

## **CHAPTER 10**

### **POWER AND ENERGY**

*[Power and energy are crucial to the socio-economic development of the country as well as to the enhancement of living standard. According to the provisional estimates released by BBS, in FY 2013-14, the contribution of power sector to GDP was 1.23 percent at constant price while the contribution from Natural Gas and Crude Petroleum, Coal and other Mineral resources together was estimated at 1.64 percent. Both the sectors posted growth rates of 8.16 percent and 5.22 percent respectively in FY 2013-14. There is a huge demand for power, oil, gas and other mineral resources in various sectors of the economy including agriculture, industry, transport and communication. As the total demand for power is on the increase, the Government has given top priority to the development of power sector. A policy has been formulated to encourage private sector to generate electricity under public-private partnership (PPP), rental power producer (RPP), and independent power plant (IPP) arrangements. Side by side, the demand for petroleum products, gas and other energy products are also increasing day by day. Achieving the avowed goal of transforming Bangladesh into a middle income country according to Vision 2021 declared by the Government is closely linked to meeting the escalating demands for power and energy. The Government has therefore, charted out short, medium and long term plans for the development of power and energy sectors. Besides, it has also given top priority to augment investment in these sectors.]*

#### **Power Sector**

In this modern era economic and development activities of a nation largely depend on supply of electricity. In FY 2013-14 about 68 percent of the total population of the country has access to electricity (including renewable energy) and per capita electricity generation is 348 KWh, which is still low compared with other developing countries. Recognising this fact, the Government as in the previous tenure has taken necessary initiatives to reform and restructure the power sector. In order to fulfill the vision and election manifesto target, the Government has planned to generate additional 24,000 MW electricity within 2021 under short, medium and long term planning and committed to make electricity available to all by 2021. The electricity generation capacity has exceeded the target (8,000 MW within the year 2015) and reached to 10,341 MW by June 2014. Up to June 2014 total 9,380.7 circuit kilometers transmission lines and 3,17,928 kilometers distribution lines with necessary infrastructure have been constructed.

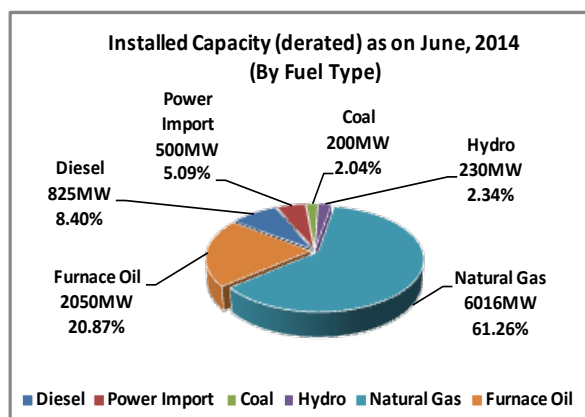
#### **A. Generation**

##### **Generation Capacity and Demand**

In FY 2013-14 total derated capacity of power generation was 9,821 MW including 5,230 MW in public sector and 4,091 MW in private sector. Up to June 2014, maximum generation was 7,356 MW on 30th March 2014. The installed capacity by fuel type and installed capacity by ownership for FY 2013-14 are shown in Figures 10.1 and 10.2 respectively.

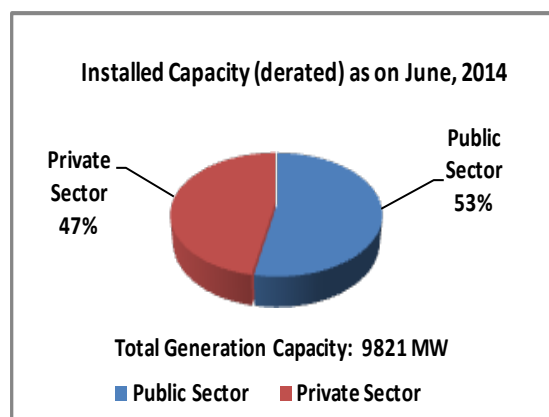
**Figure 10.1: Installed Generation Capacity (derated)**

(Based on type of fuel consumes)



**Figure 10.2: Installed Generation Capacity (derated)**

(Based on ownership)

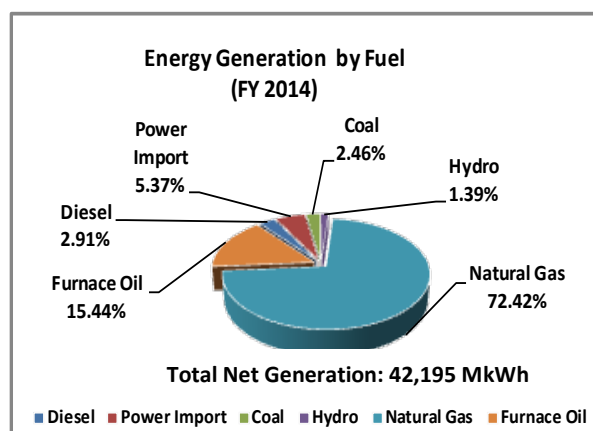


Source: Bangladesh Power Development Board (BPDB) Source: Bangladesh Power Development Board (BPDB)

## Power Generation

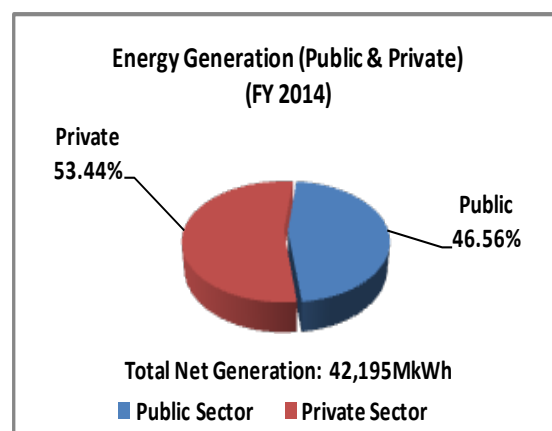
The net energy 42,195 MKWh was generated in total from public and private sector power plant during FY 2013-14 out of which 47 percent power generated by public sector power plants. The share of gas, hydro, coal, power import from India and oil based energy generation were 72.42 percent, 1.39 percent, 2.46 percent, 5.37 percent and 18.35 percent respectively. In FY 2012-13, 38,229 MKWh net energy was generated. Energy growth in FY 2013-14 was about 10 percent. Net energy generation is shown in Figures 10.3 and 10.4 respectively.

**Figure 10.3: Generation by Fuel Type (FY 2013-14)**



Source: Bangladesh Power Development Board (BPDB)

**Figure 10.4: Generation by Ownership (FY 2013-14)**



Source: Bangladesh Power Development Board (BPDB)

## Fuel Consumption for Power Generation

Fuel consumption pattern in power generation has been changed significantly over the years. The natural gas consumption in Public sector power plant was 107 billion cubic feet in 1995-96, which has increased to 182 billion cubic feet in FY 2013-14. The consumption of natural gas and liquid fuel since FY 1995-96 are given in Table10.1.

**Table 10.1: Fuel Consumption by Public Power Plants**

FY	Natural Gas (Billion cft)	Coal (1000 Ton)	Liquid Fuel (million liter)	
			Furnace Oil	HSD, SKO & LDO
1995-96	107	-	76	201
1996-97	107	-	125	304
1997-98	120	-	109	320
1998-99	137	-	53	245
1999-00	141	-	137	111
2000-01	151	-	114	92
2001-02	152	-	102	66
2002-03	131	-	154	74
2003-04	134	-	209	114
2004-05	141	-	230	124
2005-06	154	190	205	150
2006-07	146	510	112	119
2007-08	151	450	137	112
2008-09	161	470	90	113
2009-10	167	480	10	125
2010-11	150	410	119	138
2011-12	151	450	183	60
2012-13	176	592	266	35
2013-14	182	540	425	173

Source: BPDB, Power Division

## Maximum Generation

For the last few years, though for few times electricity generation was sufficient but due to capacity constraint of transmission and distribution line and sub-station electricity could not be supplied to the consumers. In spite of having sufficient generation electricity could not be supplied to the consumers due to transmission and distribution bottleneck. From the historic data it is found that in 1995-96 maximum generations was 2,087 MW which is increased to 7,356 MW in 30th March 2014. The installed capacity (derated) and maximum generation since FY 1995-96 are given in Table10.2.

**Table10.2: Installed Capacity (Derated) and Maximum Generation**

FY	Installed Capacity (derated) MW	Maximum Generation (MW)
1995-96	2105	2087
1996-97	2148	2114
1997-98	2320	2136
1998-99	2850	2449
1999-00	2665	2665
2000-01	3033	3033
2001-02	3218	3218

<b>FY</b>	<b>Installed Capacity (derated) MW</b>	<b>Maximum Generation (MW)</b>
2002-03	3428	3458
2003-04	3592	3622
2004-05	3721	3751
2005-06	3782	3812
2006-07	3718	3718
2007-08	4130	4130
2008-09	5166	4162
2009-10	5271	4606
2010-11	6639	4890
2011-12	8100	6066
2012-13	8537	6434
2013-14	9821	7356

Source: BPDB, Power Division

### Future Power Generation Programme

The Government has prepared Power System Master Plan 2010 to realise the goal to provide access to electricity to all. According to the Power System Master Plan (PSMP-2010) study, the maximum demand in 2015, 2021 and 2030 would be about 10,000 MW, 19,000 MW and 34,000 MW respectively. To meet the demand with reasonable reliability, generation capacity will be increased to 24,000 MW and 39,000 MW by the year 2021 and 2030 respectively. To meet this demand of electricity short, medium and long term generation, transmission and distribution and lines expansion projects are in the various stages of implementation. According to the existing generation expansion programme, about 17,155 MW new generation will be added to the national grid from 2014 to 2021.

**Table10.3: Power Generation Projections**

<b>Sl. No.</b>	<b>Items</b>	<b>2013-14</b>	<b>2020-21</b>
1.	Installed Capacity, MW	10,341	24,000
2.	Maximum Demand, MW	7,500	20,000
3.	Net Generation, MKWh	42,195	72,222
4.	Transmission Line, ckt. Km.	9,380.70	12,000
5.	Grid Substation Capacity, MVA		
	(a) 400 KV & 230 KV	9,325	19,075
	(b) 132 KV	12,983	27,367
	(c) HVDC substation capacity (MW)	500	1,100
6.	Distribution Line, KM	3,17,928	477,558
7.	Number of Consumers (in lakh)	154.07	207
8.	Number of Village Electrified	50,564	84,323
9.	Per Capita Generation, KkWh (including captive)	348	600
10.	Access to Electricity (including renewable energy)	68%	100%

Source: BPDB, Power Division

### Ongoing Projects

There are several projects which are under construction both in public and private sector and they are expected to come into operation shortly. Among them Bhola 225 MW CCPP, Ashugonj225 CCPP, Kodda, Gazipur 150 MW Power Plant, Siddirganj335 MW CCPP,

*Ghorasal 300-450 MW CCPP, Bheramara 360 MW CCPP, Bibiana 300-450 MW CCPP (2nd Unit) Unit, Khulna 630 MW Coal Fired Power Project, Maowa, Munshiganj 300-650 MW Coal Fired Power Project etc. are mentionable.*

## **B. Transmission System**

### **Power Grid Company of Bangladesh Ltd. (PGCB)**

Power Grid Company of Bangladesh Ltd. (PGCB) is responsible for operation, maintenance and development of transmission system all over Bangladesh. At present power generated in different power plants all over the country is transmitted to the national grid through 400 KV, 230 KV and 132 KV transmission lines. In 1996 when PGCB was formed, the total lengths of 230 kV and 132 kV line were 838 ckt km and 4,755 ckt km respectively. At the end of June 2014 the lengths of 400 kV, 230 kV and 132 kV transmission lines are 164.7 ckt km, 3,066 ckt km and 6,150 ckt km respectively. The total length of the Optical Ground Wire (OPGW) installed in the transmission line from 1996 to June, 2007 was 2,200 km. This has been increased to 4,200 km upto June, 2010 after completing the NLDC project. Now, the length of OPGW has become about 4,750 km. Therefore, the major parts of the country are covered by the PGCB optical fiber network.

## **C. Distribution**

At present the following five organisations are responsible for electricity distribution:

1. Bangladesh Power Development Board (BPDB)
2. Bangladesh Rural Electrification Board (BREB)
3. Dhaka Power Distribution Company (DPDC)
4. Dhaka Electric Supply Company (DESCO)
5. West Zone Power Distribution Company (WZPDC)

### **Distribution Projects**

An integrated power distribution programme has been undertaken to increase the distribution network in order to bring more people under electrification as well as improving the customer service. Up to June 2014, about 154.07 lakh consumers are connected with the grid through construction of 3,17,928 kilometer distribution lines.

### **Operational Activities**

The performance of the distribution entities has been increased appreciably due to relentless effort of monitoring of the Government. Distribution entities have already been taken various steps to improve electricity distribution system, consumer satisfaction, system loss and accounts receivable. At a glance achievement of distribution sector is shown in Table 10.4.

**Table10.4: Overall Achievement of Distribution Sector**

Total Distribution Lines	3,17,928 KM
Total Consumers	154.07 Lakh
Irrigation Consumer	2.68 Lakh
Access to electricity (including renewable energy)	68%
Distribution Loss (overall)	11.96%
Accounts Receivable (overall)	2.37 Equivalent months

Source: Power Division

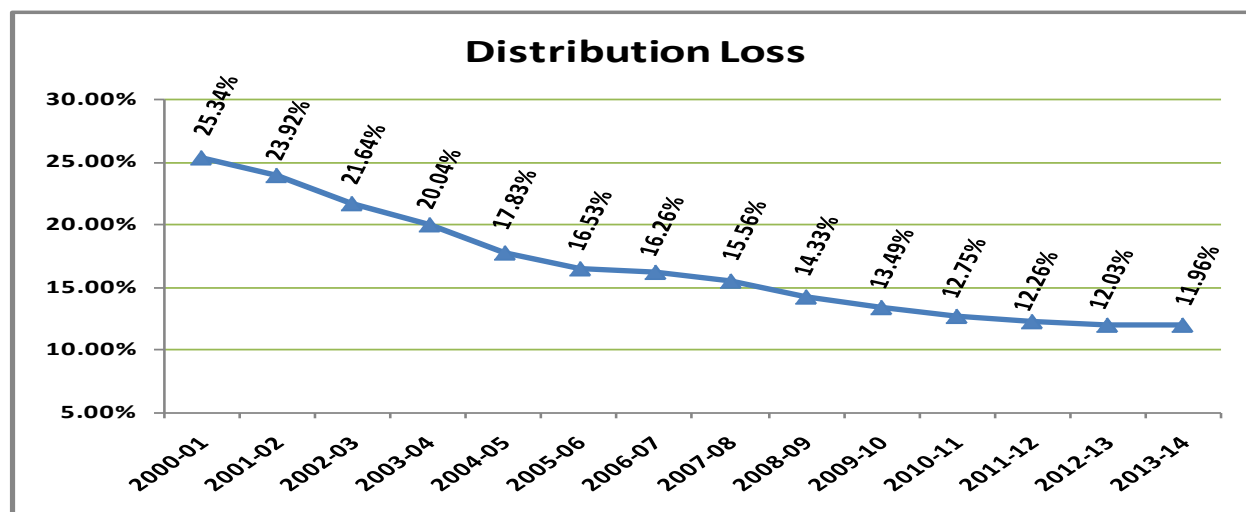
**System Loss**

System loss is one of the key performance indicators of the distribution entities. To achieve desirable performance and viability of the sector, there is no alternative to bring down the system loss to an acceptable limit. Various measures like continuous performance monitoring of the utilities, reforms and target-oriented measures are implemented to reduce the system loss. The system loss (distribution) has come down to 11.96 percent in FY 2013-14 from 25.34 percent in FY 2000-01 which is shown in Table 10.5.

**Table10.5: Year-wise System Loss Statistics**

FY	Distribution	Transmission	Total Loss
2000-01	25.34%	-	28.43%
2001-02	23.92%	-	27.97%
2002-03	21.64%	3.79%	25.69%
2003-04	20.04%	3.48%	24.49%
2004-05	17.83%	3.42%	22.79%
2005-06	16.53%	3.44%	21.25%
2006-07	16.26%	3.15%	20.25%
2007-08	15.56%	3.51%	18.45%
2008-09	14.33%	3.06%	16.85%
2009-10	13.49%	3.08%	15.73%
2010-11	12.75%	2.66%	14.73%
2011-12	12.26%	2.96%	14.61%
2012-13	12.03%	2.94%	14.36%
2013-14	11.96%	2.74%	14.13%

Source: Power Division

**Figure 10.5: Year-wise Distribution Loss from FY2000-01 to FY 2013-14**

### **Power System Interface Meter**

Under 'Interface Meter Turnkey Project' 409 Interface Meters have been installed at all generating stations throughout the country and Dhaka distribution zone and transmission network at 230KV, 132KV and 33KV level. All the meters are connected with the main server located at *BidyutBhaban*, Dhaka under supervision of BPDB. Energy inflow/outflow, demand, voltage, current, power factor, meter tempering etc. may be known from the main server. BPDB, REB, DPDC, DESCO and WZPDC have individual workstation and can read real time data. The interface meters have been using as billing meters. As a result disputes of energy import-export reduced significantly and energy auditing system and operators' performance enhanced.

### **Remote Area Power Supply System (RAPSS)**

A good proportion of the populations lives in remote areas and sometimes isolated from main land. In order to bring these people under electricity coverage, the Government has approved Guidelines for Remote Area Power Supply System (RAPSS) in Private Sector in July 2007. Government has taken initiatives to establish solar mini-grid for remote off-grid area under RAPSS where grid expansion is not planned for next 15 to 20 years.

### **Pre-Paid Meter**

For optimum use of power consumption, BPDB installed about 46,000 pre-paid meters in Chittagong, Bogra, Sylhet and Sirajgonj. Besides, DESCO has installed about 17,687 pre-paid meters in *Uttara, Tongi, Gulshan* area and DPDC has installed about 5000 prepaid meters in *Azimpur* area. Another 35,000 Smart Pre-paid meters installation is underway. As the consumer purchase energy in cash before use, therefore, virtually there is no accounts receivable of pre-paid consumers. Moreover, due to introduction of pre-paid meters, system loss has been reduced significantly and also demand at consumer level reduced. Unified software for pre-paid meter is underway and in next five years big and medium consumers will be brought under this system.

## **D. Sustainable Energy**

### **Renewable Energy**

In the Government power generation plan emphasis has been given for the development of renewable energy resources. In this context renewable energy policy has been approved. According to the policy 5 percent of total electricity generation would come from renewable energy by the year 2015 and 10 percent by 2020. Sustainable and Renewable Energy Development Authority (SREDA) has been established under SREDA Act, 2012.

### **Achievement**

- Present power generation from renewable: 403 MW (including hydro)
- IDCOL and BREB are distributing Solar Home System (SHS) to the people living in the off-grid areas. IDCOL through different partner organisation has already distributed about 32 lakhs SHS and BREB distributed about 15 thousand SHS throughout the country.

- Installation of 450 KW solar systems in 15 *upazilas* Complex by BREB.
- Installation of 2MW wind project by BPDB.

### **Energy Efficiency and Energy Conservation**

Government has undertaken a number of initiatives for efficient energy use and reduced consumption of energy. Energy efficiency and energy conservation action plan, 2012 has been prepared with a target to save 10 percent of energy by 2015, 15 percent by 2021 and 20 percent by 2030. Some initiatives on energy efficiency and energy conservation are given below:

#### **a) Efficiency Improvement in Power Generation Sector:**

- Rehabilitation of old and inefficient power plant
- Repowering of old and inefficient power plant
- Conversion of simple cycle to combine cycle

#### **b) Efficiency Improvement in Transmission Sector:**

- Power sector improvement of through installation of capacitor bank/PFI plants
- Up gradation of transmission line and grid sub-stations.
- Automation of generation control system.

#### **c) Efficiency Improvement in Distribution Sector:**

- Up gradation of distribution line and sub-stations.
- Power factor improvement through installation of capacitor bank/PFI plants.
- Implementation of Pre-payment metering system.
- Reduction of technical and non-technical losses.

#### **d) Demand Side Management:**

- Replacement of inefficient incandescent bulbs by energy saving LED/CFL/Tube lights.
- Building Code has been updated incorporating Energy Efficiency and Solar Energy issues
- Increase awareness among the children by incorporating Energy Efficiency and Solar Energy issue in the academic curricula of School/*Madrassa*/Colleges.
- Installation of Solar Panel in the Government, Semi Government and autonomous organisations within next 3 years
- Use of CFL/LED in all ministries and power sector entities
- Conventional street lights will be replaced by LED and solar subsequently
- Increase public awareness for energy conservation
- Discourage use of incandescent bulb and electric heater gradually
- Limiting use of Air Conditioners keeping temperature not below 24<sup>0</sup> C



- Energy Star Rating in the electric appliances CFL and Electric Ballast is completed. Fan, Motors, Refrigerator and Air-condition is underway by BSTI.
- Discourage use of neon sign in the markets/ shopping malls at night.
- Closing of markets and shopping malls within 8 p.m.

## E. Rural Electrification

Most of the people of Bangladesh live in rural areas. Among other prioritised activities of Government, rural electrification has emerged as a unique activity. Through agricultural development, establishing small and cottage industries and various income generating activities rural people is improving their living standard and at the same time putting important role in eradication of poverty from the country. So to expedite rural development at the same time national development using power effectively, Bangladesh Rural Electrification Board (BREB) was formed in 1977. Presently BREB is trying to implement its objective through its activity on infrastructural development. Bangladesh Rural Electrification Board act have been passed in 10<sup>th</sup> November 2013.

Up to June 2014, BREB through 72 *PalliBidyutSamities* (PBS) have constructed 2,64,000 km lines in 50,564 villages across the country. A total of 1,01,49,129 connection were given up to June 2014, of whom the domestic connection was 86,92,620, commercial 9,02,389, irrigation 2,18,198, industrial 1,45,487 and other connections 1,90,435. Ten years statement on line construction, consumer connection target and achievement statement is shown in Table 10.6.

**Table 10.6: Physical Target and Achievement**

FY	Distribution Line (Km)			Consumer Connection		
	Target	Achievement	Decrease/Increase (-)/(+)	Target	Achievement	Decrease/Increase (-)/(+)
2004-05	15400	16260	554	650000	670263	-12020
2005-06	14500	15091	-1169	750000	741095	70832
2006-07	5476	4764	-10327	65000	453426	-287669
2007-08	5042	3089	-1675	245000	226252	-227174
2008-09	6116	5062	1973	368275	405990	179738
2009-10	2852	2713	-2349	420000	468563	62573
2010-11	2095	3028	315	180000	259548	-209015
2011-12	7700	10049	7021	269500	713713	464165
2012-13	10222	10279	230	300000	142899	-570814
2013-14	16971	17544	7265	600000	758932	616033

Source: Rural Electrification Board (REB), [Variance = Current year Achievement – Previous year Achievement]

## Purchase and Sale of Energy

Rural Electrification Board purchases energy from PDB and sells to its consumers (household, industry, agriculture, commercial and others). Table 10.7 shows the statistics of purchase and sale of electricity of REB during FY 2013-14.

**Table 10.7: Purchase and Sales of Electricity by Rural Electrification Board**

2013-14	Electricity Purchase (Mwh)		Sales of Electricity (Mwh)						Average System Loss of 70 PBSs (%)	
	Grid Meter	S/s Meter	Domestic	Industry	Commercial	Irrigation	Others	Total	Grid Meter	S/s Meter
July '13	1678449	1614373	796029	400504	107907	61561	1355	1367356	18.53	15.30
Aug '13	1569635	1515410	888997	288627	115500	47043	1391	1341558	14.53	11.47
Sep '13	1489532	1439866	818054	342014	107506	43939	1475	1312988	11.85	8.81
Oct '13	1417574	1365011	766768	311099	108338	27727	1457	1215389	14.26	10.96
Nov '13	1180685	1150304	664865	315330	98635	28246	1401	1108477	6.12	3.64
Dec '13	1191361	1159084	554006	355602	92819	40940	1391	7390509	12.31	9.86
Jan '14	1348702	1310600	567879	348805	95324	169199	1402	1182609	12.32	9.77
Feb '14	1303898	1267401	552296	320947	93110	228609	1369	1196331	8.25	5.61
Mar '14	1683072	1622113	537384	413322	100447	334957	1327	1387437	17.57	14.47
Apr '14	1821921	1756272	739513	378673	116004	310759	1574	1546523	15.12	11.94
May '14	1698988	1644651	808650	426625	120112	92844	1504	1449735	14.67	11.85
Jun '14	1675324	1616503	900807	368742	122690	35199	1531	1428969	14.70	11.60
Total	18059141	17461588	8595250	4270289	1278393	1421023	17158	15582113	13.72	10.76

Source: Rural Electrification Board (REB), Power Division

### Accounts Receivable and Accounts Payable of BREB

Table 10.8 shows the amount of BREB's accounts receivable and accounts payable during the period from FY 2000-01 to FY 2013-14.

**Table 10.8: Amount of Accounts Receivable and Accounts Payable of Bangladesh Rural Electrification Board**

Fiscal Year	Receivable Month	Receivable Amount (Tk.000)	Payable on Purchase Power (12 month average) (Tk.000)
2000-01	2.23	1864124	580795
2001-02	2.21	2349959	767100
2002-03	1.92	268177	1049579
2003-04	1.81	3022224	1213820
2004-05	1.85	3446585	1324081
2005-06	2.00	4288939	1528566
2006-07	1.72	3743158	1543398
2007-08	1.54	3765651	1750170
2008-09	1.55	4081795	2108864
2009-10	1.53	4770491	2474828
2010-11	1.48	5232594	2726788
2011-12	1.71	9826510	4902372
2012-13	1.53	9949627	5474525
2013-14	1.34	10182108	6343269

Source: Rural Electrification Board (REB), Power Division

### Projects under Implementation of BREB

BREB has been implementing 11 projects during FY 2013-14. Among the ongoing projects, the Rural Electrification Up-gradation Project (Rajshahi, Rangpur, Khulna and Barisal divisions) is going on in full swing. Through its implementation, a new line of 33kv and 11kv of 5,184 km under 33 PBS in the Rajshahi, Rangpur, Khulna and Barisal divisions has to be installed or the capacity of the existing line has to be raised. Besides, 50 new substations will be built and the

capacity of the existing 30 substations will be upgraded. Under the 1.8 Million Consumer Connection project enhancement of distribution line and consumer connection is proceeding rapidly. Under this project by this time 13,079 km distribution line and 19 sub-stations has been constructed and 34 of sub-station has been augmented.

### **Power Generation by BERB**

Under Financing of Bangladesh Rural Electrification Board and some *Palli Bidyut Samities*, Rural Power Company (RPCL) has been formed. By which 210 MW (combined cycle) in *Shamvuganj* in the Mymensingh District and 55 MW (Duel-Fuel) in *Kadda* in the Gazipur District in total of 265 MW power is Generated. From *Rauzan* of Chittagong PBS-2, 25.5 MW Power Plant has started commercial operation from 10 May 2013.

**Table 10.9: Individual Power Plants under BREB**

Sl. No.	Name of the Plant	Generation Capacity (MW)	Fuel Type
1.	Nawabganj Power Plant	55	Furnace oil
2.	Manikganj Power Plant	55	Furnace oil
3.	Munshiganj Power Plant	54	Furnace oil
4.	Rauzan Power Plant	25.5	HPO

Source: BREB

### **Oil, Gas and Mineral Resources Sector**

The main purpose of oil, gas and natural resource sector is to meet growing energy demand of the country by undertaking enhanced exploration activities based on modern seismic survey like 3D survey and development and appraisal of oil and gas fields. Besides strengthening exploration and development of gas fields, the sector strategy also aims to reduce extreme dependence on natural gas through diversification of energy- mix, balanced and synchronised development of gas production, transmission and distribution activities, encourage participation of private entrepreneurs in oil and gas exploration, production, and distribution

#### **Natural Gas Reserves**

Natural gas is an important source of energy that accounts for 72 percent of the commercial energy of the country. Till date 26 gas fields have been discovered in the country. According to the latest estimate total initial gas in place (GIIP) is 37.91 trillion cubic feet (tcf), of which 27.07tcf is recoverable in proven and probable categories. As of June 2014, total 12.14tcf gas has been produced leaving 14.94tcf net recoverable. A total of 800.6 billion cubic feet (BCF) gas was produced in FY 2012-13 and 820.3 BCF gas was produced in FY 2013-14. Field-wise gas production and reserves are presented in Table 10.10.

**Table 10.10: Status of Gas Production and Reserve**

(In Billion Cubic feet (BCF))

Gas field	Producing Wells	Total Reserve (Proven + Probable) (GIIP)	Reserve (Recoverable)	Production July'13-June'14	Cumulative Production as of June, 2014	Remaining Reserves
1. Bakhrabad	6	1701.0	1231.5	14.11	754.61	476.89
2. Habiganj	7	3684.0	2633.0	81.55	2052.35	580.65
3. Kailashtilla	4	3610.0	2760.0	29.28	621.48	2138.52
4. Rashidpur	4	3650.0	2433.0	17.09	535.39	1897.61
5. Sylhet	2	370.0	318.9	3.21	203.71	115.19
6. Titas	21	8148.9	6367.0	178.55	3799.05	2567.95
7. Narsingdi	2	369.0	276.8	10.35	154.25	122.55
8. Meghna	1	122.1	69.9	3.49	49.59	20.31
9. Sangu	0	899.6	577.8	0.31	487.91	89.89
10. Saldanadi	1	379.9	279.0	5.39	62.19	216.81
11. Jalalabad	4	1491.0	1184.0	87.77	851.67	332.33
12. Beanibazar	1	230.7	203.0	3.73	79.13	123.87
13. Fenchuganj	3	553.0	381.0	13.99	116.29	264.71
14. Moulavibazar	6	1053.0	428.0	27.06	254.46	173.54
15. Bibiyana	15	7427.0	5754.0	286.28	1697.78	4056.22
16. Bangura	4	1198.0	522.0	37.5	263.80	258.20
17. SHAHBAZPUR	2	677.0	390.0	0.71	9.01	380.99
18. SEMUTANG	2	653.8	317.7	2.63	8.33	309.37
19. SUNDALPUR	1	62.2	35.1	2.72	7.12	27.98
20. SRIKAIL	2	230.0	161.0	14.6	17.1	143.90
<b>NOT IN PRODUCTION:</b>						
21. BEGUMGANJ		39.0	21.0	0	0.00	21.00
22. KUTUBDIA		65.0	45.50	0	0.00	45.50
23. RUPGANJ		48.0	33.60	0	0.00	33.60
<b>PRODUCTION SUSPENDED</b>						
24. CHHATAK		1039.0	474.0	0	26.46	447.54
25. KAMTA		71.8	50.3	0	21.1	29.20
26. FENI		185.2	125.0	0	62.4	62.60
<b>TOTAL</b>	<b>90</b>	<b>37910.20</b>	<b>27072.13</b>	<b>820.27</b>	<b>12135.22</b>	<b>14936.91</b>

Source:Petrobangla , Energy and Mineral Resources Division.

**Natural Gas Production and Sectorwise Consumption**

Natural gas is the main source of fuel for power, fertiliser, industrial, commercial and domestic sectors. Year-wise/sector-wise natural gas production and consumption are shown in Table 10.11.

**Table 10.11: Production of Natural Gas and its Consumption by Sector**

(In billion cubic feet)

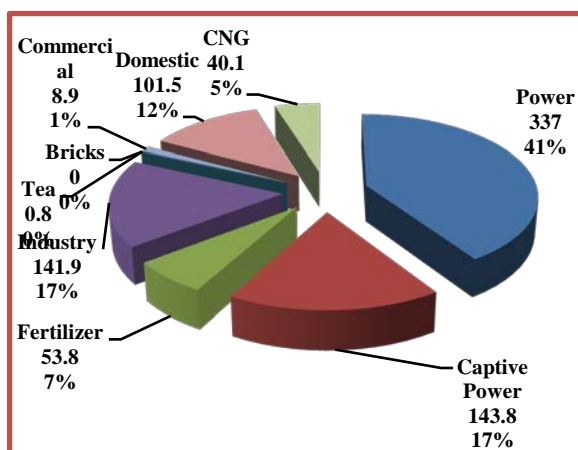
FY	Production	Consumption									
		Power	Captive Power	Fertilizer	Industry	Tea Estate	Bricks	Com.	Dom.	CNG	Total
1990-91	172.84	82.6	-	54.2	13.2	0.7	0	2.9	10.5	0	164.1
1991-92	188.48	88.1	-	61.6	13.4	0.7	0.2	2.9	11.6	0	178.5
1992-93	210.98	93.3	-	69.2	15.2	0.7	0.2	2.4	13.5	0	194.5
1993-94	223.76	97.3	-	74.5	20.26	0.7	1.1	2.87	15.4	0	212.13
1994-95	247.38	107.4	-	80.5	24.24	0.6	1.1	2.88	18.86	0	235.58
1995-96	365.51	110.9	-	90.98	27.31	0.72	0.99	3	20.71	0	254.61
1996-97	260.99	110.82	-	77.83	28.62	0.71	0.48	4.49	22.84	0	245.79
1997-98	282.02	123.55	-	80.07	32.32	0.74	0.39	4.61	24.89	0	266.57
1998-99	307.48	140.82	-	82.71	35.79	0.71	0.35	4.71	27.02	0	292.11

FY	Production	Consumption									
		Power	Captive Power	Fertilizer	Industry	Tea Estate	Bricks	Com.	Dom.	CNG	Total
1999-00	332.35	147.62	-	83.31	41.52	0.64	0.35	3.85	29.56	0	306.85
2000-01	372.16	175.27	-	88.43	47.99	0.65	0.44	4.06	31.85	0	348.69
2001-02	391.53	190.03	-	78.78	53.56	0.72	0.53	4.25	36.74	0	364.61
2002-03	421.16	190.54	-	95.89	63.76	0.74	0.52	4.56	44.8	0.23	401.04
2003-04	454.59	199.4	32.03	92.8	46.49	0.82	0.12	4.83	49.22	1.94	427.66
2004-05	486.75	211.02	37.87	93.97	51.68	0.8	0	4.85	52.49	3.62	456.3
2005-06	526.72	222.72	49.02	88.58	63.44	0.76	0	5.24	57.13	6.71	493.61
2006-07	562.21	221.1	93.47	62.51	77.48	0.75	0	5.66	63.25	11.99	536.26
2007-08	600.86	234.28	80.23	78.67	92.19	0.8	0	6.6	69.02	22.82	584.51
2008-09	653.75	256.31	94.7	74.85	104.39	0.65	0	7.46	73.78	31.02	643.16
2009-10	703.6	283.15	112.61	64.72	118.81	0.80	0	8.12	82.69	39.33	710.23
2010-11	708.9	273.8	121.2	62.8	121.5	0.8	0	8.5	87.4	38.5	714.4
2011-12	743.57	304.30	123.56	58.39	128.45	0.76	0	8.55	89.15	38.55	751.7
2012-13	800.6	328.8	134.1	60.0	135.7	0.8		8.8	89.7	37.8	795.8
2013-14	820.3	337.0	143.8	53.8	141.9	0.8	0	8.9	101.5	40.1	827.8

Source: Petrobangla, Energy and Mineral Resources Division.

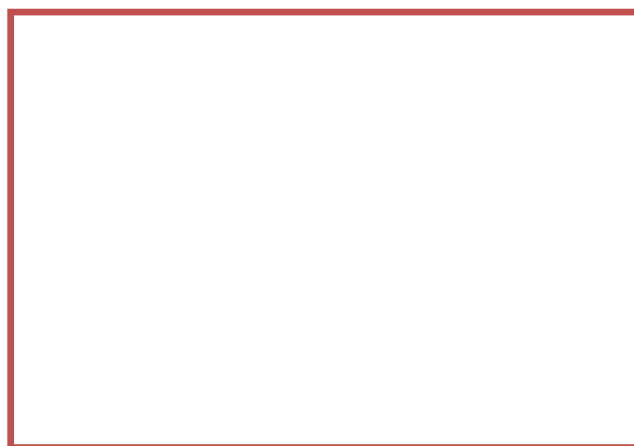
## Sector wise Gas Consumption Pattern

Figure: 10.6: Category-wise Gas Consumption FY2013-14



Source: Petrobangla

Figure: 10.7: Category-wise Gas Consumption FY2012-13



Source: Petrobangla

## Demand for Natural Gas

Demand of natural gas is rising at a rate of around 8 percent per annum. Various activities are underway to increase supply of gas matching the demand. Drilling projects have been taken to increase gas production by 675 million cubic feet per day by year 2016. Besides steps have been taken for importing 5 million tonnes of LNG per annum equivalent to 500 million cubic feet of gas per day:

**Table 10.12: Sector-wise Average Gas Demand**

(In Billion Cubic Feet)

	2012-13	2013-14	2014-15	2015-16	2016-17
Power	328.8	379	416	458	504
Captive	134.1	217	234	258	284
Fertilizer	60.0	94	94	94	94
Industry	135.7	247	259	280	307
Commercial	8.8	13	13	14	14
Brick		0	0	0	0
Domestic	89.7	140	148	168	185
Tea-Estate	0.8	1	1	1	1
CNG	37.8	113	121	153	168
System Loss	4.8	20	20	20	20
Total	800.6	1222	1306.5	1444	1577

Source: Petrobangla, Energy and Mineral Resources Division

## Mineral Resources

Bureau of Mineral Development (BMD) issues exploration licence and lease out mines and quarries. The mineral substances to be explored under the licensing jurisdiction of BMD include among others coal, peat, coal bed methane, mineral sand, metallic minerals, white clay, silica sand, ordinary stone, limestone and clay/shell.

## Coal

Bureau of Mineral Development (BMD) granted mining leases of coal and hard rock in 1994 in favour of *Barapukuria* Coal Mining Company Limited and *Madhapara* Granite Mining Company Limited (two companies of *Petrobangla*) at *Barapukuria* of *Parbatipur* upazila in Dinajpur. At present, coal is being extracted from this mine under the supervision of BMD. In 2004, the exploration license of coal at *Khalashpir* in Rangpur district was granted in favour of Hosaf International Limited. The exploration of this company has been completed. Besides, in 2008 BMD granted an exploration license of coal in favour of Petrobangla at *Dighipara* of *Nawabgonj* upazila in Dinajpur District. The exploration work of *Petrobangla* has not been completed yet. Three exploration licenses of peat were granted in 2010 in favour of Padma Mining and Energy Corporation Limited, *Swadhin Bangla* Mines and Electricity Limited and Reliance Minerals Limited at *Rajoir* and *Kotalipara* upazilas in *Madaripur* and *Gopalganj* Districts respectively. The exploration work is going on in these areas.

## Hard Rock

A mining lease was granted in 1994 in favour of *Madhyapara* Granite Mining Company Limited (a company of *Petrobangla*) to extract hard rock from the mine located at *Madhyapara* of *Parbatipur* Upazila in Dinajpur. Accordingly hard rock is being extracted from this mine.

## Mineral Sand

In 2012 three exploration licenses of mineral sand were granted in favor of Premier Minerals Limited at *Sadar* and *Shibganjupazilas* in *Chapainawabganj* and *Raipuraupazila* in Narsingdi District. The exploration work in these areas is underway.

## White Clay/China Clay

BMD grants quarry lease to extract white clay/china clay which is the raw material of ceramic industry. At present 13 different companies are extracting white clay under the quarry lease granted.

## Silica Sand

BMD also grants quarry leases of ordinary stone and silica sand for the construction and glass industries respectively in Bangladesh.

## Ordinary Stone

In FY 2013-14 twenty three quarry leases are granted in favour of different traders to extract ordinary stone in Panchagar, Nilphamari and Lalmonirhat districts.

## Petroleum Products

Bangladesh Petroleum Corporation (BPC), one of the largest state owned enterprises in the country, is responsible for importing petroleum product and ensures their uninterrupted supply. Besides this, it also provides storage facilities to ensure energy security of the country. In order to create facilities for discharging refined and crude oil in the deep sea, BPC has taken up a project titled 'Single Point Mooring'. It has also taken up a programme for scaling up the refining capacity of the Eastern Refinery Ltd. Table 10.13 and 10.14 show the import quantity of crude and refined petroleum products during the period from FY 2001-02 to FY 2013-14:

**Table 10.13: Import of Crude Oil**

FY	Quantity(Metric tonnes)	C&F Value/Million US\$	Crore Taka
2001-02	1224707	220.19	1277.78
2002-03	1331003	289.30	1693.03
2003-04	1252424	314.12	1848.43
2004-05	1063208	364.01	2261.98
2005-06	1253285	573.65	3901.16
2006-07	1211037	604.73	4196.85
2007-08	1040084	762.08	5288.85
2008-09	860877	494.44	3431.40
2009-10	1136567	646.21	4491.41
2010-11	1409302	978.81	7037.00
2011-12	1085937	919.26	7053.51
2012-13	1292102	1060.30	8536.70
2013-14	1176693	968.55	7957.29

Source: Energy and Mineral Resources Division

**Table: 10.14: Import of Refined Petroleum Products**

FY	Diesel, Kerosene, Octane& Jet A-1		Lubricating Base Oil		Furnace Oil	
	Quantity (Metric ton)	Value (Crore Taka)	Quantity (Metric ton)	Value (Crore Taka)	Quantity (Metric ton)	Value (Crore Tk.)
2001-02	2072300	2535.62	15316	30.59		
2002-03	2213899	3319.36	1911	5.10		
2003-04	2262348	4015.81	6516	18.38		
2004-05	2691750	7213.88	10189	38.14	39935	61.53
2005-06	2380582	9382.77	5137	35.53		
2006-07	2536535	10443.20	4277	25.13		
2007-08	2227753	14343.04	5006	29.94		
2008-09	2507819	10945.24	4828	23.63	29959	60.38
2009-10	2634212	12024.18	7262	52.03		
2010-11	2488456	21403.69	4749	43.75	230524	1123.17
2011-12	3409935	27111.24	4980	53.11	680982	3819.07
2012-13	2827160	21949.10	4853	38.56	803603	4367.26
2013-14	3158343	23485.56	0	0.00	1016101	5144.68

Source: Energy and Mineral Resources Division

### Subsidy for Petroleum Products

Bangladesh Petroleum Corporation (BPC) imports crude and refined petroleum products every year according to national demand. As the international price of crude and refined petroleum products is higher than the domestic selling price, BPC incurs loss by the selling these. The Government has to pay subsidy for import of petroleum products to make good the loss. Table 10.15 shows the amount of subsidy given to BPC during FY 2008-09 to FY 2013-14.

**Table 10.15: Amount of Subsidy given to BPC by the Government**

(In Crore Taka)

FY	Amount of Subsidy
2008-09	1500.00
2009-10	900.00
2010-11	4000.00
2011-12	8549.50
2012-13	13557.83
2013-14	2477.60

Source: Bangladesh Petroleum Corporation

### Mineral Resources (Except Oil and Gas) Investigation, Exploration and Evaluation

In order to expedite exploration of mineral resources and evaluate of that resource the Geological Survey of Bangladesh (GSB) has been implementing a number of projects. Skilled manpower has been developed through the projects. Enough research facilities has also been made by procuring modern equipment to work in the micropaleontology, petrology-mineralogy, analytical chemistry, engineering geology, geophysics, RS and GIS and clay mineralogy laboratories. As a result, low sulfur high-grade bituminous coal at *Jamalgonj-Kuchma*, *Barapukuria* and



*Dighipara* of Dinajpur and *Khalaspir* of Rangpur district, and *Maddhyaparahard* rock of Dinajpur district has been discovered at shallower depth.

Besides, peat, glass sand, white clay, construction sand, gravel, limestone, heavy minerals have been discovered in different parts of the country. In recent time GSB has discovered limestone and magnetic rock (ironore) in *Chakupara-Masidpur* area of *Alihat* Union of *Hakimpurupazila* of Dinajpur district and fossil in *Chalanbil* Area. GSB discovered different types of minerals equivalent to nearly Tk.13,958 billion that takes an important role in the revenue income of the Government (Table 10.16).

**Table 10.16: Discovered Minerals in Bangladesh and their Market Price**

Name of Minerals	Number of fields	Quantity (Probable ) In Million MT	Tentative Market price (In Crore Tk.)
Coal	4	1671(3716)	13,36,800 (25,20,000)
Peat	6	200	56,000
Limestone	3	129	1,580
White Clay	3	40	20
Glass Sand	5	116	324
Hard Rock	1	115	1,086
Heavy Mineral	4	-	-
		<b>Total</b>	<b>13,95,810</b>

Source: GSB

GSB actively took part in the delineation of maritime boundary of Bangladesh in accordance with the implementation of United Nations Convention on Law of the Sea UNCLOS III.

### **Hydrocarbon Unit**

Hydrocarbon Unit provides technical recommendation to Energy and Mineral Resources Division for the development of oil, gas and mineral resources sector and materials related thereto. Besides, Hydrocarbon Unit assists to provide views/comments to international and regional organisations on different issues pertaining to energy sector. A mini-data bank in the Hydrocarbon Unit operates some selected data of the hydrocarbon sector like gas reserve, undiscovered gas resources and gas production and consumption. Hydrocarbon Unit publishes monthly report on ‘Gas Reserve and Production’ and annual report on ‘Gas Production and Consumption’.

Under the ‘Strengthening of the Hydrocarbon Unit (Phase II) Project’ the following technical reports have been made:

- Four recommendations reports on Refinery, Marketing, Healthy Safety and Environment (HSE) and Policy and Regulation
- Review of the existing mining operations of the Barapukuria Coal Mine and recommendations on improvements
- Coal sector Development Strategy (including peat)
- Action Plan and Guidelines for CBM, UCG and Hard Rock Development activities,

- Review of the existing Mining Act, Rules and Regulations
- Mineral Resources Assessment and
- Preliminary Study on Shale Gas Potentiality in Bangladesh, etc.

### **Hazard Control and Safety Management**

Department of Explosives is engaged in carrying out the following types of activities:

- (1) Granting of licenses/permit/NOC for importation of explosives, various kinds of flammable chemicals, empty/filled cylinders, pressure vessels and accessories under the Explosives Substance and Petroleum Act.
- (2) Providing expert opinions on examination and analysis of bomb/explosives exhibits.

In FY 2013-14, as many as 2,02,358LPG cylinder have been imported under permit/license and 108LPG cylinder storage license and 35 Pressure Vessel import permit have been granted by this department. 30 MT.imulex detonators, 35 MT explosives (power gel), 1,80,000 Meter detonating fuse, 98,860 pieces electric detonators, 200 pieces boosters, 3,000 pieces detonating cords have been imported under import permit/license and at the same time 6explosives storage license, 7 transport licence and 6 explosives import license granted in favour of nationalised gas field company, *Madhapara* Hard Rock Mining Co., *Barapukuria* Coal Mining Company and other international oil companies. 933 petroleum storage license have been granted in favour of different rental power plant which are diesel/furnace oil based and others companies. To ensure pipe line safety 51 'leak test' of high pressure gas pipeline have been witnessed by this department which are under commissioning for augmentation of gas transmission. Furthermore 19,742 petroleum carrying/storage tanks of different petroleum oil tanker (both live and scrap vessels) have been tested and gas free certificate has been issued. As many as 825 bomb/improvised devices have been tested and expert opinion have been furnished to the Honorable Court against the cases framed under the Explosive Substance Act. Moreover, this department earned revenue of Tk.4.15 crore in FY 2013-14.

### **Regulatory Functions in Energy Sector**

To expedite long term development of the energy sector, the Bangladesh Energy Regulatory Commission (BERC) is carrying out activities for creating favorable environment to private investment in electricity generation and energy transmission, transportation and marketing, and for management and operation of this sector, bringing transparency in tariff fixation, protecting consumers interests and creating competitive market.

**Fixation of Benchmark Indicative Price for Commercial Power Stations:** According to the 'Increase of Private Participation in Power Sector Policy, 2008', the Commission fixes Benchmark Indicative Price for commercial power generation based on furnace oil, dual energy (gas/furnace oil) and gas and coal (imported and local) for commercial power stations. On 17 February 2013, the Commission has fixed the Benchmark Indicative Price for commercial power stations based on gas. The Benchmark Indicative Price has been fixed with the end in view that

the investors may get an idea, in advance, on tariff before establishment of commercial power generation stations and the power distribution agencies may purchase power safely from those power generating entities.

**Establishment of Power Maintenance and Development Fund:** The BERC has been established the ‘Power Maintenance and Development Fund’ in 2011 for the Power Development Board by increasing bulk electricity tariff rate to 5.17 percent. Up to April 2014 the money accumulated in that Fund stood at Tk.2,144crore.

**Making Electricity Grid Code:** To develop standard of and establish control over, service providing entities related to electricity transmission, grid code is essential. The Bangladesh Energy Regulatory Commission has, in exercise of the power conferred by section 22 (f) of the Bangladesh Energy Regulatory Commission Act, 2003 (Act No. 13 of 2003), made the Electricity Grid Code, 2012. It will be helpful in ensuring standard and safety of electricity transmission including cross border electricity imports and exports.

**Settlement of Tariff Re-Fixation Proposal:** During last five years, the Commission settled 4 proposals for enhancement of bulk electricity tariff rate of the Bangladesh Power Development Board (BPDP) and 2 proposals for enhancement of retail electricity tariff rate of every electricity distribution entity/company.

**Establishment of Gas Development Fund:** On an application by Petrobangla, the Gas Development Fund was establishment in 2009 by increasing average tariff rate of natural gas by 11.22 per cent at customer level. Up to May 2014 the money accumulated in that Fund stood at Tk.3,400crore. According to the Gas Development Fund Policy, condition has been imposed to the effect that the money of this Fund can be used in exploration and augmentation of production of gas by only the local companies, As a result, the local companies will be encouraged and flourished and their efficiency will be increased.

### **Training Activities**

Bangladesh Petroleum Institute(BPI) is a Statutory Body under Energy and Mineral Resources Division. BPI is responsible for providing Technical, Administrative and Financial higher training to the officers’ and professionals’ working in the oil, gas and mineral resources sector. It also responsible for conducting research, other development and data management activities related to this sector. The institute is being operated under the guidance of a 10 members’ high level Governing Board.

BPI along with *Petrobangla*, *Bapex*, MOECO and JGI of Japan has completed the ‘Joint Research for the System Analysis in *Surma* Basin (Forth phases)’. It is expected that the result of the research may help to discover new oil and gas fields in the north-eastern part of Bangladesh in near future.