

Research Report: Energy Sector of Bangladesh.  
Date: March 15, 2011

Natural Gas is the most important source of energy in our country as it accounts for about 75% of the total commercial energy of the country. At present, about 37% of natural gas production is used as fuel for electricity generation. Overdependence on the natural gas must be reduced as the present reserve is not sufficient enough to support the country for long term economic growth.

Bangladesh, with a very low reserve of petroleum, has become a net petroleum import country. Because of the recent liquid oil based power plants, petroleum requirements have increased by 28% in 2011. Because of the unrest in Middle-East region, petroleum price is going up which will increase import bill of Bangladesh Petroleum Corporation (BPC).

Aside from natural gas and petroleum, coal resource of the country is still underutilized because of lack of proper guideline. Coal policy, which will ensure proper guideline regarding the usage of this resource for the economic development of the country, is yet to be finalized.

Lack of investment in power generation in the last decade has created electricity shortage. With a view to combat this, the Government of Bangladesh (GOB) has taken initiative to set up power plants so that the country has sufficient electricity within 2016. Successful implementation of this is highly dependable on the supply of fuel. Over dependency on gas for electricity generation must be reduced, while coal and renewable energy based power plants must be introduced for sustainable electricity generation.

Overall, in long term, an intelligent mix of the different available energy sources can enable Bangladesh to ensure a sustainable economic growth of the country. Right conditions and framework at policy and regulatory level is a must.

## Acronyms and Abbreviations

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MMCFD = Million Cubic Feet per Day.

MMCF = Million Cubic Feet

MMCM = Million Cubic Meter

HSD = High Speed Diesel

FO = Furnace Oil

## 1 Preamble

Energy is the driving force behind all economic activities and most importantly the economy can be seen as a system of energy flows, as a sequence of energy conversion that culminate in the production of goods and services. Hence economic growth of a country is directly linked to energy growth of the country.

Following table represents GDP growth rate and Total Primary Energy Consumption of Bangladesh:

Table: GDP Growth Rate and Total Primary Energy Consumption of Bangladesh.

Particulars	Unit	2005	2006	2007	2008	2009	2010
GDP Growth Rate*	(%)	5.96	6.63	6.43	6.19	5.74	5.80
Total Primary Energy Consumption**	(Quadrillion Btu)	0.71	0.77	0.80	0.87	N/A	N/A
Growth of Total Primary Energy Consumption	(%)		8.60	4.24	8.84		

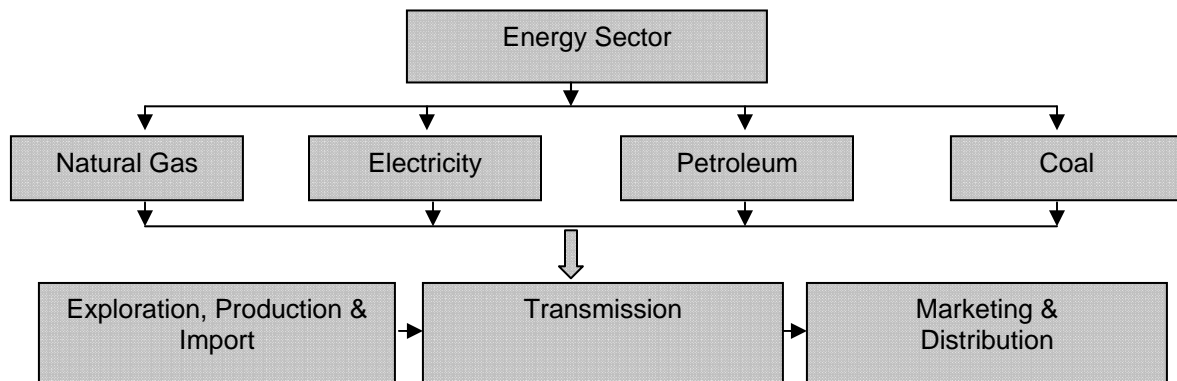
Source: \*The World Bank, \*\*U.S Energy Information Administration.

### 1.1 Industry Classification

According to the Global Industry Classification Standard (GICS) methodology, it can be broadly defined as Energy Sector.

### 1.2 Energy Sector Structure of Bangladesh

According to the source of energy, we can represent the sector in the following structure:



## 2. Natural Gas

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### Highlights

- Presently, Bangladesh Gas Fields Company Ltd (BGFCL) and CHEVRON produces the major portion of total daily gas production, 37.55% and 47.74%, respectively.
- Gas Transmission Company Limited (GTCL) has the capacity to transmit 4,455 MMCFD.
- In the gas distribution market, Titas Gas Transmission and Distribution Company Ltd (TGTDC) holds 74.42% of market share by volume and 72.64% market share by value.
- At the end of 2008, total remaining recoverable reserve of gas was 12.94 TCF. At a consumption rate of 0.73 TCF annually, remaining recoverable reserve of gas was 11.48 TCF at the end of 2010.
- At present, about 37% of production of natural gas is used as fuel for electricity generation of the country.
- Currently, the country suffers a 500 MMCFD shortage of natural gas. Because of the shortage of natural gas, new connection of gas has been restricted, CNG stations are closed for six hours daily and gas rationing has started in textile sector.
- To discover reserve of gas resource in offshore area of Bangladesh, offshore bidding – 2008 has been conducted.

The US oil company ConocoPhillips and the Irish oil company Tullow were the successful bidders. The US Company will be awarded eight blocks to conduct different types of exploration activities in the deep-sea regions. These are blocks 10, 11, 12, 15, 16, 17, 20 and 21. The Tullow will be awarded block 5 of the deep-sea region.

- At the present consumption rate and taking into account of 10% growth rate of gas consumption, remaining recoverable gas would be sufficient for the rest 9 years (from 2011 to 2019). If we account for increased consumption of gas in the coming years because of new gas fired power plants, the shortage of gas may be felt earlier.
- Discovery of new reserve of natural gas is time worthy. Unless the country have to be dependent on import of gas from the rest of the world.

## 2.1 Industry Organization

- Exploration & Production

Exploration and Production activities are operated by three (3) state owned companies and four International Oil Companies under Production Sharing Agreement (PSA).

Table: Present gas production of Bangladesh

Particulars	Production in MMCFD(8-9/2/2011)	% of total production
<b>State Owned Companies:</b>	<b>945.70</b>	<b>47.58%</b>
Bangladesh Gas Fields Company Ltd.	746.2	37.55%
Sylhet Gas Fields Ltd.	166.2	8.36%
Bangladesh Petroleum Exploration and Production Company Limited	33.4	1.68%
<b>International Oil Companies:</b>	<b>1,041.80</b>	<b>52.42%</b>
Cairn Energy	11.8	0.59%
CHEVRON	909.10	47.74%
NIKO Resources	0.00	0%
Tullow	120.90	6.08%
<b>Total Production of Gas</b>	<b>1,987.50</b>	<b>100%</b>

Source: Petrobangla.

- Transmission

Gas Transmission Company Limited (GTCL) has the responsibility to gradually create the national gas grid for the uninterrupted transportation of natural gas in a safe, reliable and economical way. Currently, the company has 875.22 KM of gas transmission line which can transmit 4,455 MMCFD.

Titas Gas Transmission and Distribution Company Ltd (TGTDCCL) has the responsibility of gas transmission from Titas, Habiganj, Bakhrabad and Kailashtila gas fields to Titas Franchise Area (TFA). The company has 613.11 KM of gas transmission line.

- Distribution

Titas Gas Transmission and Distribution Company Ltd (TGTDCCL), Bakhrabad Gas Systems Limited (BGSL), Jalalabad Gas T & D System Ltd (JGTDCCL) and Paschimanchal Gas Company Limited (PGCL) are responsible for gas distribution to the end users. Market share of the gas distributors are presented in the following table,

Table: Market Share of the gas distributors.

Company Name	TGTDCCL	BGSL	JGTDCCL	PGCL
On the basis of Gas Sales (in MMCM)	14962.94	2993.06	1422.604	727.523
	74.42%	14.88%	7.08%	3.62%
On the basis of Revenue (in Crore BDT)	6379.49	1553.20	565.96	283.13
	72.64%	17.69%	6.44%	3.22%

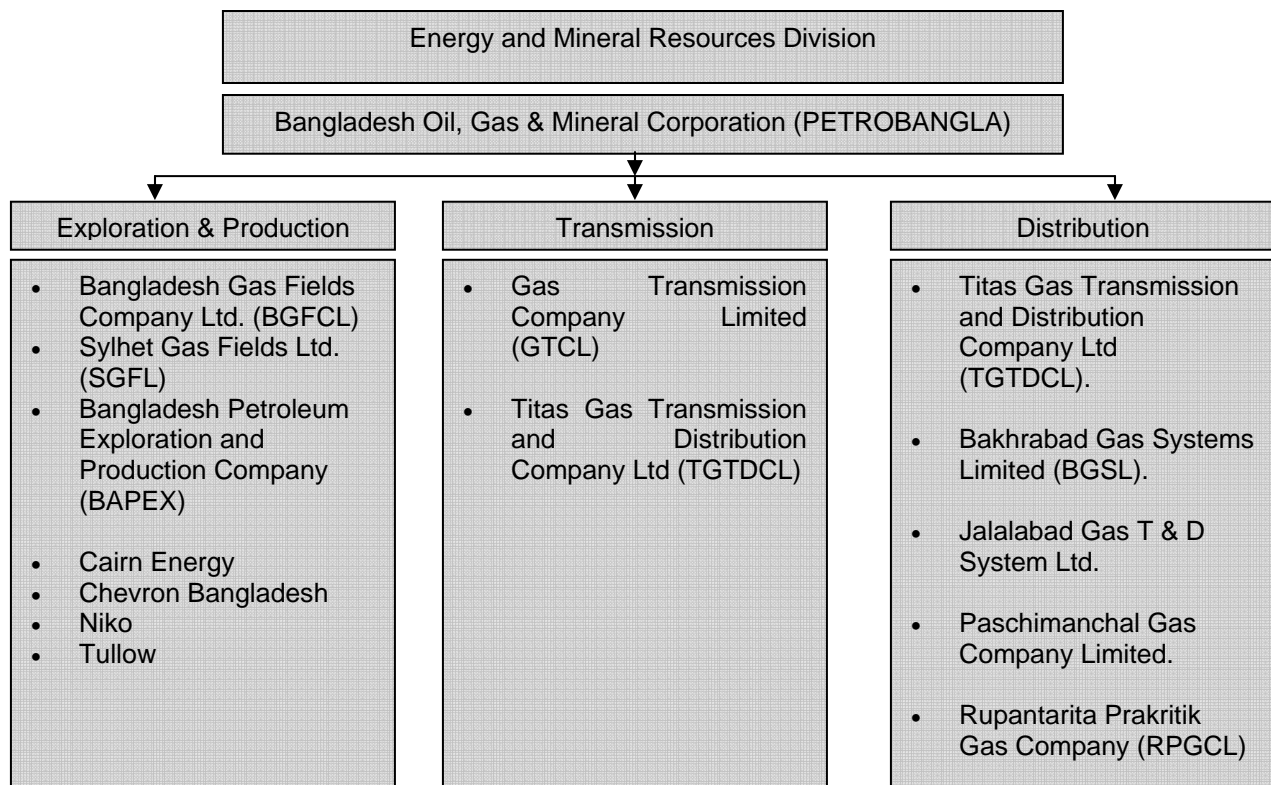
Source: Annual Report 2009- 2010, TGTDCCL.

On the other hand, Rupantarita Prakritik Gas Company Limited (RPGCL) is responsible for popularizing CNG in transport sector by establishment of a CNG-based transportation infrastructure in Bangladesh and widening its commercial operation.

The Company is also responsible for extraction of LPG, Petrol and Diesel by fractionating of Natural Gas Liquied (NGL) and marketing of the same. LP Gas Limited, a BPC owned company at Kailashtila, is marketing LPG; while Padma, Meghna & Jamuna Oil Companies of the same corporation are marketing Motor Spirit and HSD.

- **Industry organization of natural gas**

Following figure shows industry organization of natural gas.



## 2.2 Natural gas resource of Bangladesh

- **Reserve of Natural Gas: 12.94 TCF of remaining recoverable reserve.**

Till now total number of discovered gas fields are twenty three (23). Reserved gas of these fields is consists of more than 96% methane and contains no sulfur.

According to Petrobangla estimation, the country has 28.86 TCF of proven and probable natural gas reserve of which 20.98 TCF is recoverable. Cumulative production (December 2008) was 8.046 TCF making the remaining reserve of 12.937 TCF. At a consumption rate of 0.73 TCF annually, remaining recoverable reserve of gas was 11.48 TCF at the end of 2010.

Table: Natural gas reserve of Bangladesh.

Sl No	Category	Proven & Probable	Recoverable	Cumulative Production	Net Remaining Reserve
1	Producing	27.11	19.76	7.99	11.77
2	Non-Producing	1.00	0.69	-	0.69
3	Production Suspended	0.75	0.52	0.05	0.48
4	Total	28.86	20.98	8.04	12.94

Source: Annual Report 2008, Petrobangla.

- **Titans Field:**

Titans field has a net remaining reserve of 2.2 TCF. With its present production capacity, the remaining reserve can be sufficient up to 14 years.

Table: Reserve and daily production of Titans Field.

Field Name	Proven & Probable (TCF)	Recoverable (TCF)	Cumulative Production (TCF)	Net Remaining Reserve (TCF)	Daily Production (MMCFD)
Titans	7.33	5.13	2.92	2.20	420

Source: Annual Report 2008, Petrobangla.

- **Defining proved, probable and possible reserve:**

Proved reserves are those quantities of petroleum, by analysis of geologic and engineering data, can be estimated with reasonable certainty to be commercially recoverable in the future from known reservoirs and under current economic conditions, operating methods and government regulations. Probability of recovery should be at least 90% or more.

Probable reserves are those unproved reserves that geologic and engineering data suggest are likely than not to be recoverable. Probability of recovery should be at least 50% or more of the sum of the estimated proved plus probable reserves.

Possible reserves are those unproved reserves that geologic and engineering data suggest are less likely to be recoverable than probable reserves. Probability of recovery should be at least 10% or more of the sum of the estimated proved plus probable plus possible reserves.

- **Usage of natural gas:**

About 37% of gas is distributed for the electricity generation purpose, 11% is distributed for fertilizer production and the rest 52% is distributed to other purposes.



Table: Present usage of natural gas of Bangladesh.

Date	Power	Fertilizer	Others	Total Distribution (MMCFD)
8-9/2/2011	711.4	212.4	1010.9	1934.70
8-9/2/2011	36.77%	10.98%	52.25%	100%

Source: Production & Marketing Division, Petrobangla

### 2.3 Importance of natural gas and demand & supply condition

- **Natural Gas is the most important source of energy in our country as it accounts for about 75% of the total commercial energy of the country. At present, about 37% of production of natural gas is used as fuel for electricity generation of the country.**
- Demand and Supply scenario: 500 MMCFD shortage of natural gas.

Currently, the country has a shortage of 500 MMCFD against a demand of 2,500 MMCF as the available production is about 2,000 MMCFD (as on 8-9/2/2011 production was 1987.5 MMCFD). It can also be mentioned that the expected growth rate of demand of gas is 6-7% annually.

Table: Gas production, consumption and demand in Bangladesh

Particulars	Unit	2005	2006	2007	2008	2009
Gas Production	(Billion Cubic Feet)	494.41	541.02	574.57	632.13	697.47
Gas Consumption	(Billion Cubic Feet)	494.41	541.02	574.57	632.13	697.47
Gas Demand	(Billion Cubic Feet)	N/A	N/A	N/A	N/A	915.50

Source: <http://www.eia.doe.gov>

### 2.4 Tariff Structure

Following table represents the existing tariff structure of gas at consumer end in Bangladesh.

Table: Existing tariff structure of gas

Sl No	Consumer Class	BDT/MMCF
1	Power (BPDB, IPP) (per unit of MMCF)	79.82
2	Fertilizer, (per unit of MMCF)	72.92
3	Captive Power, SPP (per unit of MMCF)	118.26
4	Industry, (per unit of MMCF)	165.91
5	Tea Garden, (per unit of MMCF)	165.91
6	Commercial, (per unit of MMCF)	268.09
7	Household (meter wise)	146.25
8	Household one stove (per month)	400.00
9	Household two stove (per month)	450.00
Effective from August 1, 2009		

Source: [www.titasgas.org.bd/tariff.htm](http://www.titasgas.org.bd/tariff.htm)

## 2.5 Third round offshore bidding

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- In 1993, after the formation of a new National Energy policy, the government of Bangladesh divided its territory and offshore sites into 23 blocks and opened them to foreign bidding for oil and gas exploration.
- During the First Bidding Round in 1993, eight blocks were awarded to four companies through PSCs. In 1997 during the Second Bidding Round, three PSCs were awarded covering four additional blocks. The government planned to hold a third round of bidding focusing on the offshore Bay of Bengal region.
- In the third round bidding, the country's maritime area has been divided into 28 blocks for the hydrocarbon exploration. Of the blocks, eight are located in the shallow waters while the rest in the deep-sea area.
- The third round bidding process was conducted under the model PSC-2008 in which it was proposed that per unit (MMCF) gas price would be at US\$4. The price was calculated keeping in mind of the oil price at US\$180 per tonne. The IOCs were asked to submit their bid documents in February 2008, which was opened on May 7, 2008. Seven IOCs submitted their bid documents and offers of the ConocoPhillips and the Tullow were found attractive.
- The US oil company ConocoPhillips and the Irish oil company Tullow were the successful bidders. The US Company will be awarded eight blocks to conduct different types of exploration activities in the deep-sea regions. These are blocks 10, 11, 12, 15, 16, 17, 20 and 21. The Tullow will be awarded block 5 of the deep-sea region.

## 2.6 Recent developments

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- Facing the shortage of gas supply, the government has restricted new gas connections from July, 2010. Also, both industries and home dwellers are facing acute gas crisis presently.

From August 16, 2010 the government has decided to close the CNG filling stations across the country, except for those in Sylhet, for 6 hours between 3:00pm and 9:00pm during the month of Ramadan. Currently, the CNG filling stations are closed for 3 hours from 6:00pm to 9:00pm.

From January 27, 2011 gas rationing has started in textile and readymade garment (RMG) sector to ensure a quality supply of the fossil fuel for industrial and household uses.

- In June 2010, US oil company Chevron offered a way out to combat gas crisis. The company said it can increase gas production within 2013 by a staggering 940 mmcf, almost half the country's present consumption. But to make it a reality, the government has to set up at least one cross-country pipeline to transmit gas from Sylhet to the central region. Construction of such a pipeline will require \$100-150 million. The energy ministry had given it a primary nod suggesting that Titas could work on it.

- The US oil company Chevron has started drilling an exploratory well at the potential Kajol structure in the southern Patuakhali district aimed at determining the actual gas reserve and the locations for developing wells. Based on a preliminary assessment we are hopeful of some 0.50 trillion cubic feet (tcf) of reserve at the Kajol structure under block-7, situated in Barisal, Patuakhali, Jhalakathi and Pirojpur districts.

## 2.7 Natural Gas Outlook

- At the present consumption rate and taking into account of 10% growth rate of gas consumption, remaining recoverable gas would be sufficient for the rest 9 years (from 2011 to 2019).

Table: Yearwise remaining recoverable reserve of natural gas

Particulars	2010	2011	2012	2013	2014
Beginning Remaining Recoverable Reserve (TCF)		11.48	10.68	9.79	8.82
Growth Rate of Consumption		10%	10%	10%	10%
Yearly Consumption (TCF)	0.73	0.80	0.88	0.97	1.07
Ending Remaining Recoverable Reserve (TCF)	11.48	10.68	9.79	8.82	7.75
Particulars	2015	2016	2017	2018	2019
Beginning Remaining Recoverable Reserve (TCF)	7.75	6.58	5.28	3.86	2.30
Growth Rate of Consumption	10%	10%	10%	10%	10%
Yearly Consumption (TCF)	1.18	1.29	1.42	1.56	1.72
Ending Remaining Recoverable Reserve (TCF)	6.58	5.28	3.86	2.30	0.58

Source: Research, IDLC

- If we account for increased consumption of gas in the coming years because of new gas fired power plants, and if the projected exploration ventures do not yield significant positive results or existing gas fields fail to prove presently estimated reserve, the deficit of supply might be felt earlier.
- If significant gas discovery cannot be made to enhance the existing reserve base of gas, Bangladesh may have to think about import of gas as the country to keep up its GDP growth rate of 6%.
- Ministry of Power, Energy and Mineral Resources has told that a total of 2,323 million cft gas would be added to the national grid by the year 2015 to meet the growing demand of gas.

Under the short term programme till December 2010, additional 158 MMCFD gas would be produced. Under the mid term programme to be completed by June 2013, an additional 585 MMCFD would be produced and an additional 500 MMCFD of LNG gas would be imported. Under the long term programme by 2015, an additional 1,080 MMCFD gas would be produced.

### 3. Electricity

#### Highlights

- During FY 2010, maximum shortfall of electricity (in summer) was 2,123 MW which was around 33% of the peak demand.
- Daily shortages of electricity and list of problems coming with it are largely due to the lack of investments in new power generating capacity over the last decade.
- Electricity generation is highly dependent on gas supply.
- 25% of the current capacity is more than 20 years old resulting in temporary shutdown or outage and high maintenance cost.
- Per unit electricity generation cost is higher than per unit electricity selling cost making subsidy requirements from Government of Bangladesh.
- Industry is profitable but highly dependent on regulation set by the regulatory authority.
- To combat present and future electricity crisis, it was planned that power plants with installed capacity of 14,720 MW will be added by the year 2016.
- According to the plan, the country will have surplus electricity generation capacity from the year 2013.
- Projected addition of electricity by the year 2016 is dependent on availability and uninterrupted supply of gas in a cost efficient manner. However, outlook of gas industry reveals that Bangladesh is going to face acute gas crisis in future if there is no further discovery of gas.

Table: Contribution of electricity in GDP and its growth rate

Particulars	Unit	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09 (Provisional)
Contribution of electricity in GDP	(%)	5.96	6.63	6.43	6.19	5.74	5.80
Growth Rate of Electricity	(%)	0.71	0.77	0.80	0.87	N/A	N/A

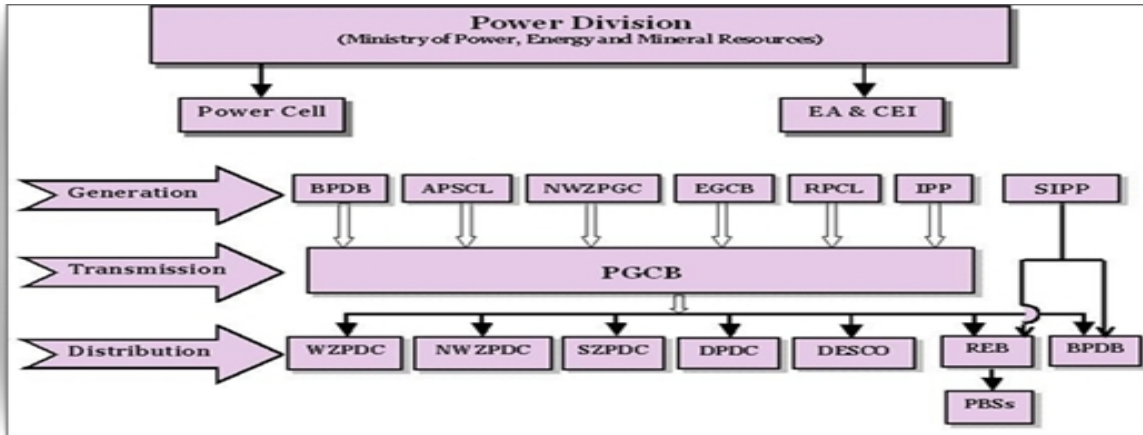
Source: Bangladesh Bureau of Statistics

### 3.1 Industry Organization

**Power Division** under Ministry of Power, Energy and Mineral Resources is responsible for formulating policy relating to power and supervise, control and monitor the developmental activities in the power sector of the country.

**Power Cell** has been created by the government under Power Division for Implementation of Bangladesh power sector reform.

Following figure represents electricity industry organization.



Source: [www.powerdivision.gov.bd](http://www.powerdivision.gov.bd)

- Generation**

**Source of energy of installed capacity: High dependency on gas.**

As on February 13, 2011 total installed capacity was 6,516 MW and present capacity was 5,945 MW. 74.38% of installed capacity and 74.21% of present capacity are dependent on gas.

It can be mentioned that gas-fired power costs half of that produced by furnace oil-fired power. Furnace oil-based power costs half of that produced by diesel.

Table: Source of energy of electricity generation.

Source of Energy	Installed Capacity (MW)	% of Total Installed Capacity	Present Capacity (MW)	% of Present Capacity	Shutdown Capacity (MW)	Running Capacity (MW)	% of Total Running Capacity
Gas	4,847	74.38%	4,412	74.21%	792	3,620	74.23%
Coal	250	3.84%	220	3.70%	100	120	2.46%
HFO	275	4.22%	271	4.56%	0	271	5.56%
HSD	594.5	9.12%	567	9.54%	16	551	11.30%
FO	170	2.61%	95	1.60%	60	35	0.72%
GT	150	2.30%	150	2.52%	0	150	3.08%
Hydro	230	3.53%	230	3.87%	100	130	2.67%
<b>Total</b>	<b>6,516.5</b>	<b>100%</b>	<b>5,945</b>	<b>100%</b>	<b>1,068</b>	<b>4,877</b>	<b>100%</b>

Source: IDLC Equity Research, BPDB. Date: February 13, 2011

**Electricity generation: Public sector contributes the major portion of the pie.**

Bangladesh Power Development Board (BPDB) with its generation subsidies contributes 59% of the total electricity generation while, private sector constitutes of Independent Power Producer (IPP), small independent power projects (SIPP) and Rental Power Plants (RPP) contributes the rest 41%. The cost of electricity up to consumer point is around Tk 5.50 per KWHr (unit).

**Age of power plants: 25% of the capacity has more than 20 years life.**

Following table shows the age schedule of power plants of Bangladesh. We can see that nearly 25% of the power plants are 20 years of old and hence subject to temporary shutdown and high maintenance cost.

Table: Age schedule of existing power plants.

Age of power plants	
Age group( years)	Installed capacity(MW)
40+	80
31-40	305
21-30	1105
11 to 20	1378
01 to 10	3068
Total	5936

Source: BPDB, January 2011.

- Defining IPP, Rental Power Plants and Captive Power Plants**

An Independent Power Producer (IPP) is an entity, which is not a public utility, but which owns facilities to generate electric power for sale to utilities and end users. Commonly, IPPs generate electricity from renewable sources such as wind, solar, geothermal or biomass, or from traditional sources like coal, oil, gas or hydroelectric. Implementation agreement is guaranteed by the government.

Rental power plants are set up to meet short-term and emergency requirements of a country and are typically commissioned within 4-6 months based on available technology. Rental periods are normally 5-7 years depending on the country’s need. Generally, the power producing equipments are easily moveable and quickly installable. Implementation agreement is guaranteed by any utility economic entitiy (like BPC) not by the government.

Captive power plants are those power plants which operate independent of wheeling to national grid. They are mostly meant by in-house power generation for industry. If excess electricity is generated and transmission line to national grid is available, excess power can be sold to utility company subject to the agreement between the two.

- Transmission**

Power Grid Company of Bangladesh, one of the subsidiaries of BPDB, has the sole responsibility to build up the national electricity grid for the uninterrupted transportation of electricity in a safe, reliable and economical way.

As on December 31, 2010, the company had 2,647.3 km of 230 kV and 5,788 km of 132 kV transmission line.

- **Distribution**

Dhaka Electric Supply Company (DESCO) is responsible for distribution of electricity in Mirpur and Gulshan area of the Metropolitan City of Dhaka.

Dhaka Power Distribution Company Limited (DPDC) is responsible for distribution of electricity to southern part of the capital city of Dhaka and adjoining townships of Narayanganj and Tongi.

Rural Electrification Board (REB) is responsible for distribution of electricity in rural areas through a system of co-operatives known as Palli Biddyt Samities (PBS).

Other than the above, distribution subsidiaries of BPDB are responsible for electricity distribution in the specific areas those cover.

### **3.2 Industry Competitive Structure And Profitability**

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- **Electricity industry: Regulated Natural Monopoly.**

Industry players are natural monopoly regulated by Ministry of Power, Energy and Mineral Resources. The tariff structure represents marginal cost pricing rule and price discrimination policy. Though, social deadweight loss is created because of marginal cost pricing, price discrimination lowers the deadweight loss of natural monopoly.

But, as the natural monopoly incurs loss because of this pricing tool, the government provides necessary subsidy. By applying marginal cost pricing rule along with price discrimination, efficiency gain is achieved for the society which must be counted against the deadweight loss created by the collected tax to provide the subsidy.

- **Industry structure and profitability: Poters' 5 factor model**

Degree of actual and potential competition is very low because of following reasons,

- i. The industry is highly regulated and tariff (price) is determined by the regulatory authority. Jurisdiction of each company is also defined by the regulator.
- ii. No form of rivalry exists among the existing firms.
- iii. Threat of new entrants in the production and distribution side is low because of capital intensive nature of business. Also, degree of actual and potential competition is low as license to produce and distribute electricity is awarded by the regulatory authority which limits threat of new entrants. However, acute competition is witnessed to get license.
- iv. Threat of substitute products is also negligible.



Bargaining power of input and output market is also limited because of regulation,

- Bargaining power of the buyers is very low as consumers have to pay the tariff fixed by the regulator,
- Because of the dependency on the natural resources, bargaining power of the suppliers should be very high. But, regulatory authority controls the bargaining power of the suppliers. Moreover, interest of private electricity generators is protected by the Gas Supply Agreement (GSL) for uninterrupted supply of raw materials.

Overall, because of the low competition and lower bargaining power of the input and output market, profitability should be high. But, this profitability is also regulated by the regulatory authority because of wider economic welfare.

### 3.3 Future Plan

- **Planned power plants:**

To combat the existing power crisis, the government has declared future plan. According to the plan, power plants with installed capacity of 14, 720 MW will be added by the year 2016.

Table: Power generation Project up to 2016 (MW)

Calendar year wise project completion from 2010 to 2016								
Year	2010	2011	2012	2013	2014	2015	2016	Total
Public	255	851	838	1040	1270	450	1500	6204
Private	270	105	1072	1311	1123	1900	1300	7081
Quick rental	250	1185						1435
Total	755	2141	1910	2351	2393	2800	2800	14720

Source: BPDB

- **Fuel requirement: Gas requirement will be above 2 fold from now by 2016**

Because of the high dependency on gas, gas requirements for the power generation will also increase substantially.

Table: Future gas requirement for power plants

Gas requirement in coming years(MMCFD) include dual fuel IPPs										
SL	Description	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	General capacity	4652								
2	General addition		1139	1340	1950	1370	450	1500	750	750
3	Plant retirement		98	33	106	522	0	156	0	0
4	Gas based Generation	4652	5693	7000	8844	9692	10142	11486	12236	12966
5	Gas required considering retirement without	1217	1553	1809	2175	2392	2471	2735	2867	2999
6	Gas required considering retirement	1217	1526	1773	2111	2181	2260	2524	2656	2788
7	Net gas required considering retirement and 90% plant availability(MMCFD)	1095	1373	1596	1900	1963	2034	2272	2360	2509

Source: BPDB



- Required gas production and supply to power plants:

As on 8-9/2/2011, total requirement of gas for power plants was 1,076 MMCFD and total supplied gas to power plants was 711 MMCFD which was 55.64% and 36.76% of total gas distribution (1,934 MMCFD). Shortage of gas supply was 365 MMCFD which was 34% of the total gas requirement.

To fulfill the planned electricity generation, gas production and supply has to reach 5,680 MMCFD by 2016 and 6,272.5 MMCFD by 2018 if we consider a 40% gas allocation to the electricity generator plants. Probable scenario are presented below,

Table: Required gas production (in accordance with gas allocation to power plants)

Year		2016	2018	2016	2018	2016	2018
GAS Requirement for Power Plants	MMCFD	2272	2509	2272	2509	2272	2509
GAS Allocation Ratio to Power Plants	%	40%	40%	50%	50%	60%	60%
Total Required Gas Production	MMCFD	5680	6273	4544	5018	3787	4182

Source: IDLC Equity Research.

- Demand and Supply Condition:

In the FY 2010, maximum shortfall (in summer) was 2,123 MW or 33% of maximum demand of electricity. If the planned electricity generation comes true, the country will have surplus electricity from 2013 onward.

Table: Projected electricity demand and supply situation

Estimated demand supply gap up to 2016 (in MW) As on January, 2011							
Year	2010	2011	2012	2013	2014	2015	2016
Max demand with DSM(in April)	6454	6765	7518	8349	9268	10283	11405
Gen addition-public sector	255	851	838	1040	1270	450	1500
Gen. addition-private sector	520	1290	1072	1311	1123	1900	1300
Regional power imp				500			
Capacity retired		88	83	161	1292	128	1033
Gen.capacity(end of December)	5936	7989	9816	12506	13607	15829	17596
Net	5699	7669	9423	12006	13063	15196	16892
Dependable capacity(End of Dec)	4331	5905	7350	9485	10450	12157	13514
Max surplus/shortfall(In summer)	-2123	-860	-168	1136	1182	1874	2109
	-33%	-13%	-2%	14%	13%	18%	18%

Source: BPDB

- Power system master plan (PSMP)

Ministry of Power, Energy & Mineral Resources has disclosed Power System Master Plan (PSMP) which is updated on an yearly basis. The PSMP Update was prepared by a consultant Nexant in collaboration with BPDB, PGCB Ltd in association with Bangladesh Engineering & Technology Services in June 2006.

PSMP states that it plans to generate 20,000 MW of electricity by 2020 and 35, 000 MW of electricity by 2030.

### **3.4 Recent Developments**

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- From the January, 2009, the GOB has signed deals to set up 33 power plant projects to generate 3,265 MW of electricity of which 265MW are rental, 1,435 MW are quick rental and 1,535 MW are of public sector. Twenty five of the new plants or 75 per cent of the total plants will be run either by diesel or furnace oil.
- The Asian Development Bank (ADB) will assist Bangladesh to generate 500 MW of electricity from solar power plants by 2012.
- Government has proposed Speedy Supply of Power and Energy (Special Provision) Bill – 2010. The activities and actions taken under this cannot be challenged in the court. Also, the government will have the authority to bypass any existing laws of the land that impedes the execution of power projects including Public Procurement Act, 2006 to implement the power and energy projects.
- The revenue board has decided to waive 15% of Value Added Tax on furnace oil production and local sale in a bid to facilitate power plants' purchase of the alternative fuel at lower cost. There will be a requirement of 1 million tones of furnace oil in the year 2011 to run 16 quick rental power plants which are under pipeline. The government has planned to produce 4,270 MW of electricity by 2015 with diesel and furnace oil to meet the demand of electricity.
- The government is at risk of a large sum of money as compensation to Rental Power Plants sponsors for its failure to arrange necessary fuel supply to the plants.
- In a move to raise electricity tariff by 12% every six months upto 2013, Bangladesh Energy Regulatory Commission (BERC) has raised power tariff by 11% for bulk consumers and 5% for retail consumers effective from February 1, 2011. The regulatory authority has also ordered a further hike of bulk tariff by 6.66% from August 1, 2011.

- Techknow Industrial SDN Bhd, a Singapore based company, has proposed Bangladesh to set up a sea wave-based mega power plant with a capacity to generate 1000MW of electricity.
- Recently, Bangladesh and Russia has struck an agreement to install the country's first nuclear power plant to generate around 2,000 MW of electricity at Rooppur in Pabna. The plant is expected to be completed by 2017-18.
- It is expected that a dozen of quick rental power plants with a total capacity of 960 MW would come into operation within April, 2011. Commencement of these quick power plants would support peak demand of electricity during April, 2011.

### **3.5 Industry Outlook**

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- With a minimum 10% of electricity demand growth, electricity demand forecast is 11,433 MW by 2016. If we want electricity supply on an uninterruptible basis, we must have at the least 25% more active but redundant generation capacity to enable the plants to have regular needed maintenance and repair. So, we must have 14,291 MW of electricity generation capacity in 2016 for uninterruptible electricity supply.
- Outlook of the industry is positive but highly dependent on the implementation of the planned power plants. For the implementation of the planned power plants, uninterruptible fuel supply is a must. About 4.8 million tones of petroleum oil will be required for 2011, up by 1.05 million tones from the previous year's demand. Also, gas production and supply has to be increased.
- For the sustainable electricity supply, we need to implement coal based power plants which will reduce dependency on gas. In the long term, we need to shift to nuclear power plants and renewable fuel based power plants like, wind, solar energy, sea wave etc.

## 4. Petroleum (Oil)

### Highlights

- Bangladesh has low level of domestic reserves of petroleum along with insignificant production capacity. Relatively, high level of consumption has made it a net oil importer country.

### 4.1 Industry organization

- Exploration, Production and Import

Exploration and production activities are primarily carried out by the Bangladesh Petroleum Exploration and Production Company (BAPEX). However, the country has also initiated several Production Sharing Contracts (PSCs) with foreign oil companies. Bangladesh Petroleum Corporation (BPC) is responsible for import of petroleum products.

- Refining and Blending

Under a Processing Agreement with BPC, Eastern Refinery Limited ERL processes crude oil imported by BPC and delivers the finished petroleum products to the other subsidiaries of BPC for marketing and distribution. Also, Eastern Lubricants Blenders Limited (ELBL) and Standard Asiatic Oil Company Limited (SAOCL) are responsible for blending of Lubricating Oils and greases on behalf of Petroleum Marketing Companies.

- Distribution

In the downstream, Padma Oil Company Limited (POCL), Jamuna Oil Company Limited (JOCL), Meghna Petroleum Limited (MPL) and LP Gas Limited (LPG) is participating in distribution activities of petroleum products.

### 4.3 Selected statistics of Petroleum of Bangladesh.

Following table represents key statistics of petroleum of Bangladesh.

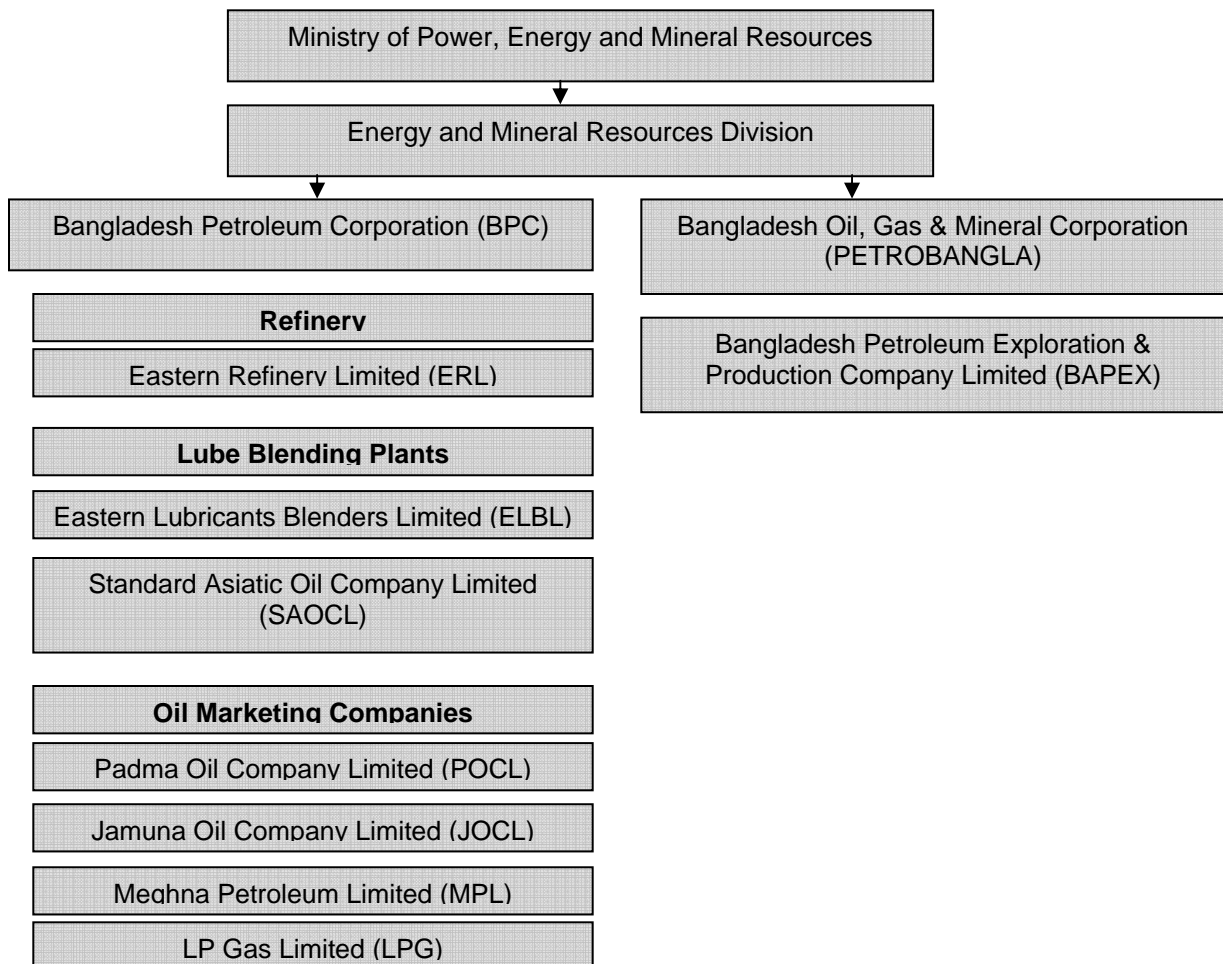
Particulars	Unit	2005	2006	2007	2008	2009
Proved Reserve of Crude Oil	Billion Barrels	0.028	0.028	0.028	0.028	0.028
Production	'000 Barrels Per Day	6.76	6.73	6.72	6.39	5.72
Consumption	'000 Barrels Per Day	86.76	90.77	90.76	93.00	96.00
Import (Refined Petroleum)	'000 Barrels Per Day	57.26	62.60	64.27	NA	NA
Import (Crude Oil)*						
Export	'000 Barrels Per Day	1.35	2.61	2.77	NA	NA

\* Import of Crude Petroleum Commodities

Fiscal Year	Quantity (Metric Ton)	C&F Price (million USD)	BDT in Crore
2004-05	10,63,208	364.01	2261.98
2005-06	12,53,285	552.12	3750.69
2006-07	12,11,037	659.09	4455.06
2007-08	12,41,815	912.50	6179.12
2008-09	8,60,877	494.44	3431.40

Source: Economic Review FY 09, Ministry of Finance, GOB.

- Relationship among the companies and regulatory authority in Petroleum



## 4.2 Petroleum Outlook

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- In 2011, BPC has to import around 4.8 million tones of petroleum oil which was 3.75 million tones in the previous year. Installation of a good number of liquid fuel based power plants is the main reason for such increase in petroleum oil import. In 2012, the BPC's import will increase further by 1.0 million tones.
- Because of the present turmoil in the Middle-East and Africa, petroleum price will be inflated further which will increase import bill of BPC.
- If the government increases its subsidy in the petroleum, then profitability of the companies operating in the refining and distribution will increase because of volume increase. Also, if the increased petroleum cost is transferred to the end-users, profitability of the existing companies in refining and distribution will also increase.

In the absence of increased subsidy and price hike in the retail end, profitability of the existing companies in the value chain will shrink.

## 5. Coal

### 5.1 Reserve estimate

According to Bangladesh's National Energy Policy 2004, total coal reserves of coal are 2, 527 million tones of which major portion is deposited in Barapukuria, Phulbari, Jamalganj and Khalaspir fields.

Table: Reserve and production of coal of Bangladesh.

Name of Coal Field	Reserve (million tons)	Production/annually (million tons)
Barapukuria	390	1
Phulbari	400	
Jamalganj	1000	
Khalaspir	450	
Others	287	
<b>Total</b>	<b>2,527</b>	

### 5.3 Production and Development

Barapukuria Coal Mining Company Limited (BCMCL) is operating Barapukuria Coal Field and annual production from this field is one million tones annually. Asia Energy Corporation (Bangladesh) Proprietary Limited is developing Phulbari Coal Field. Other than these two, majority of Jamalganj and Khalaspir resources are in too deep to be mined.

### 5.4 Coal Policy and coal fired power plants

- In the absence of coal policy, development of the sector was long pending over the years. Finally, draft of coal policy has been prepared and currently is under review.
- Currently, the country generates only around 250MW of electricity using coal as fuel from its lone coal-fired power plant at Barapukuria. Once the coal policy is finalized, it is planned that following coal fired power plants would be implemented:

Table: Coal fired future power plants

SI No	Name of Power Plants	Capacity (MW)	Ownership	Types of Fuel	Expected Commissioning Date
1	Barapukuria 250-300 MW (3 <sup>rd</sup> Unit)	250	BPDB	Coal	December, 2013
2	Chittagong	1300	PPP (Joint Vent.)/ IPP	Coal	June, 2015

3	Khulna South	1300	PPP (Joint Vent.)/ IPP	Coal	December, 2015
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Source: BPDB

## **6. Concluding Remark**

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From the above findings, it may be concluded that because of the lack of prudent policy making and implementation, the country is facing energy shortage right at this moment. Sustainable energy growth is a must for the sustainable economic growth.

For a sustainable energy growth, the country would have to shift to renewable source of energy while, an excellent mix of various source of energy in the intermediate period is essential to support current economic development.



## 7. Glossary

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- **Natural Monopoly**

A natural monopoly arises where the largest supplier in an industry, often the first supplier in a market, has an overwhelming cost advantage over other actual and potential competitors. This tends to be the case in industries where capital costs predominate, creating economies of scale that are large in relation to the size of the market, and hence high barriers to entry.

Examples include public utilities such as water services and electricity. It is very expensive to build transmission networks (water/gas pipelines, electricity and telephone lines); therefore, it is unlikely that a potential competitor would be willing to make the capital investment needed to even enter the monopolist's market.

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