

## CHAPTER 10

### POWER AND ENERGY

#### Electricity

Presently 42 percent of the population has access to electricity and per capita generation is only 165 kWh which is very low compared with other countries. The government has declared its vision to provide electricity to all by the year 2020. A number of reform and restructuring programmes has been undertaken accordingly. Contribution of electricity to GDP and growth rate of electricity in the last 6 years is presented below:

**Table 10.1: Contribution of Electricity in GDP and its' Growth Rate**

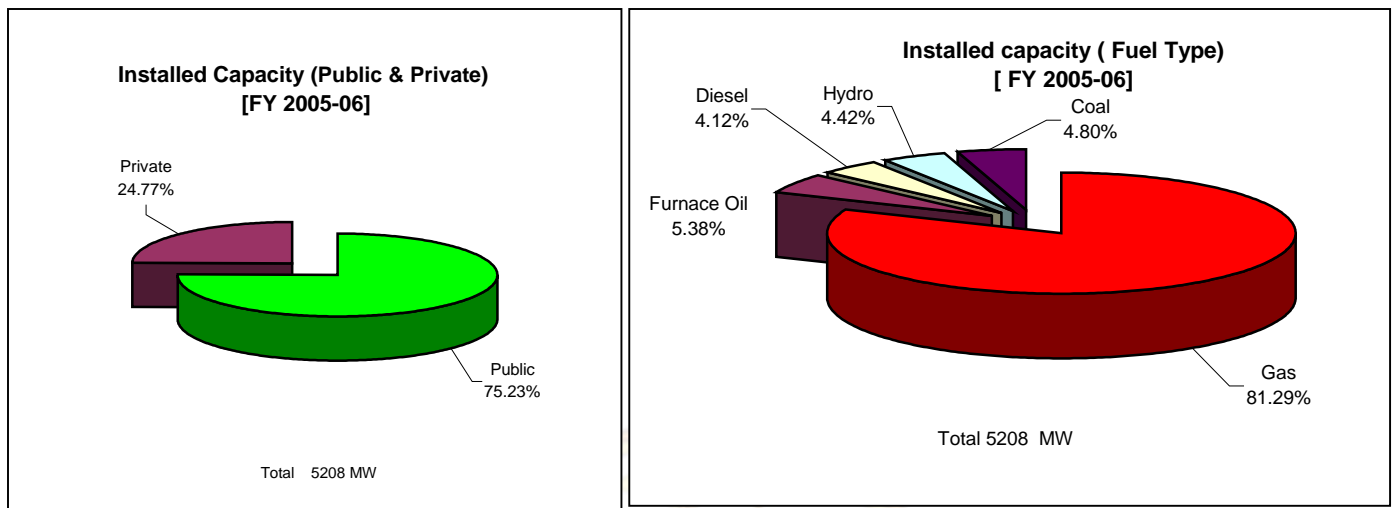
Contribution	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06 (Provisional)
Contribution of electricity to GDP (%)	1.23	1.27	1.30	1.34	1.37	1.38
Growth rate of electricity (%)	7.60	7.78	7.29	9.19	8.58	7.76

Source: Bangladesh Bureau of Statistics

#### Generation Capacity and Demand

In FY 2005-2006, total installed generation capacity was 5208 MW including 3918 MW in public sector and 1290 MW in private sector. Commissioned in February 2006, Barapukuria coal based 2x125 MW power plant contributed a lot in managing load shedding in the northern region of the country. In the public sector, a good number of generation units has become very old and has been operating at a much-reduced capacity. As a result, their reliability and productivity are also poor. Over the last few years, actual demand could not be met due to shortage of available generation capacity. In FY 2005-2006, maximum generation was recorded 3812 MW (PDB 2591MW and IPP 1221MW). Following graphs (10.1 and 10.2) show installed generation capacity in public and private sector and generation pattern on the basis of fuel use:

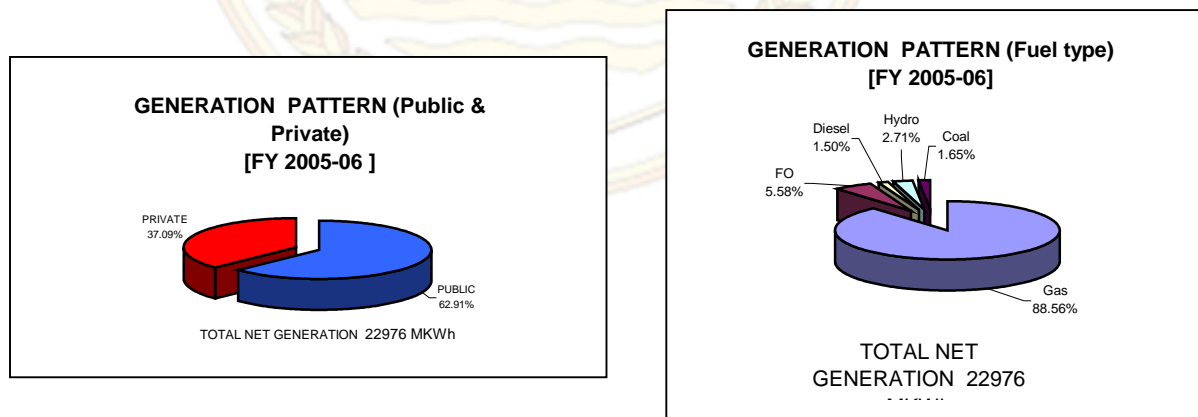
**Graph-10.1 and 2: Power Installed Capacity, 2005-06**



### Power Generation

About 22976 million kilowatt hour (MkWh) net power was generated during FY 2005-2006 which includes 14455 MkWh from public sector and 8521 MkWh from private sector. Of the total net power generation, 62.91% was generated from public sector and 37.09 percent from private sector. This power generation was 7.32 percent higher than the total generation of previous fiscal year. Of the total power generation, 88.56 percent was gas based, 2.71 percent hydro, 1.65 percent coal and 7.08 percent oil based. This is shown in graph no. 10.3 and 10.4 below.

**Graph- 10.3 & 4: Power Generation Pattern, 2005-06**



In FY 2005-2006, natural gas consumption by BPDB power plants was 153920 million cubic feet. Total electricity sale through PDB system stood at 20954.27 MkWh in FY 2005-06. Of the total PDB's sale, 25.36 percent was sold to DESA, 9.69 percent to DESCO, 38.48 percent to REB, 6.55 percent to WZPDCL and 19.92 percent to BPDB's own retail consumers.

### Maximum Generation

Though the installed capacity has increased considerably but due to shortage of available generation capacity, the actual demand could not be met in the last few years. The Installed Capacity, Dependable Generation Capacity and Maximum Generation during FY 1995-96 to FY 2005-06 are given in the Table-10.2:

**Table 10.2: Installed Capacity, Dependable Generation Capability and Maximum Generation**

<b>Fiscal Year</b>	<b>Installed capacity (MW)</b>	<b>Dependable generation capacity (MW)</b>	<b>Maximum generation (MW)</b>
1995-1996	2908	2105	2087
1996-1997	2908	2148	2114
1997-1998	3091	2320	2136
1998-1999	3611	2850	2449
1999-2000	3711	2665	2665
2000-2001	4005	3033	3033
2001-2002	4230	3300	3218
2002-2003	4710	3600	3458
2003-2004	4710	3700	3622
2004-2005	5025	3900	3751
2005-2006	5275	4150	3812

Source: Bangladesh Power Development Board

### Power Development Programme

As per Base Forecast of Power System Master Plan (2005), the maximum demand in 2007, 2012 and 2015 would be about 5112 MW, 7732 MW and 9786 MW respectively. The demand is expected to rise to 13993 MW in 2020. To meet the demand with quality supply and reliability, a power development plan including reform strategy has been developed. The generation projects up to 2012 have been listed in Table-10.3:

**Table 10.3: Power Generation Projects up to 2012**

Sl. No.	Generating Station	Capacity & Type (MW)	Expected Commissioning date
<b>Public Sector</b>			
	<b>Under-construction</b>		
1	Sylhet (Fenchuganj) 90 MW CCPP 2nd Phase	60 MW GT 30 MW ST	May/ 07 August/ 07
	<b>Planned</b>		
2	Sylhet 150 MW CCPP ( 100 MW CT ) and Associated Power Evacuation Facilities	100 MW	FY 2009
3	Siddhirganj 2x120 MW peaking power plant	240 MW CC	FY 2008
4	Chandpur 150 MW CCPP (100 MW GT) and Associated Power Evacuation Facilities	100	FY 2008
5	Sikalbaha 150 MW Gas Turbine	150	FY 2009
6	Siddhirganj 2x225 MW Gas Turbine P/S (Including evacuation facilities)	300 MW	FY 2009
7	Haripur 360 MW Combined Cycle Power Plant	360 MW	FY 2009 FY 2010
8	210 MW Khulna Thermal Power Station	210 MW	FY 2009
9	Bhola 150 MW CCPP	150 MW	FY 2009
10	Khulna 150 MW Peaking Power Plant	150 MW	FY 2009
11	210 MW Siddhirganj Thermal Power-2	210 MW	FY 2009
12	Sirajganj 150 MW Gas Turbine	150 MW	FY 2009
13	Kaptai Power Plant extention 2x50 MW (6th & 7th unit)	100 MW	FY 2010
14	Sikalbaha 450 Combined Cycle Power plant (2x225 MW)	450 MW	FY 2009 FY 2010
15	Sylhet 150 MW Gas Turbine	150 MW	FY 2011
16	Bheramara 450 Combined Cycle Power Plant	450 MW	FY 2012
<b>Private Sector</b>			
17	Baghabari (West Mont) CC: 40 MW ST addition to existing 90 MW	40 ST	Sept/ 06
18	Baghabari (West Mont) 130 MW CC ( 90 MW +40 MW ST) (2nd Phase)	130	Sept/ 06 March/ 08
19	Serajganj 450 MW Combined Cycle Power Plant-1	450	FY 2009
20	Meghnaghat 450 MW CC (Unit -2)	450	FY 2008, FY 2009
21	Meghnaghat 450 MW CC (Unit -3)	450	FY 2008, FY 2009
22	Small IPP (10-30MW)& Traylor/ Skid/Barge	90+360= 450	FY 2007
23	Meghnaghat 450 MW CC (Unit -4)	450	FY 2011
24	Serajganj 450 MW Combined Cycle Power Plant Unit-2	450	FY 2012
<b>Mixed Sector</b>			
25	Mymensingh (RPC) CC : 70 MW ST	70	Sept/ 06

Source: Power Division.

## Transmission System

### Power Grid Company of Bangladesh (PGCB)

Power Grid Company of Bangladesh Ltd. was created in 1996 under the Power Sector Reform Programme of the government. Since then, PGCB is running as a single power transmission entity in the country under the Company Act, 1994. With the creation of this company, the existing transmission system has been handed over to PGCB from PDB and PGCB has taken over the full responsibility of the total transmission system. In 1996 when PGCB was formed, the total length of 230 kV and 132 kV line stood at 838 circuit (ckt) km and 4755 ckt km respectively and by June 2006, the length increased to 1466 km and 5377 ckt km. PGCB has started off loading its share to the stock market by direct listing for collecting capital from the market recently. To create the infrastructure for transmitting power from Meghnaghat IPP and to develop a 230 kV ring around Dhaka city, PGCB has completed following two projects by June 2006 :

- (1) “Comilla-Meghnaghat-Haripur 230 kV Transmission Line and Turn in and out of existing Ghorashal-Haripur 230 kV Line to Rampura”
- (2) “Hasnabad–Aminbazar–Tongi and Haripur–Meghnaghat 230 kV Transmission Line”

Besides the projects mentioned above, the other important projects under implementation are shown in Table-10.4 as follows:

**Table 10.4: Projects under implementation**

Sl	Name of the Project	Progress up to June '06	Remarks
1	Khulna-Ishurdi and Bogra-Barapukuria 230 kV Transmission line.	62.22%	
2	Ishurdi-Baghabari-Serajganj-Bogra 230 kV Transmission line.	46.26%	
3	Joydevpur-Kabirpur- Tangail 132 kV Transmission line.	62.63%	
4	Second East-West Electrical Interconnector Line.	40.54%	
5	National Load Despatch Centre	20.30%	
6	Natore-Rajshahi 132 kV Single Circuit Line.	--	Own Financing
7	Construction and Extension of Grid Substations including Transmission Line Facilities.	5.00%	
8	Shunt Compensation at Grid Substations by Capacitor Banks	--	

Source: Power Division

The following projects are expected to be started in coming year:

1. Meghnaghat-Aminbazar 400 kV Transmission line.
2. Three Transmission line
3. Aminbazar – old Airport 230 kV Transmission line and associated substation.
4. Siddhirganj – Maniknagar 230 kV Transmission line



5. Sylhet-Shahjibazar-Ashuganj 230 kV Transmission line.
6. Barisal-Bhola 132 kV Transmission line.

### **Power Distribution System**

Distribution System comprises 33 kV, 11 kV and 0.4 kV lines. In FY 1991-1992 the total distribution line was 32,780 km, which has increased to 45644 km in FY 2005-2006. The number of consumers has also increased to 15,18,891 in FY 2005-2006 from 9,03,001 of FY 1991-1992.

### **System Loss, Accounts Receivable and Accounts Payable**

In FY 2005-2006, the system loss stand 8.76 percent (on net generation), which is 1.43 percent lower than what stood in the previous year. Also the distribution loss in BPDB system came down to 19.06 percent in FY 2005-2006 from 20 percent in the previous year. On the other hand, the accounts receivable in FY 2005-2006 amounts to Tk. 4500.94 core, which is equivalent to 10.95 months' bill. System Loss, Accounts receivable and payable of BPDB up to FY 2005-2006 are shown in Table no. 10.5.

**Table 10.5: System Loss, Accounts Receivable and Payable of BPDB**

<b>Fiscal Year</b>	<b>System loss (of net generation) (%)</b>	<b>Distribution loss excl. bulk (%)</b>	<b>Accounts receivable (Core Taka)</b>	<b>Accounts payable (Core Taka)</b>
1995-1996	17.0	29.09	1100.82	-
1996-1997	16.0	28.28	1348.23	-
1997-1998	16.5	29.82	1729.81	-
1998-1999	16.8	30.56	2464.53	-
1999-2000	15.4	27.73	2789.22	From 1.7.1991 to 31.6.2000 Tk. 4275.43
2000-2001	13.85	26.11	3354.99	4905.68
2001-2002	12.62	24.50	3671.74	5647.73
2002-2003	11.35	22.35	3993.80	4778.29
2003-2004	10.16	21.33	4368.10	5177.92
2004-2005	9.29	20.00	4397.71	5460.22
2005-2006	8.76	19.06	4500.94	6319.91

Source: Bangladesh Power Development Board

### **Dhaka Electric Supply Authority (DESA)**

Dhaka Electric Supply Authority (DESA) was created by separating the former Dhaka Electric Supply from Bangladesh Power Development Board (BPDB) on March 06, 1990. System loss of the former Dhaka Electric Supply was 38.26 percent. However, DESA's system loss went down to 20.13 percent. in June 2006.

### Electricity Purchase, Revenue Collection and System Loss

Purchase of electricity of DESA from BPDB was 2260 MkWh in the year of creation of DESA i.e. in FY 1991-1992. Purchase has increased to 5300.971 MkWh in FY 2005-2006. Year wise electricity purchase, revenue collection and system loss of DESA since its inception are shown in Table no. 10.6.

**Table 10.6: Year wise Purchase, Revenue Collection and System Loss of DESA**

Financial Year	Total Electricity Purchase (MkWh)	Revenue Collection (Crore Taka)	System Loss (%)
1991-1992 (9 months)	2259.885	320.080	35.55
1992-1993	3356.390	467.030	31.20
1993-1994	3696.357	474.161	31.33
1994-1995	4162.396	584.090	30.00
1995-1996	4550.851	599.790	29.47
1996-1997	4935.532	708.360	27.29
1997-1998	5418.941	793.480	27.89
1998-1999	5946.635	809.630	24.84
1999-2000	6504.047	1000.730	25.72
2000-2001	7240.456	1141.047	25.68
2001-2002	7833.191	1427.321	25.05
2002-2003	8306.079	1591.857	23.05
2003-2004	6144.932	1514.96	26.21*
2004-2005	5044.797	1253.03	21.94
2005-2006	5300.971	1255.60	20.13

Source: Dhaka Electric Supply Authority (DESA)

\*System Loss has increased due to direct billing to DESCO & REB by PDB, which was previously done by DESA at zero loss.

### Accounts Receivable

DESA collects about 90 percent of its billed amount in each month. Total 'Accounts receivable' of DESA up to June 2006 since its creation is about Tk 809.89 crore. Year wise accounts receivable and payable of DESA to government. organisations, autonomous bodies and private consumers are presented in Table no.10.7:

**Table 10.7: Year wise Account Receivable and Payable of DESA**

(Amount in Crore Taka)

<b>Financial Year</b>	<b>Amounts Receivable</b>	<b>Amounts Payable</b>
October 1991	213.10	107.18
June 1992	237.90	200.18
June 1993	300.10	288.59
June 1994	429.20	466.00
June 1995	508.60	658.07
June 1996	626.20	812.78
June 1997	792.80	1022.33
June 1998	998.10	1463.26
June 1999	1244.19	2120.51
June 2000	1396.51	2616.21
June 2001	1480.73	3058.30
June 2002	1540.14	3430.33
June 2003	1699.26	2923.20
June 2004	1592.46	3086.49
June 2005	689.31	2795.01
June 2006	809.89	3086.47

Source: Dhaka Electric Supply Authority (DESA)

**Dhaka Electric Supply Company Ltd. (DESCO)**

In order to disconnect illegal electricity connections, prevent electricity pilferage and reduce system loss DESCO over the last few years has taken a range of steps like supervision through Monitoring Cell, disconnection and filing cases through Magistrate courts. Aside from these, the development activities that have been completed are Decentralisation of Operational Activities, Introducing One Point Service, Electronic Bill Payment System, Spot Metering etc. Technical and commercial programmes taken up in FY 2005-2006 are as follows:

**Pre-paid Metering System**

DESCO seeks opportunities to create and promote consumer convenience as well as enhance income potential of the company. In this context DESCO has under taken 'Pre-paid Metering Pilot Project' with consumer-friendly facilities and accordingly, installation of pre-paid meters started in August 2005. DESCO installed 5000 user-friendly pre-paid meters to initially cover the consumers residing at Sector-4 & 6 under Uttara Model Town in Dhaka with the technical assistance of Bangladesh University of Engineering & Technology (BUET). Besides, in the phase-II a contract agreement has been signed with BUET to install another 5000 single phase and 1000 three phase meters in the FY 2005-2006. The valued customers of pre-paid meters will enjoy government declared 2 percent rebate on electricity sales rate and monthly minimum charge is not applicable for the pre-paid customers.



### System Loss Reduction and Collection of Outstanding Bill

DESCO has succeeded in lowering system loss at 16.20 percent in FY 2005-06. It may be noted that the entity's bill collection ratio in FY 2005-06 is 96.63 percent and C.I. Ratio 80.98 percent. DESCO is trying to achieve 100 percent collection of electricity bill. Measures have therefore been taken to prepare and dispatch electric bills to every consumers as well as a number of collection accounts has been opened in different banks within and outside DESCO's area in order to help the consumers to pay their bills more conveniently. Besides, DESCO has introduced Easy pay, Ready cash, Auto debit system etc. to collect bills. Measures have been taken so that the outstanding bills of government/semi-government/autonomous bodies do not exceed 3 months. Commercial statistics is shown in the Table no. 10.8 below.

**Table 10.8: Commercial Statistics of DESCO**

Description	2001-02	2002-03	2003-04	2004-05	2005-06	Decrease/ Increase (since inception)
1	2	3	4	5	6	7
Energy Import (MKWH)	673.09	855.79	1739.87	1842.89	2023.22	(+)1350.13
Energy Sales (MKWH)	493.62	675.57	1405.03	1536.31	1695.55	(+)1201.93
System Loss (%)	26.66	21.06	19.24	16.64	16.20	(-) 10.46
Energy Sales (MTk.)	1470.03	2216.75	4902.32	5466.09	6423.74	(+)4953.71
Bill Collection (MTk.)	1308.98	1642.67	4305.93	5305.85	6207.45	(+)4898.47
Bill Collection Ratio (%)	89.04	74.10	87.83	97.07	96.63	(+) 7.59
C.I. Ratio (%)	65.30	58.50	70.93	80.92	80.98	(+) 15.68
Nos. of Consumer	1,08,182	2,05,803	2,41,964	2,59,580	2,81,960	(+)1,73,778
Disc. of illegal connection (Nos.)	25,486	35,276	36,852	46,780	39,491	(+)14045
Profit/Loss (in crore Tk.)	(5.4)	0.89	33.8	54.03	65.0	(+)59.6
Nos. of 33/11 Substation	6	13	13	13	13	(+)7
Capacity of 33/11KV Substation	200/280	425/593	425/593	430/602	620/868	(+)420/588
Maximum demand (MW)	149.90	315.24	351.82	377.25	397.03	(+)247.13
33KV Overhead line (KM)	17.20	73.70	76.70	76.70	76.70	(+)59.50
33KV Under ground line (KM)	37.80	70.30	125.30	142.80	142.80	(+)105.0
11KV Overhead line (KM)	169	536	552	600.00	612.00	(+)443.0
11KV Under ground line (KM)	43	205	205	238.00	241.0	(+)198.0
Distribution Transformer (Nos.)	1555	3369	3594	3785	4106	(+)2551
L.T. Line (KM)	422	991	1030	1105.00	1142.00	(+)720.0
Sales & Distribution division	02	02	06	06	06	(+)04

Source: Dhaka Electric Supply Company Ltd. (DESCO)

### Capacity Enhancement of Substations

With a view to ensuring uninterrupted power supply as well as to catering to the increased demand of the consumers, the capacity of the following sub-stations has been enhanced:

- (1) 33/11 kV Substation at Gulshan-1
- (2) 33/11 kV Substation at Gulshan-2
- (3) 33/11 kV Sub-station at Nikunja
- (4) 132/33/11 kV Sub-station at Uttara
- (5) 33/11 kV Sub-station at Mirpur-2

Moreover, DESCO has inter-linked the Digun–Kafrul, Digun–Mirpur Old–Mirpur-2, Mirpur Old–Kafrul and Baridhara–Gulshan sub-stations to under ground cables with view to supply power through alternative sources in case of emergency as well as for efficient load management:

### Off loading of Shares

As part of continuous restructuring of power sector as well as to ensure private participation, DESCO has offered 25 percent of its shares for public in the stock market through direct listing system.

### Rural Electrification Board (REB)

Up to June 2006, by constructing 2,07,130 km distribution lines, REB has given a total of 6,870,912 connections in 45,794 villages, of which 58,07,713 domestic, 1,98,662 irrigation, 7,36,013 commercial, 1,14,744 industrial and 13,781 other connections.

### On going projects under REB

RADP of FY 2005-2006 provide an allocation of Tk 757.85 crore (of which Tk. 547.84 crore in local currency and Tk. 210.01 crore in Project aid) for implementation of 18 projects (13 investment projects and 5 technical assistance projects). Achievement of financial progress in FY 2005-06 is 89 % of the total allocation.

During the period between 1996-97 to 2000-2001, a total of 19,96,795 consumer connections has given through construction of 54,545 km line by REB. On the other hand , during FY 2001-02 to June2006 77,702 km line has been constructed through which 34,75,191 consumers got electricity connections. Besides, in the remote areas where power can not be distributed in a conventional way, REB has taken 2 renewable energy projects with a target to provide 22000 domestic connections through Solar Home Systems. Up to June 2006, 1618 domestic connections have been given. REB purchases electricity from PDB and distributes electricity to the consumers. The following Table-10.9 shows the statistics of purchase and sale of electricity by the Pally Biddyt Samities (PBS's/REB) in FY 2005-06:

**Table 10.9: The Purchase and Sale of Electricity among the Consumers by REB 2005-06**

Year/month	MWH purchased	MWH sold/consumed						Avg system loss of 67 PBS (%)
		Domestic	Industry	Commercial	Agriculture	Others	Total	
July' 2005	709776	285593	270714	36368	8529	1167	602370	15.13
Aug' 2005	719393	303176	263935	37679	9417	1212	615419	14.45
Sept' 2005	709971	313675	255298	37970	10691	1218	618853	12.83
Oct' 2005	708129	298153	261393	36901	6006	1168	603633	14.76
Nov' 2005	608318	291374	215634	39419	6970	1219	554616	08.83
Dec' 2005	633444	237521	263642	31894	12248	1230	546545	13.72
Jan' 2006	683154	251771	230917	36259	88295	1256	608499	10.93
Feb' 2006	708300	216653	224206	31102	179556	1561	653078	7.80
March' 2006	833513	200748	271495	36216	210585	1114	720159	13.60
April' 2006	746188	228984	252423	38481	134999	1158	656050	12.08
May' 2006	682753	258521	272820	38138	25129	1305	595913	12.72
June' 2006	732810	300827	272123	41714	12610	1228	628523	14.23

Source: Rural Electrification Board (REB)

The following Table (10.10) shows the accounts payable to PDB and accounts receivable from the consumers:

**Table 10.10: Accounts Receivable and Payable in Purchase and Sale of Electricity of REB.**

<b>Year</b>	<b>Accounts receivable (Months)</b>	<b>Accounts receivable (Crore Taka)</b>	<b>Aging of Accounts Payable (PDB Bill Outstanding) (Crore Taka)</b>
1992-93	2.44	36.62	0.31
1993-94	2.10	37.93	0.37
1994-95	2.14	50.36	0.69
1995-96	2.10	55.68	0.72
1996-97	2.49	74.26	0.71
1997-98	2.46	91.25	1.47
1998-99	2.49	127.14	3.57
1999-00	2.30	149.33	14.85
2000-01	2.23	186.41	55.04
2001-02	2.21	234.99	42.75
2002-03	1.92	268.72	42.34
2003-04	1.81	302.22	32.46
2004-05	1.85	344.66	310.10
2005-06	2.00	428.89	12.89

Source: Rural Electrification Board (REB)

#### **Reforms and Efficiency Improvement measures:**

Government is committed to implement reform programmes for the overall improvement in the power sector. For the improvement of management efficiency in generation, transmission and distribution, a number of reform programmes has been taken up. Several of them have already been implemented. The implementation status till date is as follows:

- (1) Ashuganj Power Station has been converted to Ashuganj Power Company Ltd. (APSCL) and it started functioning since June 2003.
- (2) Electricity Generation Company of Bangladesh (EGCB) has been created to look after the generation in Siddhirganj Power Station area.
- (3) Under the reform programmes Power Grid Company of Bangladesh (PGCB) and Dhaka Electric Supply Company (DESCO) were created in 1996. PGCB has taken over total transmission system from BPDB in December 2002
- (4) West Zone Power Distribution Company has taken over Distribution business from BPDB and started functioning since October 2003.
- (5) Creation of North -West Zone Power Distribution Company is under way and expected to be operational very soon.
- (6) Bangladesh Power Development Board will be converted into holding company under the Company Act, 1994. Foreign consultants have already been engaged for this purpose.

- (7) Haripur Power Station has been converted to Strategic Business Units (SBU). Based upon the satisfactory performance of Haripur SBU, Baghabari Power Station has also been converted into SBU. In future more power stations will be converted into SBUs.
- (8) In order to increase the efficiency of distribution management, distribution circles have been reorganised into Strategic Business Units (SBUs) introducing modern management.

#### **Projects of Power Division included in RADP**

RADP of FY 2005-06 provides an allocation of TK. 3397.12 crore (GOB Tk. 2143.53 crore and Project Aid-Tk1253.59 crore) for implementation of 63 development projects (54 investment projects and 9 Technical Assistance projects) of Power Division. This budget includes GoB fund of Tk.15.00 crore for implementation of 2 projects of BPDB under Japan Debt Cancellation Programmes.

#### **Private Participation in Power Sector**

In order to provide electricity service to all by the year 2020, government has taken various programmes. Power sector development involves huge amount of investment which is very difficult for the government alone to manage. Realising this fact, Private Sector Power Generation Policy was adopted in 1996 to encourage private sector participation in power sector. As part of reform programmes taken up by the government, Power Grid Company of Bangladesh (PGCB) and Dhaka Electric Supply Company (DESCO) were established in 1996 under the Companies Act 1994. Moreover a contract has been signed between BPDB and BON Consortium Power Co. Ltd. to construct Meghnaghat 450 MW Combined Cycle Power Station (2<sup>nd</sup> Phase) on the basis of BOT. It is expected that in 37 months from the date of signing contract the plant will start its commercial operation. Besides, the establishment of a number of 10-30 MW small power plants is under way.

#### **Fuel and Mining Sector**

##### **Natural Gas**

In Bangladesh natural gas is one of the important sources of energy that accounts for 73 percent of commercial energy of the country. Till now 23 gas fields have been discovered in the country. Of them 22 gas fields contain 28.41 Trillion Cubic Feet (TCF) of gas, of which 20.51 TCF is recoverable. Exploration of reserve of Bangura gas field in Block 9 is under way. As of June 2006, a total of 6.557 TCF gas has been produced leaving 13.951 TCF recoverable. The total gas reserve and extractable gas and cumulative gas production up to June 2006 are shown in Table 10.11:



**Table 10.11: Total Gas Reserve, Extractable Gas and Cumulative  
Production of Gas up to June 2006**

(In Billion Cubic Feet (BCF))

<b>Gas Field</b>	<b>Total Reserve (Proven + Probable)</b>	<b>Reserve (Recoverable)</b>	<b>Cumulative Production as of June 2006</b>	<b>Remaining Reserve (As of June 2006)</b>
<b>IN PRODUCTION</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
BAKHRABAD	1,498.6	1,049.0	655.22	393.778
HABIGANJ	5,139.0	3,852.3	1,358.17	2,494.130
JALALABAD	1,195.0	836.5	326.13	510.370
KAILASHTILLA	2,720.1	1,903.3	363.67	1,539.634
MEGHNA	170.6	119.6	35.31	84.290
NARSINGDI	307.2	215.1	65.00	150.103
RASHIDPUR	2,002.0	1,401.2	385.25	1015.952
SYLHET	683.9	478.7	176.99	301.714
SANGU*	1,031	848.5	376.60	471.897
SALDA NADI	165.8	116.1	46.60	69.496
TITAS	7,325.0	5,127.5	2,549.48	2,578.016
BEANI BAZAR	243.1	170.2	41.19	129.013
FENCHUGANJ	404.0	282.8	28.93	253.869
FENI	185.2	129.6	55.31	74.29
MOULAVIBAZAR	448.9	359.6	45.75	313.85164
<b>NOT IN PRODUCTION:</b>				
BEGUMGANJ	46.7	32.7	0.00	32.7
KUTUBDIA*	65.0	45.5	0.00	45.5
SEMUTANG	227.0	150.3	0.00	150.3
SHAHBAZPUR	664.3	465.6	0.00	465.6
BIBIYANA	3,144.5	2400.8	0.00	2,400.8
<b>PRODUCTION SUSPENDED</b>				
CHHATAK	677.0	473.9	25.8	448.1
KAMTA	71.8	50.3	21.1	29.2
<b>TOTAL</b>	<b>28,415.7</b>	<b>20,509.1</b>	<b>6,557.49</b>	<b>13,951.606</b>

Source: Energy and Mineral Resources Division. \* Offshore field

Presently, 67 wells in 16 gas fields are in production. These include: Titas (16 wells), Bakharabad (4 wells), Habiganj (9 wells), Rashidpur (7 wells), Kailashtilla (3 wells), Sylhet (2 wells), Narsingdi (1 well), Meghna (1 well), Saldanadi (2 wells), Fenchuganj (2 wells), Sangu (6 wells), Jalalabad (4 wells), Beanibazar (2 wells), Feni (3 wells), Moulavibazar (4 wells) and Bangura (1 well). A total of 486.75 billion cubic feet (BCF) gas was produced in the FY 2004-2005, while in the FY 2005-2006, total gas production was 526.72 BCF (Provisional). Natural gas is the key energy source of power generation, fertilizer production, industrial and domestic purposes. The following tables, 10.12 and 10.13 show year wise and sector wise consumption and demand of natural gas:



**Table 10.12: Sector and Year wise Consumption of Natural Gas**

(In Billion ft)

Fiscal Years	Production	Sectors									Total Sales
		Power	Fertilizer	Industry	Captive Power	Tea Estates	B. Fields (seasonal)	Commercial	Domestic	CNG	
1990-91	172.84	82.60	54.20	13.20		0.70	0.00	2.90	10.50	0	164.10
1991-92	188.48	88.10	61.60	13.40		0.70	0.20	2.90	11.60	0	178.50
1992-93	210.98	93.30	69.20	15.20		0.70	0.20	2.40	13.50	0	194.50
1993-94	223.76	97.30	74.50	20.26		0.70	1.10	2.87	15.40	0	212.13
1994-95	247.38	107.40	80.50	24.24		0.60	1.10	2.88	18.86	0	235.58
1995-96	365.51	110.90	90.98	27.31		0.72	0.99	3.00	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
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	44.80	0.23	401.04
2003-04	454.59	199.40	92.80	46.49	32.03	0.80	0.12	4.83	49.22	1.94	427.66
2004-05	486.75	211.02	93.97	51.68	37.87	0.80	0.00	4.85	52.49	3.62	456.30
2005-06	526.72	222.00	88.58	63.44	49.02	0.76	0.0	5.24	57.13	6.71	493.61

Source: Energy and Mineral Resource Division.

**Table 10.13: Sectorwise Demand for Natural Gas.**

(In Billion Cubic Feet)

Sector	2004-05 (Actual)	2005-06 (Provisional)	2006-07	2007-08	2008-09
Power	211.02	222.72	247.8	268.30	291.60
Captive power	37.87	49.02	46.97	53.40	61.25
Fertilizer	93.97	88.58	98.91	107.30	136.15
Industry	51.68	63.44	76.99	86.00	112.50
Commercial	4.85	5.24	5.80	6.30	6.70
Brick Field (Seasonal)	0.00	0.00	0.00	0.00	0.00
Domestic	52.49	57.13	65.41	72.00	79.10
Tea-Estate	0.80	0.76	0.80	0.80	0.80
CNG	3.62	6.71	7.50	8.50	9.50
*System Loss	30.45	33.12	23.00	21.10	20.00
<b>Total</b>	<b>486.75</b>	<b>526.72</b>	<b>573.18</b>	<b>623.70</b>	<b>717.60</b>

Source: Energy and Mineral Resource Division. \*Including own use.

In Bangladesh, it has become extremely important to explore and develop new gas fields to meet the increasing demand of gas. To intensify exploration activities, the whole country has been divided into 23 blocks. As a result, International Oil Companies have signed 10 Production Sharing Contracts (PSCs) for 12 blocks. Out of these, 02 PSCs have already been expired. Currently 08 PSCs are active in 10 blocks. Relevant information are presented in Table 10.14 below:

**Table 10.14: Agreement for Gas Exploration under Production Sharing Contracts (PSC's) for hydrocarbon exploration**

<b>International Oil Company</b>	<b>Exploration Block</b>	<b>Area</b>
Chevron Bangladesh Limited.	13, 14	Sylhet, Moulavibazar
Chevron Bangladesh Limited.	12	Sunamganj, Habiganj
Cairn Energy Sangu Field Limited/ Haliburton Energy Inc.	16	Bay of Bengal.
Tullow Bangladesh Limited/ Rexwood/ Okland	17, 18	Cox's Bazar, Bay of Bengal.
Tullow Bangladesh Limited/ Niko Exploration (Block-9 ) Limited/BAPEX	9	Gazipur, Narsingdi, Comilla & Chandpur.
Chevron Bangladesh Limited/ Cairn Energy Exploration (Bangladesh) Limited/BAPEX	7	Barisal, Patuakhali, Pirojpur, Jhalakati, Barguna and Bay of Bengal.
Cairn Energy Exploration (Bangladesh) Limited/BAPEX	5	Khulna, Satkhira, Bagerhat, Bay of Bengal.
Cairn Energy Exploration (Bangladesh) Limited/BAPEX	10	Laxmipur, Noakhali, Bhola, Bay of Bengal.

Source: Energy and Mineral Resource Division.

To meet the increasing demand of gas several important projects like, Shahbazpur Gas Field Development Project, Operation Capability Strengthening Project, Mubarakpur Oil/gas Exploration Well Drilling Project, Gas Supply to Sylhet Combined Cycle Power Plant and Shahjalal Fertilizer Factory are being implemented. Recently construction of Ashuganj-Monohordi pipeline (30" dia 37 km long ) has been completed. 20" dia 60 km long Dhanua-Aminbazar Gas Transmission Pipeline Project is now under implementation to transmit the gas produced from north-eastern part of Bangladesh to Dhaka region and other parts of the country. An opportunity has been created for expansion of gas network to the western and south-western zone of the country by implementing Gas Transmission and Development Project. Under this project, total 356 km gas transmission pipelines will be constructed to transmit about 360 mmcf/d gas to the western & south-western region of the country. These pipelines are; (i) Monohardi-Dhanua-Elenga-East Bank of Jamuna gas transmission pipeline (51 km) (ii) West Bank of Jamuna Bridge-Nalka, Hatikumrul-Iswardi-Bheramara gas transmission pipeline (87 km) (iii) Bonpara-Rajshahi gas transmission pipeline (53 km) (iv) Bheramara-Khulna gas transmission pipeline (165 km). Moreover, 02 compressor stations will be installed at Muchai and Ashuganj under the same project.

## **LPG and CNG**

**LPG:** The LPG Plant sited at Kailashtilla, Sylhet has been producing annually 5000 metric tons of LPG from the NGL of Kailashtilla gas field. Installation of NGL fractionation plant of 110 tons capacity at a cost of Taka 93 crore is under way in Kailashtilla under turnkey EPC contract to produce petroleum products like LPG, MS, HSD, Kerosene by fractionating NGL extracted from the wet gas fields like Kailashtilla, Beanibazar and Jalalabad. The project is expected to be implemented within June, 2007. Once implemented, it would be possible to produce annually 8,560 MT LPG, 13,140 MT Petrol and 14,600 MT Diesel. It is to be noted that a 2/3 NGL fractionation plant will be established by private sector also.

**CNG:** Vehicle conversion to Compressed Natural Gas (CNG) is being carried on and promotion of this mode of fueling is being encouraged. Besides public sector, government has been encouraging private sector participation for installation of CNG re-fuelling stations. To facilitate CNG use, about 122 CNG re-fuelling stations and 80 conversion workshops have already been setup in the country. Among these CNG re-fuelling stations, 81 are sited in Dhaka, 5 in Savar, 7 in Gazipur, 4 in Narayanganj, 4 in Comilla, 2 in Feni, 5 in Sylhet, 14 in Chittagong. Installation of another 07 CNG filling stations is under way in various region. The number of CNG vehicles in the country now stands at 75,491.

Under Dhaka Clean Fuel Project another 26 (Twenty Six) re-fuelling stations will be installed along the following 06 highways: i) Dhaka-Chittagong, ii) Dhaka-Sylhet, iii) Dhaka-Mymensingh, iv) Dhaka-Aricha and v) Dhaka-Sirajganj-Bogra, vi) Dhaka-Mawa highway. Under this project, 100 CNG buses will be handed over to private entrepreneurs through Commercial Bank/Leasing Company. There is a plan to import 5,000 conversion kits & 6,000 cylinders to convert government/ semi government/autonomous bodies' petrol driven vehicles into CNG mode Dhaka Clean Fuel Project. A new workshop will be set up and existing workshop at Joarshahara will also be upgraded under the same project. Construction of 100 km gas distribution lines will be completed soon under Dhaka Clean Fuel Project. Efforts are continuing to convert more vehicles to CNG mode and installation of more re-fuelling stations are being planned to ensure supply of CNG to the converted vehicles. Accordingly, government has liberalized the conditions relating to importation of CNG conversion kits etc. so that private entrepreneurs could come forward.

## **Fuel Demand and Supply System**

Bangladesh Petroleum Corporation (BPC) has completed development and expansion of fuel reserve system, by modernizing and upgrading the fuel supply system conforming to international standard for international and domestic flights. Apart from this, BPC is responsible for development and expansion of fuel reserve system throughout the country. Currently, its total fuel stock capacity is 8.53 lakh metric tons. The following two tables (Table- 10.15 and 10.16) present the information on import of refined and crude petroleum commodities by Bangladesh Petroleum Corporation during 1990-91 to 2005-06:

**Table 10.15: Import of Crude Petroleum Commodities**

<b>Financial year</b>	<b>Quantity ( Metric Ton)</b>	<b>C &amp; F Price ( Million US Dollar)</b>	<b>Creore Tk.</b>
1990-91	11,81,652	215.36	783.04
1991-92	10,17,764	147.63	570.40
1992-93	11,28,657	162.52	638.17
1993-94	12,39,038	149.94	599.20
1994-95	13,63,888	181.83	733.88
1995-96	11,40,334	153.42	639.23
1996-97	12,39,699	203.69	875.31
1997-98	11,44,048	151.56	714.10
1998-99	9,55,874	98.10	473.72
1999-00	12,36,049	218.68	1110.96
2000-01	13,37,121	290.73	1598.60
2001-02	12,24,707	220.19	1277.78
2002-03	13,31,003	289.30	1693.03
2003-04	12,52,424	314.12	1848.43
2004-05	10,63,208	364.01	2261.98
2005-06 (Provisional)	12,53,285	573.65	3901.16

Source: Bangladesh Petroleum Corporation

**Table 10.16: Import of Refinery Petroleum Commodities**

(Quantity: Metric ton, Value: Creore Tk.)

<b>Year</b>	<b>JP-1, Kerosene, Petrol, Bitumen, Diesel</b>		<b>Lubricating</b>	
	<b>Quantity</b>	<b>Value</b>	<b>Quantity</b>	<b>Value</b>
1990-91	684441	688.99	26522	44.16
1991-92	805658	623.04	25771	34.99
1992-93	792131	607.81	28660	36.89
1993-94	916658	619.62	34274	45.15
1994-95	1114572	758.14	50262	81.09
1995-96	1466118	1125.07	39184	68.52
1996-97	1596567	1510.10	47638	64.98
1997-98	1734874	1275.04	39742	57.53
1998-99	2221872	1350.10	39961	45.62
1999-2000	1823400	2021.23	50229	86.41
2000-01	2068913	2999.20	29918	69.34
2001-02	2072300	2535.62	15316	30.59
2002-03	2213899	3319.35	1911	5.10
2003-04	2262348	4015.81	6516	18.38
2004-05	2691750	7213.88	10189	38.14
2005-06 (Provisional)	238052	9382.77	5137	35.53

Source: Bangladesh Petroleum Corporation

### **BPC's Financial Loss in Marketing Imported Finished Products and Refined Products**

BPC incurred a loss of Tk. 7.61 crores during FY 2002-03 FY from marketing of imported POL products. This is due to lower local sales price (transfer price) against higher purchase cost not commensurating each other. Despite that in 2002-03 BPC contributed Tk. 2766.13 crores to the national exchequer as import duty and tax. During FY 2003-04 BPC incurred loss to the tune of Tk. 958.93 crore while it contributed Tk. 3087.28 crore to the national exchequer as import duty and tax. During FY 2004-05 BPC's loss amounted to TK. 2386.73 crore while its contribution to national exchequers was Tk. 2745.77 crore. BPC incurred a provisional loss of Tk. 3177.58 crore in FY 2005-06 while it deposited Tk. 2620.26 crore to national exchequer.

### **Bangladesh Energy Regulatory Commission (BERC)**

For the long term development of energy and gas sector, Bangladesh Energy Regulatory Commission (BERC) was established in 2004 as an independent organisation to create an atmosphere conducive to private investment in the generation, transmission, transportation, storage and marketing of energy; to assure transparency in the management, operation and tariff determination in this sector; to protect consumer's interest and to promote the creation of a competitive market.

The BERC has already framed a set of important regulations and drafted other necessary and important regulations. The Licensing Regulations, 2006 is at the final stage for gazette notification. The approval of the organizational set up is under active consideration of the government. The statement of Issuance of Electricity Generation Licenses and income of BERC is presented in Table 10.17 below:

**Table 10.17: Issuance of Electricity Generation Licenses and Income of BERC**

<b>Year</b>	<b>Nos. of licenses issued</b>	<b>Total capacity of electricity generation (MW)</b>	<b>Income (In lakh Taka)</b>
2003-04	Nil	Nil	0.02
2004-05	4	64.90	28.57
2005-06	14	158.20	79.63

Source: Bangladesh Energy Regulatory Commission.

### **Bangladesh Petroleum Institute:**

Bangladesh Petroleum Institute (BPI) under Ministry of Energy and Mineral Resources (MOEMR) was started in 1982 with the objective to establish a well-organized and highly technology-training institute for doing R& D, data management and providing higher diploma education for the oil, gas and mineral sector. All activities of BPI are being carried according to the directives of its Governing Board.



From its inception, BPI has been working to identify the potential areas of finding oil and gas by doing photo-geology, seismic modeling, geophysical interpretation and different other studies and have prepared 24 research/technical reports, so far. From its inception, BPI has organized 239 training courses, seminar and workshops where a total of 4460 participants of different level have participated.

### **Hydrocarbon Unit**

Since its formulation in 1999, the Hydrocarbon Unit (HCU) under Energy and Mineral Resources Division is playing an important role in the upstream petroleum sector of the country. After completion of Resource Assessment (2001) in the petroleum sector of the country, HCU completed the 'Gas Reserve Estimation Study: 2003'. According to this study the present scenario of the gas reserve is as follow:

Total gas reserve	: 20.50 Tcf
Production (up to June 2006)	: 6.50 Tcf
Net Recoverable reserve (up to June 2006)	: 14.00 Tcf

HCU's Optimal Gas Utilization Study covered issues like- (a) Domestic gas market developments, (b) Investment requirement, (c) Foreign debt and currency reserve, (d) Impact on gas reserves, (e) Surplus gas exploitation option etc. A follow-up study had been undertaken and completed. The follow-up study examines different issues and risks involved in the regional cooperation in energy. HCU is working as the 'technical arm' and 'think tank' of the Energy and Mineral Resources Division, and offering information-based technical opinion about the operations of the Production Sharing Contracts (PSC) with the foreign oil companies.

### **Coal and Hard Rock**

Barapukuria coal mine could produce about 3.00 lakh metric tons of coal in FY 2005-06 against its annual targeted capacity of 10.00 lakh metric tons. Out of this targeted production about 7.00 lakh metric tons coal will be used in the Barapukuria thermal power plant (2 x 125 MW) and remaining 3.00 lakh metric tons of coal will be locally used particularly by the brick fields which will have an impact of reducing deforestation. On the other hand, Madhyapara hard rock mine is going in to production very soon with a targeted capacity of 1.65 million tons of hard rock per year. The hard rock of Madhyapara will be used for local construction industries, roads and highways and railway as well as for river training.

### **Geological Survey of Bangladesh (GSB)**

GSB has been performing the responsibility of exploring, discovering, assessing the mineral resources of the country and conducting survey research in the field. GSB is implementing different development projects to strengthen exploration and evaluation of mineral resources in the country. Important outcomes of the project are the discovery of coal deposits at Barapukuria Dighipara of Dinajpur district and Khalashpir of Rangpur district. Besides these, glass sands,

white clay and gravel deposits have been discovered in different places of the country. Presently, a development programme entitled 'Geoscientific Activities for Mineral Investigation (2004-2008)' at a cost of Taka 350.0 lakh under revenue budget is being implemented. Under this programme, drilling of a hole (GDH-62/2006) with a total depth of 524.50m (1721 feet) in Dighipara coal basin, geological mapping of Monohardi and Shibpur Upazila of Narshingdi district, geological investigation for identification of arsenic contamination in ground water in Dhunot Upazila of Bogra district, and geophysical mapping (gravity and magnetic surveys) in Gaibandha-Sadullapur-Palashbari area of Gaibandha district have been completed during FY 2005-2006. Now the revised reserve of the Dighipara Coal Basin has been estimated at 150 million tons on the basis of five holes.

Under another project entitled 'Modernization of Drilling Equipment and Accessories of the Geological Survey of Bangladesh for Investigation of Mineral Resources (2005-2008)' at a cost of Taka 952.57 lakh a rig towing vehicle and few equipment have been procured during FY 2005-06.

With the financial and technical assistance from the Government of Federal Republic of Germany, a pilot project entitled '3-Dimensional Geological Modeling for Industrial Siting and Waste Management and Health Hazard Assessment of Dhaka City, Bangladesh' has been completed in June, 2006.

