of Completion
01.	Bibiyana-Kaliakoir 400 kV and Fenchuganj-Bibiyana 230 kV Transmission Line (NG2)	400 KV	168	2011-2012
		230 KV	57	
		132 KV	10	
02.	400 kV Interconnection between Bangladesh (Bheramara) and India (Baharampur)	400 KV	30	2012-2013
03.	Bibiyana-Comilla(N) 230 kV transmission line.	230 KV	160	2011-2012
04.	Eight new 132/33 kV S/Ss with Interconnecting 132 kV line.	132 KV	100	2012-2013
05.	Barisal-Bhola-Burhanuddin 230 kV Transmission Line	230 KV	60	2012-2013
06.	Aminbazar-Maowa –Mongla 400 kV & Mongla –Khulna(S) 230 kV Transmission line (NG3)	400 KV	192	2014-2015
		230 KV	40	

SI No.	Transmission Line	Voltage Level	Length KM	Expected Date of Completion
07.	Anowara – Meghnaghat 400 kV Transmission line (NG4)	400 KV	260	2014-2015
08.	Raozan-Sikalbaha- Anowara & Hathazari-Khulshi 230 kV Transmission Line	230 KV	60	2012-2013
09.	Construction of 230/132 kV Substations at Shyampur, Jhenaidah (Or Jessore) , Bheramara and Sripur	132 KV	32	2012-2013
10.	Enhancement of Capacity of Grid Substations and Transmission Line (Phase-I)	132 KV	-	2012-2013
11.	Ishurdi-Rajshahi 230 kV Transmission Line.	230 KV	70	2012-2013
12.	RPCL Mymensingh-Tangail via Bhaluka 132 kV double circuit Transmission Line	132 KV	100	2012-2013
13.	Brahmanbaria-Nabinagar-Narsingdi 132 kV Double Circuit Pole Line	132 KV	55	2011-2012
14.	Goalpara-Bagerhat 132 kV 2 nd Single Circuit Transmission line	132 KV	45	2011-2012
15.	Electricity interconnection between Tripura and Eastern Region of Bangladesh.	230 KV	13	2012-2013
16.	Chandraghona-Rangamati-Khagrachari 132 kV Transmission Line	132 KV	80	2012-2013
17.	Three new 132/33 kV S/Ss with Interconnecting 132 kV line	132 KV	-	2012-2013

Source: Bangladesh Power Development Board

Year-wise Power Generation considering Planned Implementation

Year-wise power generation data is shown in Table 3.13. According to the plan around 11457 MW extra powers will be added to the national grid by FY 15.

Table 3.13: Year wise Power Generation during the Sixth Plan

FY	Public sector (MW)	Private Sector (MW)	Total (MW)
2010	-	194	194
2011	413	1753	2166
2012	1106	72	1178
2013	865	2311	3176
2014	1510	823	2333
2015	810	1600	2410
	Total Extra Generation		11457

Source: Bangladesh Power Development Board

Adequacy of the Planned Power Expansion Program

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 11457 MW extra power will be added to the national grid by 2015, and the total power supply capacity will reach to 15,357 MW due to the retirement of some existing old power plants. On average, the demand for electricity is assumed to increase by 10% each year during 2010 and 2015. The overall scenario of estimated gaps in power demand and supply are shown in Table 3.14.

Table 3.14: Power Supply-Demand Balance in the Sixth Plan

Fiscal Year		2011	2012	2013	2014	2015
Max. Demand with DSM (MW)		6765	7518	8349	9268	10283
Gen addition – Public Sector(MW)		413	1106	865	1510	810
Gen. addition – Private Sector(MW)		1753	72	2311	823	1600
Cross Border (MW)		-	-	500	-	-
Capacity Retired(MW)		88	83	161	897	448
Generation Capacity(MW)		7349	8444	11959	13395	15357
Net Capacity(MW)		7055	8106	11481	12859	14743
Dependable Capacity (MW)		5432	6323	9070	10287	11794

Source: Bangladesh Power Development Board

Institutional Reforms in the Power Sector

Implementation of the power sector programs will require continued and sustained reforms. There have been several reforms so far in Bangladesh in the power sector. During 1996–2000, several changes were made to the institutional arrangements in the power sector. The Power Grid Company of Bangladesh (PGCB) was established to gradually take over the operation of the high-voltage power transmission network (230 kilovolts [kV] and 132 kV) from BPDB. The Dhaka Electric Supply Company (DESCO) was established to take over power distribution in parts of Dhaka from DESA. PGCB and DESCO were established on a commercial basis as Government-owned companies under the Companies Act. Several privately owned power generation projects were also established during this period as independent power producers (IPPs) selling electricity to BPDB. Some distribution areas were transferred from BPDB and DESA to PBSs.

Further institutional reforms were undertaken during 2001–2008. More distribution zones in Dhaka were transferred to DESCO from DESA, the West Zone Power Distribution Company (WZPDC) was established in 2001 to take over power distribution from BPDB in the western part of the country, and the Dhaka Power Distribution Company (DPDC) was established in

2006 to take over the remaining operations of DESA. WZPDC and DPDC were also established under the Companies Act as Government-owned companies. In the generation sector, the Ashuganj Power Company Limited was created to take over the power station at Ashuganj, and the Electricity Generation Company of Bangladesh (EGCB) and North West Power Generation Company (NWPGC) were established to implement several power generation plants financed by ADB and World Bank, JICA and other development partners.

Despite these reforms the power sector still faces a number of main development challenges that will require continued further efforts. These challenges include the need for resource mobilization, planning and implementation of least cost power expansion programs, efficiency of billing and collection processes, and sector corporate governance. To address these concerns the Government will undertake further actions during the Sixth Plan with the following objectives:

- establishing transparent corporate governance and a regulatory regime to provide performance-based incentives to sector entities;
- improving the commercial performance of the sector to improve its cost recovery and financial viability. This requires fundamental corporate and institutional reforms;
- attracting investments from the private sector to increase the generation capacity of the country and maintain an adequate and reliable power supply;
- encouraging development partners to provide concessionary financing for investments in urgently needed power transmission and distribution projects;
- changing the prevailing culture of electricity pilferage and nonpayment of electricity bills in collusion with utility employees;
- establishing the performance-driven and accountable corporate culture in the newly established companies. This requires a drastic change from the existing practices and culture of the power sector;
- maintaining the reform momentum with further unbundling of power generation and distribution operations of BPDB and the restructuring of the operations of DESA;
- addressing the power shortages as a matter of urgency through a combination of investments from the private sector and the public sector;
- commercializing the generation operations of BPDB, which have not been restructured. BPDB continues to operate in a suboptimal manner, with low plant factors and thermal efficiencies. The existing generation assets need to be rehabilitated to improve their efficiency and availability. The generation companies created out of BPDB need to be made fully operational with the transfer of assets and the signing of PPAs with BPDB;
- further improving the power distribution operations of WZPDC, BPDB, and DPDC.
- addressing the financial insolvency of BPDB and the former DESA, which have large unpaid Government debts and irrecoverable accounts receivable. To set the power sector's financials on a sound basis, a major financial restructuring is required including the write-off of BPDB's liabilities to the Government; and

- addressing overall financial non-viability of the sector despite improvements in control over losses and bill collection. Significant increases in retail power tariffs are needed to ensure that all sector entities achieve financial viability.

PRIMARY ENERGY SECTOR

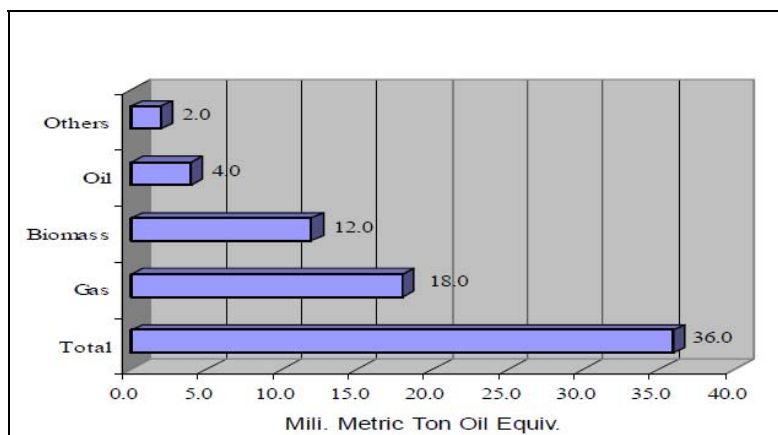
Shortage of power is a reflection of an even bigger challenge in terms of limited supply of primary energy. Bangladesh showed early promise in terms of having adequate sources of primary energy from natural gas and coal and to a limited extent from hydro-power. The optimism on gas extended to an extent that there was even a talk of exporting gas. Lack of adequate planning and investment in primary energy for a large number of years has caused a serious shortage of primary energy in Bangladesh. As a result, energy shortage has emerged as a binding constraint on growth in Bangladesh.

In recognition of this energy crisis, in addition to emphasis on power, the Government is also developing a comprehensive primary sector strategy and associated programs and policies. Achieving energy security is a key development objective of Vision 2021 and specific actions will be taken to move towards this objective during the Sixth Plan.

Sources of Energy Supply

At present, Bangladesh has energy supply from both renewable and nonrenewable sources, 38 percent of which comes from biomass (Figure 3.1). However, 75 percent of commercial energy is provided from natural gas. Currently, gas production per day is 2000 MMCF. Imported oil accounts for the major share of the rest of the energy requirement. Bangladesh's annual requirement of energy is approximately 36 million metric ton. Apart from natural gas and crude oil, coal is mainly used as fuel in the brick-fields and at the Barapukuria 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. 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.

Figure 3.1: Sources of Energy Annual Energy Supply 2009



Source: Energy and Mineral Resources Division

Non-renewable energy

The principal sources of commercially used non-renewable energy include:

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

Natural Gas

The major source of our primary energy is natural gas. As many as 23 gas fields have been discovered since 1955 when the first gas field was found in Sylhet. Gas has served Bangladesh well, but galloping growth in demand combined with inadequate investment in gas exploration has led to a serious shortage of gas supply.

Reserve and Production Levels of Natural Gas

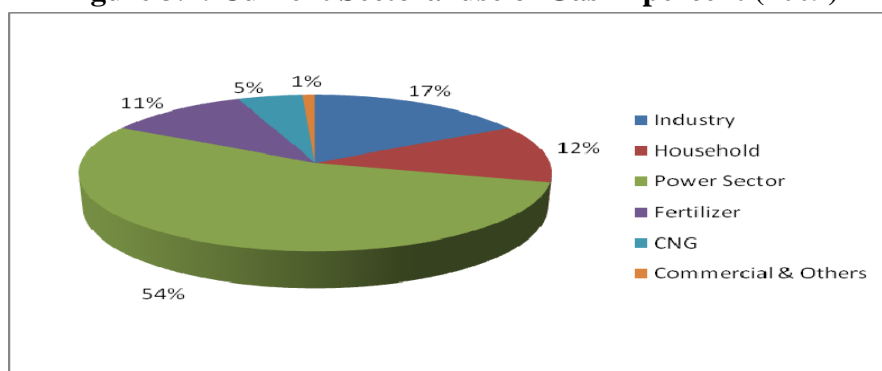
The existing natural gas is mainly used in electricity, fertilizer, industry, transport and housing sectors. The reserve and production situation of gas up to 2010 are as follows:

- 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)- 20.605 TCF (Trillion Cubic Feet)
- Total consumption of gas up to June 2010- 9.077 TCF
- Total reserve remaining(2P) UPTO June 2010- 11 .528TCF
- Daily gas exploration- about 2000 MMCF (Million Cubic Feet)
- Production by Petrobangla- 960 MMCF
- Production by International Oil Companies- 1040 MMCF
- Daily demand of gas- 2500+ MMCF
- Daily shortage of gas supply- 500+ MMCF
- Gas production increased from January 2009 to December 2010- 284 MMCFD

Consumption of Natural Gas

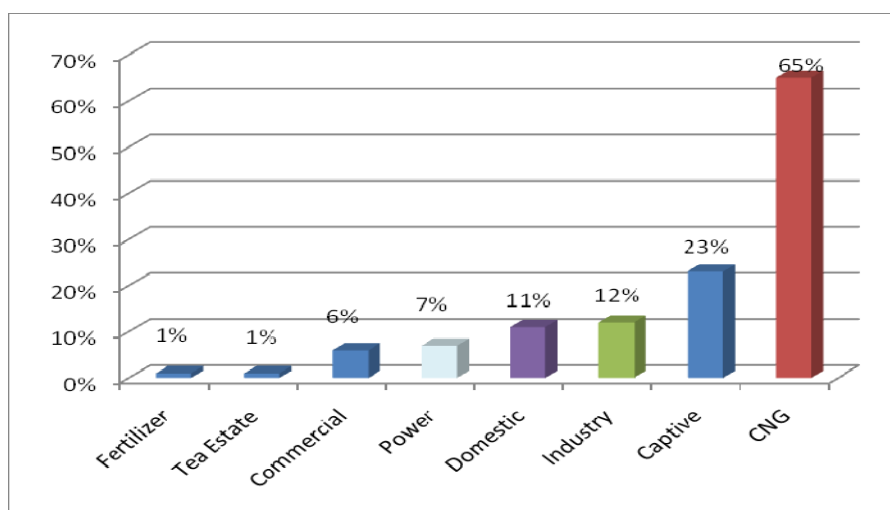
The existing natural gas is mainly used in electricity, fertilizer, industry, transport and housing sectors (Figure 3.2). From Figure 3.2 it is evident that more than half of the gas is used for electricity generation, yet the demand for gas has grown much faster from industries and households (Figure 3.3)

Figure 3.2: Current Sectoral use of Gas in percent (2009)



Source: Energy and Mineral Resources Division

Figure 3.3: Sector wise annual average growth rate of use of gas, 1991-2010



Source: Energy and Mineral Resources Division

Demand and Supply of Natural Gas during the Sixth Plan

The demand for natural gas during the Sixth Plan is shown in Table 3.15. This is based on the projected expansion in power generation during the Plan period and the average rate of consumption in the past 17 years for other sectors. Under these projections, the demand for

Table 3.15: Sector-specific Projected Demand for Gas during the Sixth Plan

Sector	2010-11	2011-12	2012-13	2013-14	2014-15
Power	300.5	324.5	350.5	378.5	415.8
Captive Power	142.6	164	188.6	216.9	238.6
Fertilizer	94	94	94	94	94
Industry	160.7	184.8	214.4	246.5	271.1
Household	99.5	111.4	124.8	139.8	153.8

Sector	2010-11	2011-12	2012-13	2013-14	20014-15
CNG	44.7	51.4	56.5	113	124.3
Others	30.8	31.9	32.7	33.7	37.4
Total	872.8	962	1061.5	1222.4	1335

Source: Energy and Mineral Resources Division

gas will expand from 783 billion cubic feet (cft) in FY2009/10 to 1335 billion cft by the end of the plan period. Regarding supply, at present only 730 BCF (Billion Cubic Feet) gas is being supplied. As a result, there is already a shortage of gas. Unless steps are taken to extract more gas through more intense use of existing fields as well as new fields, a serious shortage of gas will emerge in the coming years.

Challenges Faced by the Gas Sector

The main challenges facing the natural gas sector are as follows:

- maintaining the production level of existing fields operated by national gas companies;
- undertaking exploration in new areas to expand gas reserves;
- attracting investments and technical expertise from IOCs under PSAs for exploration and development of new gas fields;
- establishing a national gas transmission network by connecting the main gas fields with the main demand centers in the greater Dhaka and Chittagong area;
- improving the technical and commercial performance of gas distribution companies to reduce distribution losses;
- diversifying the primary energy supply from natural gas to other forms of energy, given the high dependence of the economy on natural gas and limited proven gas reserves in the country and difficulties in increasing production capacity in the short and medium terms;
- arresting the declining production in gas fields operated by Petrobangla subsidiaries through timely maintenance of existing fields, drilling of additional wells, and appraisal of existing gas fields to ascertain the possibilities for additional gas production;
- adjusting end user gas prices since the prevailing gas pricing structure and high level of Government taxes do not provide adequate margins for the national gas companies to undertake the requisite investments in developing new fields;
- attracting new investments from IOCs for exploring new areas, especially the offshore blocks where the national oil companies do not have any prior experience.
- improving energy efficiency, including the efficiency of using scarce gas resource. The prevailing practice of setting gas prices below international prices is encouraging inefficient use of gas and its use for applications for which more economical alternatives are available;
- discouraging the use of gas for captive power generation by industries using suboptimum and inefficient technologies. However, this can be done only after ensuring a reliable (in terms of both continuity and quality) supply of grid-based power.

Sixth Five Year Action Plan for the Development of Natural Gas Sector

Based on the identification of major challenges, the salient features of the planned policy strategy for the gas sector include the following.

Strategy and Policies

- 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
- Ensuring proper pricing of gas to conserve energy and improve the financial operations of the gas sector
- Maximizing domestic production of diesel, kerosene, motor spirit (MS) and HOBC through fractionation of condensate in the country.

Action Plan for Exploration and Increased Generation of Natural Gas

The Government has already taken a number of time-bound steps to explore, discover and improve new gas field and also for gas extraction and supply. The salient features of implementable and ongoing programs under short, medium and long-term plans are as follows:

Program-completed by 2010

In order to increase gas, exploration actions have been taken that will bring about an additional 158 million cubic feet daily (MMCFD) gas for the national grid by December 2010. Under the short-term programme, gas production has already increased by 114 million cubic feet daily (MMCFD). The gas field wise detailed description is given in Table 3.16. In summary, actions have been taken to increase 78 MMCFD by rehabilitation (work over) of five wells; 35 MMCFD by digging two evaluation/development wells at Shalda River and Fenchuganj gas fields; 15 MMCFD from one exploration well at Sundalpur in Noakhali District; and 30 MMCFD from exploration/ development well in southern part of Sangu gas field.

Table 3.16: Short Term Plan completed by December 2010

Under Implementation by National Gas Companies						
Sl. No.	Program	Time Schedule		Increase in Production (MMCFD)	Agency	Activity
		Start	Completion			
Under Implementation by National Gas Companies						
1	Sylhet 7	December 09	January 10	8	SGFL	Workover
2	Meghna 1	April 10	June 10	15	BGFCL	Workover

3	Habiganj 11	April 10	June 10	20		Workover
4	Titas 12	May 10	June 10	20		Workover
Sub Total				63		
						Workover
						Exploration
						Appraisal Well
5.Other Sources				51	BAPEX	Appraisal Well
Total				114		

Source: Energy and Mineral Resources Division

Program to be completed by June 2013

The June 2013 program consists of additional exploration as well as LNG imports. The details are shown in Table 3.17. These actions will generate additional 1920 MMCFD to the national grid by 2013.

Table 3.17: Medium Term Plan to be completed by June 2013

Sl. No.	Program	Completion	Planned increase in Production(MMCFD)	Agency	Activity	Remarks
A) Under Implementation by National Gas Companies (by 2011)						
1.	Kapashia 1	June 11	20	BAPEX	Exploration	
2.	Shrikail 2	Dec 11	20		Exploration	
3.	Mobarakpur 1	Dec 11	15		Exploration	
4.	Shalda 4	June 12	15		Development	
5.	Fenchugan 4	June 12	20		Development	
6.	Titas 17	Oct 11	25	BGFCL	Development	
7.	Titas 18	March 12	25		Development	
8.	Semutang 1, 5	June 12	20	BAPEX	Workover	
9.	Sundalpur	June 12	15		Exploration	
10.	Salda 3	June 12	15			
11.	Sunetra 1	Jan 12	25			
12.	Shabazpur 3, 4	March 12	50		Development	
13.	Bakhrabad 9	Aug 2012	20	BGFCL	Development	
14.	Titas 19, 20, 21, 22	June 12	100	BGFCL	Excavation	
15.	Rashidpur 8	June 12	20	SGFCL	Excavation	
16.	Rashidpur 5	June 12	15		Workover	
Total (A)			420			
B) LNG Import						
1	LNG	Dec 2012	500			
Total (B)			500			
C) Under Implementation by International Gas Companies						
1	Moulavibazar	Dec 13	540	Chevron	9 Well Development Wells	Subject to Evaluation
2	Jalalabad	Dec 13	100	Chevron	3 Well Dev	Excavation of Exploration Well

Sl. No.	Program	Completion	Planned increase in Production(MMCFD)	Agency	Activity	Remarks
3	Bibiyana	Dec 13	360	Chevron	Development 6 well	
Total (C)			1000			
Grand Total (A+B+C)			1920			

Source: Energy and Mineral Resources Division

National Gas Company

Actions have been taken to supply 285 MMCF gas daily to the national grid by exploration/development of the following gas fields: Kapashia 1 (20 MMCFD); Shrikial 2 (20 MMCFD); Mobarakpur 1 (15 MMCFD); Shalda 4 (15MMCFD); Fenchuganj 4 (20 MMCFD); Titas 17 (25 MMCFD) and Titas 18 (25 MMCFD), Semutang 1, 5 (20 MMCFD); Sundalpur (15 MMCFD); Salda 3 (15MMCFD); Sunetra 1 (25MMCFD); Shahbazpur 3, 4 (50MMCFD). Moreover, BAPEX has taken a programme to identify the site for digging new development wells by data collection, processing and analysis by 2-D seismic survey of 3100 line kilometer.

International Oil Company

Target has been set to supply 1000 MMCFD of gas daily to the national grid by Chevron gas field under PSC.

Program to be completed by 2015

During this period by drilling and development of exploratory wells an additional gas production of 180 MMCFD by local companies and 500 MMCFD by international oil companies (total 680 MMCFD) will be added to the national grid by 2015 (Table 3.18).

National Gas Company

Steps have been taken to supply 180 MMCFD gas to the national grid through drilling of 9 development wells of which 5 are in Sylhet, Koilashtila and Rashidpur gas fields, and 4 in Titas gas field.

International Oil Company

Target has been set to supply 500 MMCF gas to the national grid by IOCs under Product Sharing Contracts (PSC).

Table 3.18: Program to be completed by 2015

Sl. No.	Program	Completion	Increase in Production (MMCFD)	Agency	Activity	Remarks
A) Under Implementation by National Gas Companies						
1	Titas Well 23, 24, 25 and 26	To be completed by 2015	100	BGFCL	Appraisal well	

2	Excavation of 5 Wells in Sylhet, Koilashtila and Rashidpur	To be completed by 2015	80	SGFL	Appraisal well	
Total (A)			180			
B) Under Implementation by International Gas Companies						
1	Moulavibazar	To be completed by 2015	500	Chevron Bangladesh Ltd.		
2	Bibiana	To be completed by 2015				
3	Jalalabad	To be completed by 2015				
4	Offshore Building Round 2008	To be completed by 2015				
Total (B)			500			
Grand Total (A+B)			680			

Source: Energy and Mineral Resources Division

Steps to be taken for Increasing the Supply of Natural Gas

In order to realize the above supply initiatives for natural gas, a number of policy actions will be implemented. These include:

- Ensure adequate provision of funds.
- Make arrangements for speedy bidding procedures for off-shore blocks.
- Purchase higher quality machineries using advanced technology and build up efficient manpower to strengthen BAPEX.
- Ensure the drilling and development of wells as per plan through streamline work procedures and effective monitoring of the international oil companies.
- Secure speedy resolution of the demarcation of maritime boundary issues with India and Myanmar for the blocks located at the deep sea areas.

Liquefied Natural Gas

The shortage of gas supply can be mitigated through importing LNG. Following actions will be taken:

- Providing opportunities to the private sector to import LNG.
- Along with other necessary facilities, at least the infrastructure of two terminals of 500 MMCFD will be built to receive the imported liquid gas from the ship.
- Involve the private sector in the planning of import LNG and establishment of the terminals.

Coal

The diversification of sources of energy i.e reliance on coal will benefit tremendously from reliance on coal. High quality bituminous coal mines have been discovered at Khalashpur of Rangpur, at Barapukuria, Fhulbaria, Dighipara of Dinajpur and at Jamalganj of Bogra in the

north-western zone of the country. The total reserve of these 5 coal mines is around 2355 million MT (Table 3.19) and the heat generation capacity is equivalent to 37 trillion cft of gas approximately. With further exploration initiatives, more coal mines may be discovered on other parts of Bangladesh. Among the 5 coal mines, Barapukuria coal mine in Dinajpur has started commercial production from September, 2005 with the annual production of 10 lac tonnes of coal.

Table 3.19: Coal Reserves of Five Coal Mines

Sl. No.	Exploration location	Year and	Depth (Meter)	Magnitude of mine area (Sq. km.)	Reserve (Million Ton)
1	Barapukuria, Dinajpur	(1985-87)	118-509	6.88	390
2	Khalashpur , Rangpur	(1989-90)	257-483	12	685
3	Fhulbaria, Dinajpur	(1997)	150-240	30	572
4	Jamalganj, Bogra	(1962)	640-1158	16	1053
5	Dighipara, Dinajpur	(1994-95)	328-407	Not Available	600
Total					3300

Source: Energy and Mineral Resources Division

Actions for Strengthening Coal Production

Although there are enough reserves of coal in the country, exploitation is constrained by concerns over extraction methods, the technological security and the possible adverse social consequences. The Government is taking steps to resolve the problems in the coal sector with a view to making it a major source of primary energy supply in the future. The steps being taken include:

- Finalization of coal policy.
- Formation of coal extraction plan consistent with social and environmental safeguards.
- Building up mass awareness regarding the extraction procedure of coal especially for the open extraction method.

Nuclear Energy

Bangladesh government in principle agreed in the construction of a nuclear power plant (NPP) consisting of two reactor power units with a capacity 1000 MW each (total 2000 MW) at Rooppur Nuclear Power Project (RNPP) Site in order to curb the existing energy crisis. For implementation of the RNPP, the government of Bangladesh and the Russian Federation has signed a Framework Agreement. Under the provision of the Framework Agreement, both governments have agreed to sign an inter-government agreement (IGA) on Cooperation Concerning the Construction of a Nuclear Power Plant on the territory of the People's Republic of Bangladesh. According to the IGA, both countries shall cooperate in the construction of nuclear power Units 1 & 2 of "Rooppur" NPP in the agreed scope. Essential preparatory activities such as finalizing site safety report, preparation of project document,

determining project execution model and financing plan, safety analysis of the reactor, strengthening of regulatory activities, etc have been started. It is desirable that the construction phase activities for the first reactor would be started from the year of 2012. It is considered that the construction of the first unit of 1000 MW(e) and the second unit of another 1000 MW(e) will be completed by 2017 and 2018, respectively.

Implementation of nuclear power technology will need to tackle a number of important challenges. These include:

- Necessary fund provision.
- Ensure safety of the population and environment.
- Develop trained and efficient manpower in order to administer and maintain the nuclear plant.
- Build awareness among general people regarding the associated risks and safeguards of nuclear energy production.

RENEWABLE ENERGY

In Bangladesh renewable energy such as biomass, solar power and wind power are being used. Especially in areas which do not have gas supply, household use of biomass for cooking and solar power and wind for drying of different grains as well as clothes are known to all. However, Bangladesh is lagging far behind in the scientific use of such energy. The use of renewable energy has become popular worldwide in view of depleting reserve of non-renewable fossil fuel. Furthermore, 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
- Generation of electricity from municipal refuse
- Production of bio-gas using waste
- Electricity produced by Biomass Gasification Method using wood, rice husk, etc.

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 renewable energy. Benefits to use renewable energy are as follows:

- Supply of raw materials for power generation is potentially infinite
- Operational cost is low although initial investment is comparatively high
- Technology 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

In recognition of the vast potential benefits of renewable energy, the Government has taken a number of actions on a priority basis. These include:

- 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
- 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 lac 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 a pilot IPP project to produce power from waste
- Setting up several solar panel factories by IDCOL
- The use of solar panel in all large public buildings to be made mandatory within 3 years
- Solar panel imports made duty-free

DEVELOPMENT RESOURCE ALLOCATION IN POWER AND PRIMARY ENERGY SECTOR DURING THE SIXTH PLAN

The energy sector, especially power, faces substantial development challenges. In recognition of the fact that energy has become a binding constraint on the acceleration of GDP growth, the Government places highest priority to allocating resources to this sector. Nevertheless, the investment needs are just too large to be met through the Government's own resources. Accordingly, a key financing strategy is to mobilize as much financing through PPP arrangements as possible. The Government is also attracting direct foreign investment and domestic enterprises to invest in the energy sector. The policy framework for private participation is already in place. Further efforts will be made to strengthen this policy as needed in order to ensure adequate flow of private investment in energy sector.

Regarding public funding, in addition to budgetary allocations, emphasis will be given to improving efficiency and cost recovery of concerned public enterprises and autonomous bodies. The rising world prices of fuel and the increasing reliance on rental power plants will have an adverse effect on the financial health of energy sector entities. Efforts will be made to help them absorb these costs through price adjustments and efficiency improvements.

Against the backdrop of this financing strategy, the Sixth Plan allocation of development resources in power and primary energy sector during the Sixth Five Year Plan, both in current and constant prices, are reported in Table 3.20.

Table 3.20: Development Resource Allocation for Energy in the Sixth Plan
(Crore taka; current price)

Ministry	FY11	FY12	FY13	FY14	FY15
Power Division	4995	7069	8557	10898	13458
Energy and Mineral Resources Divn.	1080	1513	1717	2012	2289
Total	6075	8582	10274	12910	15747

Table 3.21: Development Resource Allocation for Energy in the Sixth Plan
(Crore taka; FY11 price)

Ministry	FY11	FY12	FY13	FY14	FY15
Power Division	4995	6576	7439	8896	10364
Energy and Mineral Resources Division	1080	1407	1493	1643	1763
Total	6075	7983	8932	10539	12127

Securing the higher economic growth targets of the Sixth Plan and Vision 2021 will critically depend upon the ability to address the energy constraint facing Bangladesh. The Government has embarked upon a comprehensive energy sector development strategy that seeks to substantially increase power and other energy supplies and improve sectoral efficiency during the Sixth Plan and beyond. The underlying strategy entails substantial new investments based on public-private partnerships, diversifying the sources of energy away from excessive reliance on gas to coal, hydro, solar and other renewable sources, engaging in energy trading activities with neighbors, especially India, developing primary energy sources including gas and coal, conserving energy, and better use of installed capacities. The associated policy and institutional framework involves proper pricing of energy, sound legal and regulatory framework for private participation, enabling environment for energy trade and reforms of energy institutions. Many of the required actions have already been initiated; the remaining actions will be taken during the Sixth Plan period.