

POWER AND ENERGY

At present, 93 percent people of Bangladesh have access to electricity facilities. There is enormous demand for electricity, oil, gas and natural resources in agriculture, industry and service sector as well as daily life of Bangladesh. In this context, the government is giving top priority to the development of power and energy sector. During FY2018-19 (up to February 2019), total installed electricity generation capacity stood at 18,079 MW, which was 21,169 MW including captive and renewable energy. The highest generation was 11,623 MW up to February 2019. Total net electricity production was 62,678 million kilowatt-hours in FY2017-18 and in the first seven months of FY2018-19 (up to January 2019) total net electricity production stood at 41,125 million kilowatt-hours. Out of total net generation, 48 percent power was generated by public sector, 40 percent power from private sector and 12 percent from power import. In addition, total system loss of transmission and distribution of electricity substantially declined to 10.90 percent in FY2018-19 (up to December 2018) from 15.73 percent in FY2009-10. At present, the total distribution line is 5.02 lakh kilometer and total consumer is 3.27 crore. According to Power System Master Plan (PSMP) 2016, the government has set a target to increase installed electricity generation capacity to 24,000 MW by 2021, 40,000 MW by 2030 and 60,000 MW by 2041. On the other hand, natural gas met almost 71 percent of the country's total commercial use of energy. A total of 27 gas fields have been discovered from which about 15.94 trillion cubic feet gas has been produced cumulatively (up to June 2018) and leaving recoverable net at 11.92 trillion cubic feet. Besides, the country has about 13.27 lakh metric tonnes reserve fuel oil. In order to meet the growing demands of natural gas and fuel oil and to secure energy supply of the country in long term, the highest emphasis is given on the diversification of energy sources, particularly on the efficient and best use of energy.

Power Sector

At present, about 93 percent people of the country are covered by electricity facilities (including renewable energy). The government took several initiatives such as instant, short, medium and long term plan to meet the increasing demand of electricity. In FY2018-19 (up to February 2019), total grid based installed capacity was 18,079 MW including 9,065 MW in public sector, 7,854 MW in private sector and 1,160 MW imported from India. Including captive and

renewable energy, total installed capacity was 21,169 MW. At present, per capita generation is 464 kWh (including captive). With a view to bring 100 percent population under electricity coverage, the government has been taken various initiatives to improve the distribution system. Up to February 2019, about 3.27 crore consumers are connected with the national grid of 5.02 lakh km. Performance of electricity sector has been increased significantly due to constant monitoring and evaluation. System loss of

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electricity decreased to 10.90 percent in FY2018-19 (up to December 2018) from 15.73 percent in FY2009-10. To bring all citizens of the country under electricity benefits by 2021 the government is continuing development, reform and reconstruction activities in power sector. In order to achieve the government's vision 2021, there are plans to generate 24,000 MW by 2021, 40,000 MW by 2030 and 60,000 MW by 2041.

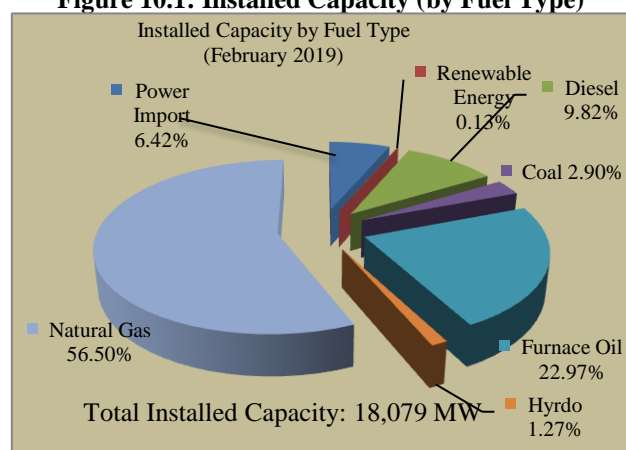
A. Power Generation

Power Generation Capacity

In FY2018-19 (up to February 2019) total grid based installed capacity was 18,079 MW including 9,065 MW in public sector; 7,854 MW in private sector and 1,160 MW from power trade. Including captive and renewable energy, the total installed capacity was 21,169 MW. The highest generation was 11,623 MW up to February 2019.

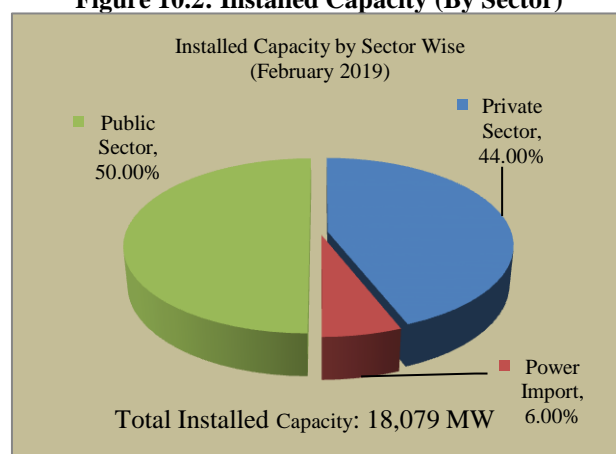
The installed capacity of power generation by fuel type and ownership in FY2018-19 (up to February 2019) is shown in Figures 10.1 and 10.2 respectively.

Figure 10.1: Installed Capacity (by Fuel Type)



Source: Power Division *Up to February 2019.

Figure 10.2: Installed Capacity (By Sector)

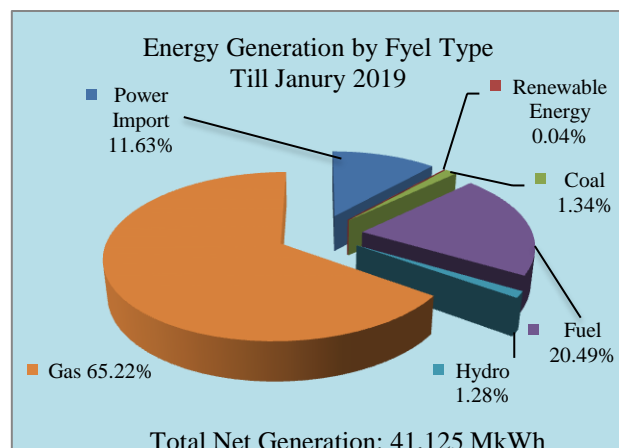


Power Generation (Million kWh)

In the first seven months of FY2018-19 (up to January 2019) a total of 41,125 million kWh net energy was generated including 19,921 million kWh from public sector and 21,204 million kWh from private sector power plants. Out of total net generation, 48 percent power was generated by public sector power plants, 40 percent power from private power

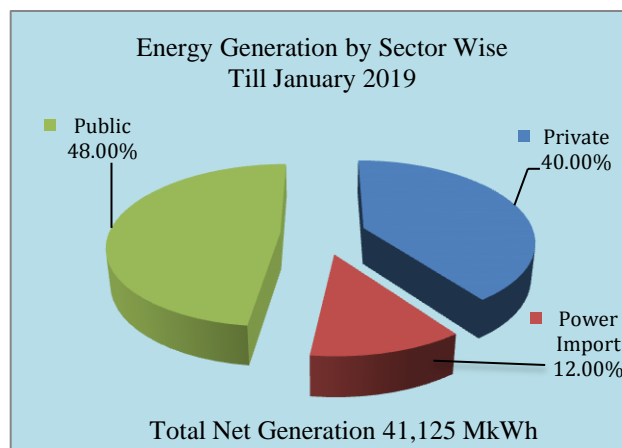
plants and 12 percent from power import. The share of Gas, Hydro, Coal, Import, liquid fuel and renewable energy generation were 65.22 percent, 1.28 percent, 1.34 percent, 11.63 percent, 20.49 percent and 0.04 percent respectively. Fuel wise and sector wise net energy generation in FY2018-19 (up to January 2019) are shown in figure 10.3 and 10.4 respectively.

Figure 10.3: Energy Generation (National) by Fuel



Source: Power Division *Up to January 2019.

Figure 10.4: Energy Generation (National) by Sector



Maximum Power Generation

From the historical data it is evident that in FY2009-10 maximum generation was 4,606

MW which was increased to 11,623 MW in FY2018-19 (up to February 2019). The installed capacity and maximum generation since FY2009-10 are presented in Table 10.1.

Table 10.1: Installed Capacity and Maximum Generation

Fiscal Year	Installed capacity MW	Maximum generation MW
2009-10	5823	4606
2010-11	7264	4890
2011-12	8716	6066
2012-13	9151	6434
2013-14	10416	7356
2014-15	11534	7817
2015-16	12365	9036
2016-17	13555	9479
2017-18	15953	10958
2018-19*	18079	11623

Source: Power Division, *up to February 2019.

Fuel Consumption for Power Generation

The natural gas consumption in public sector power plant was 166 billion cubic feet in FY2009-10 which has been increased to 211 billion cubic feet during FY2017-18. Coal has been used as fuel for the first time during FY2005-06. The total consumption of coal for electricity generation was 825 thousand tonnes during FY2017-18. For power

generation, 615 million liter furnace oil and 795 million liter diesel oil have been used by public sector power plants during FY2017-18. In FY2018-19, as of January, natural gas consumption in public sector power plants was 153 billion cubic feet and consumption of furnace oil and diesel oil were 259 and 307 million liter respectively. The consumption of natural gas and liquid fuel since FY2009-10 are given in Table 10.2.

Table: 10.2: Fuel Consumption by Public Sector Power Plants

Fiscal Year	Natural gas (Billion cft)	Coal (1000 Tonne)	Liquid Fuel (Million Liter)	
			Furnace Oil	HSD, SKO & LDO
2009-10	166	480	91	125
2010-11	150	410	119	138
2011-12	151	449	172	60
2012-13	175	590	266	35
2013-14	183	539	424	175
2014-15	180	522	378	291
2015-16	207	489	439	238
2016-17	215	587	513	348
2017-18	211	825	615	795
2018-19*	153	256	259	307

Source: Power Division * up to January 2019

Power Sector Development and Future Plan

‘Power System Master Plan 2016 (PSMP)’ has been prepared based on the availability of primary fuel supply for mitigating the growing demand of electricity and to provide

the electricity for all by 2021. As per PSMP 2016, power generation capacity will be 24000 MW by 2021, 40000 MW by 2030 and 60000 MW by 2041. Table 10.3 shows power sector development and future plan of the government up to 2041

Table 10.3: Power Sector Development and Future plan

SL	Description	2019 (February)	2021(PSMP 2010)	2030 (PSMP 2010)	2041(PSMP 2016)
1.	Installed Capacity (MW)*	21169	24000	40000	60000
2.	Electricity Demand (MW)	13000-13500	19000	33000	52000
3.	Transmission Line (Ckt. KM)	11396	12000	27300	34850
4.	Substation Capacity (MVA)	39677	46450	120000	261000
5.	Distribution Line (KM)	502000	515000	526000	530000
6.	Per Capita Power Generation (KWh)	464	700	815	1475
7.	Access to Electricity (%)	93%	100%	100%	100%

Source: Power Division *Including 3,090 MW Captive and RE

Power Generation Projects

Several projects are underway both in public and private sectors. At present, total 53 power plants are under construction with 14,202 MW capacity in which 19 are public power plants with 7,991MW capacity and 34 are private power plants with 6,211MW capacity. It is expected that most of the power plants will go to power generation by 2023. The expected power generation targets under ongoing projects are summarised in Table 10.4.

Table 10.4: Power Generation Projects (Under Construction)

Sector	No. of Projects	Capacity (MW)
Public Sector	19	7991
Private Sector	34	6211
Total (Under Construction)	53	14202

Source: Power Division

Among them mentionable projects are:

Public Sector

- *Siddirganj* 335 MW CCPP
- *Ghorasal* 206 MW CCPP

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- *Khulna* 330 MW CCPP
- *Bibiana* 400 MW CCPP (3rd unit)
- *Bibiana* 383 MW CCPP
- *Patuakhali* 1320 MW Coal based Power Plant
- *Matarbari* 1200 MW CCPP
- 1320 MW BIAF Power Company Ltd.

Private Sector

- *Maowa-Munsiganj* 522 MW coal based
- *Khulna* 630 MW coal based
- *Anowara* 300 MW coal based
- *Barisal* 307 MW coal based
- *Dhaka* 635 MW coal based
- *Chattogram* 1224 MW coal based

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 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 present (up to February 2019), the lengths of 400kV, 230 kV and 132 kV transmission lines are 697.76 ckt km, 3,371.67 ckt km and 7,328.64 ckt km respectively. Now there are two HVDC back-to-back substation with total capacity of 1,000 MW, four 400/230 kV grid substations of 3,250 MVA, one 400/132 kV grid substation of 650 MVA, 26 of 230/132 kV grid substations of 13,135 MVA capacity, 132 nos 132/33 kV grid substations of capacity 22,641.5 MVA, 450 MVAR capacitor bank in 132 kV bus in 8 substations and 1,340 MVAR capacitor bank in 33 kV bus in 46 substations in the country. At present, the total length of installed transmission line is 11,396 ckt km. Combining all the grid substations of different organizations of Power Division and other private organizations there are total of 163 grid substations with total capacity of 39,676.50 MVA and 2 HVDC stations with total capacity of 1000MW. Table 10.5 shows transmission system and sub-station infrastructure by PGCB.

Table-10.5: Transmission System and Substation Infrastructure by PGCB

Fiscal Year	Transmission System (ckt km)			400 kV HVDC Substation		400/230/132 kV station		230/132 kV Substation		132/33 kV Substation	
	400 kV	230 kV	132 kV	No	MW	No	MVA	No	MVA	No	MVA
2009-10	-	2647.30	5670.30	-	-	-	-	13	6300.00	75	7844.00
2010-11	-	2647.30	6018.00	-	-	-	-	13	6675.00	81	8437.00
2011-12	-	2647.30	6080.00	-	-	-	-	13	6675.00	83	8737.00
2012-13	-	3020.77	6080.00	-	-	-	-	15	6975.00	84	9705.00
2013-14	164.70	3044.70	6120.00	01	500	-	-	18	8775.00	86	10714.00
2014-15	164.70	3171.45	6358.83*	01	500	01	520	19	9075.00	89	11964.00
2015-16	220.70	3171.45	6396.83*	01	500	01	520	19	9375.00	90	12420.00
2016-17	559.75	3312.99	6503.95*	01	500	02	1690	19	9675.00	91	13364.50
2017-18	559.75	3324.99	6795.89*	01	500	03	2210	19	9675.00	91	15045.50
2018-19*	697.76	3371.67	7328.64*	02	1000	05	3900	26	13135.00	132	22641.50

Source: Power Division*with 85.2 ckt km **up to February 2019.

C. Power Distribution System

At present the following six 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)
6. Northern Electricity Supply Company Ltd (NESCO)

Power Distribution Projects

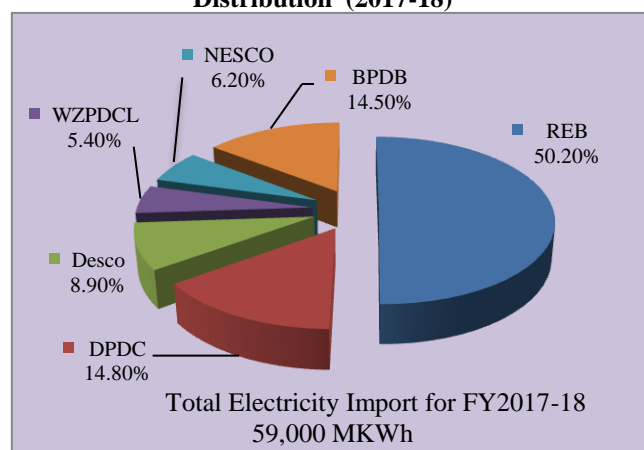
An integrated power distribution program has been undertaken to increase the distribution

network in order to bring 100 percent populations under electricity coverage by 2021 as well as to improve the customer service. Up to February 2019, about 3.27 crore consumers are connected with the grid through construction of 5.02 lakh km. distribution lines. Power Division has implemented some major power distribution expansion projects to increase the distribution network.

Inter-Utility Energy Import

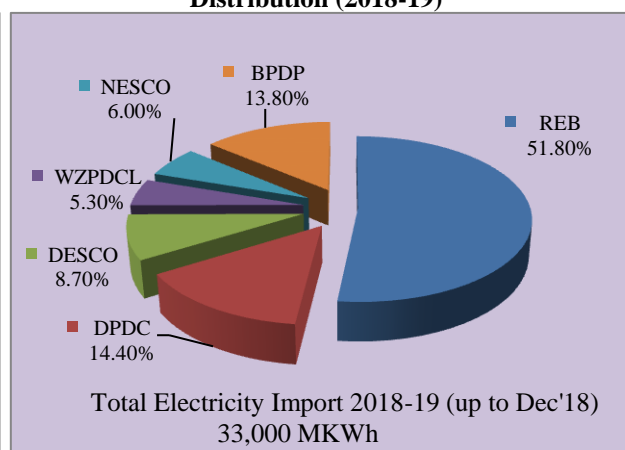
The distribution utilities have imported 59,000 MKWh and 33,000 MKWh electricity at 33 KV and 132 KV level during FY2017-18 and FY2018-19 (up to December 2018) respectively, which is shown in figure 10.5 and 10.6.

Figure 10.5: Power Import and Agency Wise Distribution (2017-18)



Source: Power Division. * up to December 2018

Figure 10.6: Power Import and Agency Wise Distribution (2018-19)



System Loss

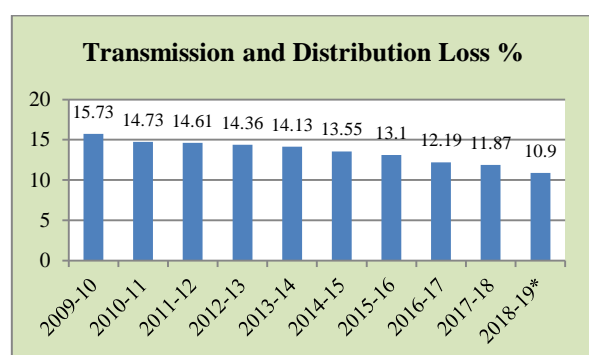
System loss is one of the key performance indicators of the distribution entities. To achieve desired performance of the sector, system loss needs to be further reduced. Various measures, such as continuous

performance monitoring of the utilities reforms and target-oriented measures are being implemented to reduce the system loss. The system loss from FY2009-10 to FY2018-19 (up to December 2018) is shown in Table 10.6 and in figure 10.7

Table 10.6: Year- wise System Loss Statistics

Fiscal Year	Distribution Loss (%)	Total Loss (T&D)%
2009-10	13.49	15.73
2010-11	12.75	14.73
2011-12	12.26	14.61
2012-13	12.03	14.36
2013-14	11.96	14.13
2014-15	11.36	13.55
2015-16	10.96	13.10
2016-17	9.98	12.19
2017-18	9.60	11.87
2018-19*	8.49	10.90

Source: Power Division * up to December 2018

Figure 10.7: Year Wise System Loss Statistics

Source: Power Division * upto December 2018

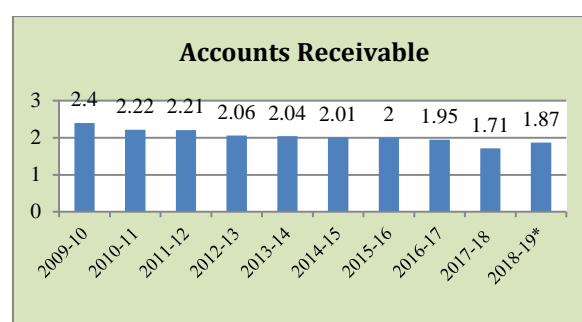
Accounts Receivable

To improve financial viability and efficiency of the sector, the government adopts a financial action plan to maintain power sector receivable at no more than 2 months' billed amount equivalent and reduce receivables from autonomous, public entities and private customers to an acceptable limit. From FY2009-10 to FY2018-19 year wise accounts receivables are shown in Table 10.7 and in figure 10.8.

Table 10.7: Year wise Accounts Receivable

Fiscal year	Accounts Receivable (Equivalent Months)
2009-10	2.40
2010-11	2.22
2011-12	2.21
2012-13	2.06
2013-14	2.04
2014-15	2.01
2015-16	2.00
2016-17	1.95
2017-18	1.71
2018-19*	1.87

Source: Power Division *Up to November 2018

Figure 10.8: Year Wise Accounts Receivable

Source: Power Division *Up to November 2018

Pre-Paid Meter

To improve power distribution system, 15.87 lakh prepaid meters have been installed by different entities. Till January 2019, BPDB, BREB, DPDC, DESCO, WZPDCL and NESCO installed 8,61,199; 61,500; 3,20,580; 2,51,331; 73,299 and 18,894 numbers of prepaid meters respectively. In addition, installation of 2 crore smart-prepaid-meters is underway. Moreover, due to introduction of prepaid meters, system loss has been reduced significantly and also consumption pattern has also been changed. Power Division has set a target to bring all large and medium consumers under prepaid meter. The list of installed prepaid meters up to January 2019 has been shown in Table 10.8

Table:10.8: Installation of prepaid meters

Utility	Single Phase	Three phase	Total
BPDB	843514	17685	861199
REB	60900	600	61500
DPDC	298905	21675	320580
DESCO	237989	13342	251331
WZPDCO	70872	2427	73299
NESCO	18435	459	18894
Total	1530615	56188	1586803

Source: Power division * up to January 2019

D. Bangladesh Rural Electrification Board (BREB)

Up to January 2019 Bangladesh Rural Electrification Board with its 80 *Palli Bidyut*

Samities has connected total consumer 2.50 crore. Among them 2.27 crore domestic, 2.58 lakh irrigation, 15.52 lakh commercial, 1.72 lakh industrial, 3.11 lakh Charitable, 795 construction, 811 temporary, 21,349 street light and 391 general. As many as 77.80 thousands villages are electrified by constructing 4.44 lakh km distribution lines. Target and achievement of line construction and consumer connection of BREB from FY2009-10 to FY2018-19 is shown in Table 10.9.

Table 10.9: Physical Target and Achievement of BREB

Fiscal Year	Distribution Line (Km)		Consumer Connection	
	Target	Achievement	Target	Achievement
2009-10	2852	2713	-	461417
2010-11	2095	3028	-	259548
2011-12	7700	10049	-	723713
2012-13	10222	10279	-	304417
2013-14	16971	17544	-	758932
2014-15	18750	18698	-	1839064
2015-16	20000	31612	1500000	3597883
2016-17	25000	36554	2000000	3511573
2017-18	30000	54886	3200000	3851143
2018-19*	50000	38379	2000000	2143840

Source: Rural Electrification Board (REB) * Up to January 2019.

Projects under Implementation of BREB

In order to achieve 100 percent electrification, presently 17 projects are being implemented under BREB against which nearly Tk.7,478.92 crore has been allocated in the Revised Annual Development Program of FY2018-19. In addition, under climate change trust fund of Ministry of Forestry, Environment and climate change 15 *upazila* complex is successfully electrified implementing a project 'Electrification in local area (*upazila* complex) by using solar energy'.

Expansion of rural electrification and development and up-gradation of existing distribution system is growing rapidly by implementing running projects, where three projects are for system upgradation, one project for pre-payment e-metering, two projects for technical assistance, one project for overloaded transformer replacement and other ten are for Line Construction and Consumer Connection. By these projects 38,379 km new distribution line construction/ renovation and 198 sub-stations construction/ augmentation will be established. By this construction line planned to connect 21.4 lakh different category consumers and to install 10

lakh pre-paid meter under rural electrification.

E. Sustainable Energy Development

Renewable Energy

The government has planned to produce electricity through coal, dual fuel and nuclear power to reduce the dependence on natural gas. Apart from this, government has taken different steps to produce environment-friendly electricity from renewable energy. After formulation of renewable energy policy, it has been implemented from 2009. The government has established ‘Sustainable and Renewable Energy Development Authority (SREDA)’ in 2014 under Sustainable and Renewable Energy Development Authority Act, 2012 to facilitate sustainable energy i.e. renewable energy as well as energy efficiency. According to the law, SREDA was established for effective utilisation and conservation of renewable energy both in public and private sector. To monitor and co-ordinate renewable energy and efficiency of energy related issue different agencies are working with SREDA. At present, 572.63 MW electricity is being generated from renewable sources. Furthermore, 543.08 MW renewable projects are under construction and 1416.41 MW renewable projects are under planning.

Energy Efficiency (EE) and Energy Conservation (EC)

The government has undertaken a number of initiatives to ensure efficient use of energy. In the meantime, the government has formulated ‘Energy Efficiency and Conservation Master Plan up to 2030’ as well as ‘Energy

Efficiency and Conservation Rules and Action Plan’ to ensure energy efficiency and conservation where numbers of interventions have been identified for implementation within stipulated time. The government set a target to improve energy efficiency in the Seventh Five Year Plan (2016-2020) and also in the Master Plan for energy security and to reduce carbon emission. The target is:

- Save 15 percent primary energy per GDP by 2021
- Save 20 percent primary energy per GDP by 2030.

Recent Achievement in Energy Efficiency Improvement:

- ‘Energy Efficiency and Conservation Rules 2016’ has been formulated
- ‘Energy Audit Regulation 2018’ has been formulated
- ‘Energy Efficiency and Conservation Promotion Financing Project’ has been started to promote energy efficiency in industries as well as in residential sector through introducing energy efficient equipment, appliances and electrical gadgets at 4 percent interest loan
- Credit facilities have been created in Bangladesh Bank for environment friendly and green industries
- Provision of Energy Efficiency and Energy Conservation has been included in ‘Bangladesh National Building Code
- Energy Efficiency and Conservation topics have been included in text book of school, college and madrasa
- Energy Saving School Awareness Program has been introduced

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- Preparation and implementation of Country Action Plan for Clean Cook Stove
- Initiate a pilot project for waste heat recovery from the exhaust of power plant and their productive use and
- Implementation of Improved Rice Parboiling System.

Renewable Energy Program of BREB

BREB is the pioneer of Solar Home System through the first ever Renewable Energy project in Bangladesh in 1993. Since then BREB has installed 51,364 Solar Home Systems (SHSs), 37 rooftop/hybrid type rooftop solar power plants, 40 solar powered irrigation pumps, 14 Solar Charging Station and 40Net Metering System. The total capacities of the installed plants are about 13.31 MWp.

F. Rooppur Nuclear Power Plant (RNPP)

Rooppur Nuclear Power Plant is one of the top priority projects of the government. Considering geological, geophysical and meteorological data of *Rooppur* Nuclear Power Plant site, different feasibility studies have been done by Bangladesh Atomic Energy Commission (BAEC). To meet the growing electricity demand of the country, the First Concrete Pouring (FCD) of Unit 1 and Unit 2 was done to get 2×1200 MW energy from this nuclear power plant by 2023 and 2024 respectively. In this regard the some important steps which have been completed during the period July 2018 – February 2019 are as follows:

- First Concrete Pouring (FCD) ceremony of the *Rooppur* NPP Unit-2 was inaugurated by the Honorable Prime Minister on 14 July 2018. FCD ceremony of the *Rooppur* NPP Unit-1 was inaugurated by the Honorable Prime Minister on 30 November 2017
- A joint meeting with the contractor institution of Russian Federation was held on 25-27 September 2018 to achieve M0 milestones
- Meeting between Russian and Bangladesh Party was held from 25-29 October 2018 to finalise the Supplementary Contracts between Russian Federation and Peoples' Republic of Bangladesh
- The 20th Coordination meeting between Russian Contractor Atomstroyexport and Bangladesh Atomic Energy Commission was held on 26 November 2018 in order to resolve issues related to the construction of *Rooppur* Nuclear Power Plant and
- A meeting was arranged on 10-15 December 2018 to negotiate the Nuclear Fuel Supply Contract in Dhaka.

G. Regional Power Cooperation

To enhance the development of power sector Bangladesh government is working with neighboring countries as well as UN-ESCAP, SAARC, BIMSTEC, SASEC and D-8 for regional cooperation. Also Bangladesh has taken initiative in cross border trade of electricity through bilateral cooperation with Nepal, Bhutan and Myanmar. Effort has been taken to import hydro power from Nepal. A Memorandum of Understanding (MoU) between Bangladesh and Myanmar is underway. Discussion is going on to import

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electricity from Bhutan. Collaboration effort with the SAARC countries is continued.

Electricity Import from India

500 MW power is being imported from *Boharampur*, India since 5 October 2013. Additional 500 MW power also imported from *Boharampur* after enhancement of the same grid substation capacity by June 2018. Besides 160 MW power is being imported from *Palatana*, Tripura state since March 2016. A feasibility study on grid interconnection facilities is going on to import additional 2,000 MW hydro power from India. Moreover, 1,300 MW Rampal coal based power plant is under implementation through joint venture with National Thermal Power Company Limited (NTPC), India.

Electricity import from Myanmar

In 2010 a discussion was held with Myanmar government to import 500 MW power. With this reference, MoU will be signed with Myanmar.

Electricity Import from Bhutan

An initiative has been taken to import hydro power from Bhutan. A tripartite MoU is at final stage between Bangladesh, India and Bhutan in order to construct a power plant through joint investment. Discussion is going on to establish *Katihar-Parbotipur /Baropukuria-Baronagar* 765 KV grid interconnection facilities.

Electricity Import from Nepal

A MoU has been signed with GMR group, India and NTPC Vidyut Vyapar Nigam Ltd (NVVN) in order to import 500 MW electricity from Nepal.

China Cooperation in Bangladesh Power Sector and Investment Opportunity

A MoU has been signed between Bangladesh and China on 21 October 2012 to enhance cooperation in power sector. As a result, cooperation and investment opportunity in Bangladesh power sector will be extended. For this reason, both of countries will contribute to uplift the mutual trade and economic cooperation. Electricity generation, transmission, distribution, energy efficiency, renewable energy has been identified as the scopes of cooperation. In addition, BIMSTEC cooperation activities are going on among the member countries. A significant development has been done in case of establishing BIMSTEC Grid.

Oil, Gas and Mineral Resources

The main purpose of oil, gas and mineral resource sector is to meet energy demand of the country by undertaking exploration, production, development and appraisal of oil and gas fields and subsequent energy reserve enhancement. The main aim of the sector is to reduce extreme dependence on natural gas through diversification of energy-mix and alternative/renewable energy resource usage, 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 accounts for 71 percent of the commercial energy of the country. Till now, 27 gas fields have been discovered in the country. According to the latest estimation of Petrobangla total initial gas in place (GIIP) is

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39.80 trillion cubic feet (TCF), of which 27.81 TCF is recoverable in proven and probable categories. From 1960 to Jun 2018, total 15.94 TCF gas was produced

cumulatively and leaving recoverable 11.92 TCF. Status of field-wise gas production and reserves is presented in Table 10.10.

Table 10.10: Status of Gas Production and Reserve

(Billion Cubic Feet)

Gas field	Producing Wells	GIIP	Recoverable Reserve			Product. FY2017-18	Cum. Product. as of Jun-2018	Net Recoverable Reserve (Jul-2018)
			1P	2P	3P			
Titas	26	8148.9	5384.0	6367.0	6517.0	195.2	4518.7	1848.3
Habiganj	7	3684.0	2647.0	2647.0	3096.0	79.9	2393.0	254.0
Bakhrabad	6	1701.0	1052.9	1231.5	1339.0	12.0	821.8	409.7
Narsingdi	2	369.0	218.0	276.8	299.0	10.0	196.1	80.7
Meghna	1	122.1	52.5	69.9	101.0	4.6	68.2	1.7
Sylhet	1	370.0	256.5	318.9	332.0	1.8	214.4	104.5
Kailashtilla	4	3610.0	2390.0	2760.0	2760.0	23.0	682.3	2077.7
Rashidpur	5	3650.0	1060.0	2433.0	3113.0	19.5	615.4	1817.6
Beanibazar	2	230.7	150.0	203.0	203.0	3.5	100.6	102.4
Saldanadi	1	379.9	79.0	279.0	327.0	1.1	89.6	189.4
Fenchuganj	2	553.0	229.0	381.0	498.0	4.7	157.0	224.0
shahbazpur	3	920.0	0.0	644.0	0.0	15.3	47.6	596.4
Semutang	2	653.8	151.0	317.7	375.1	0.5	12.9	304.8
Sundalpur	1	62.2	25.0	35.1	43.5	0.9	10.9	24.2
Srikail	3	240.0	96.0	161.0	161.0	12.9	74.3	86.7
Begumganj	0	100.0	14.0	70.0	0.0	0.0	0.9	69.1
Jalalabad	7	1491.0	823.0	1184.0	1184.0	91.9	1234.2	0.0
Moulavibazar	6	1053.0	405.0	428.0	812.0	12.4	316.3	111.7
Bibiyana	26	8350.0	4415.0	5754.0	7084.0	446.4	3379.3	2374.7
Bangura	5	1198.0	379.0	522.0	941.0	32.9	410.3	111.7
Total	110	36886.6	19826.9	26082.9	29185.6	968.5	15343.6	10789.5
Non Producing								
Kutubdia		65.0	45.5	45.5	45.5	0.0	0.0	45.5
Bhola North		600.0	0.0	420.0	0.0	0.0	0.0	420.0
Total		665.0	45.5	465.5	45.5	0.0	0.0	465.5
Production suspended								
Sangu		899.6	544.4	577.8	638.7	0.0	487.9	89.9
Chhatak		1039.0	265.0	474.0	727.0	0.0	26.5	447.5
Kamta		71.8	50.3	50.3	50.3	0.0	21.1	29.2
Feni		185.2	125.0	125.0	175.0	0.0	62.4	62.6
Rupgonj		48.0	0.0	33.6	0.0	0.3	0.7	32.9
Total		2243.6	984.7	1260.7	1591.0	0.3	598.5	662.1
Grand Total		39795.2	20857.1	27809.1	30822.1	968.8	15942.2	11917.1
In TCF		39.8	20.9	27.8	30.8	0.97	15.9	11.9

Source: Petrobangla.

Natural Gas Production and Sector-wise Consumption

Natural gas is the main source of fuel for power, fertiliser, industrial, commercial and domestic sectors. A total of 969.2 billion cubic feet (BCF) gas was produced in the

FY2016-17 while 968.7 billion cubic feet (BCF) gas was produced in the FY2017-18.

Year-wise/sector-wise natural gas production and consumption from FY2009-10 to FY2017-18 are shown in Table 10.11 and figure 10.7 and 10.8.

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	Com.	Dom.	CNG	Total
2009-10	703.6	283.3	112.6	64.7	118.8	0.8	8.1	82.2	37.2	707.6
2010-11	708.9	275.8	121.6	58.9	122.1	0.8	8.5	87.4	38.5	713.6
2011-12	743.7	302.3	124.2	58.5	128.3	0.8	8.6	89.2	38.3	750.4
2012-13	800.6	328.8	134.1	60.0	135.7	0.8	8.8	89.7	40.2	798.1
2013-14	820.4	337.4	143.8	53.8	141.9	0.8	8.9	101.5	40.1	828.1
2014-15	892.2	354.8	150.0	53.8	147.7	0.8	9.1	118.2	42.9	877.3
2015-16	973.2	399.6	160.8	52.6	156.0	0.9	9.0	141.5	46.5	966.9
2016-17	969.2	403.6	160.5	49.1	163.1	1.0	8.7	154.4	47.0	987.3
2017-18	968.7	398.6	160.5	43.0	166.6	0.9	8.2	158.0	46.2	982.0

Source: Petrobangla, Energy and Mineral Resources Division

Sector wise gas consumption pattern in FY2016-17 and FY2017-18 are given in

Figure 10.9 and Figure 10.10.

Figure: 10.9: Category-wise Gas Consumption FY2016-17

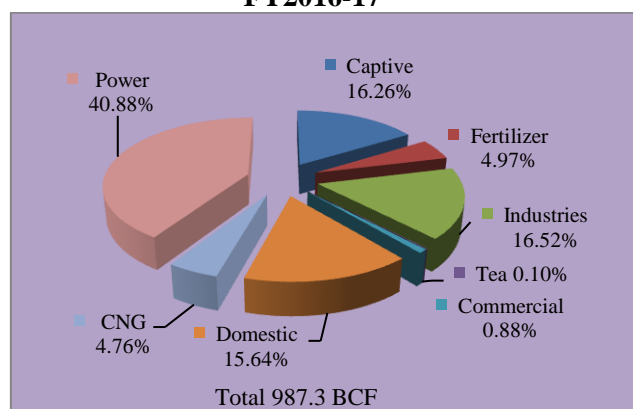
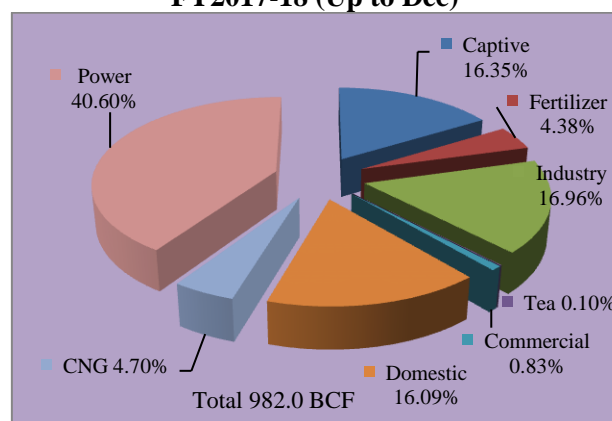


Figure: 10.10: Category-wise Gas Consumption FY2017-18 (Up to Dec)



Source: Petrobangla.

Demand Forecast for Natural Gas

Demand for natural gas is increasing along with the increasing demand for electricity. The demand for natural gas in power sector is 1,246 mmcf in 2019 which is expected to increase to 1,413 mmcf in 2021, 1,432

mmcf in 2025 and 1,669 mmcf in 2030. At present, the demand for natural gas in industry sector is fixed at 600 mmcf which is expected to reach 1,200 mmcf in 2030. For domestic use this demand has been targeted at 432 mmcf in 2019 to 2030.

Table 10.12 shows sector-wise average gas demand forecast from 2019 to 2030.

Table 10.12: Sector-wise Average Gas Demand Forecast (From 2019 to 2030)

(mmcf/d)				
Sector	2019	2021	2025	2030
Power	1246	1413	1432	1669
Captive	520	480	300	186
Domestic	432	432	432	432
Industry	600	750	1000	1200
Fertilizer	200	200	200	200
CNG	150	150	150	150
Others	35	38	40	45
Total	3183	3463	3554	3882

Source: Petrobangla, Energy and Mineral Resources Division

Liquefied Natural Gas (LNG)

In order to meet demand-supply gap and future growth of energy, the government has taken steps to import LNG. According to the decision of the government, Petrobangla has signed two separate agreements with 'Exelerate Energy Bangladesh Limited (EEBL)' and 'Summit LNG Terminal Co. (Pvt.) Ltd.' for installation of two 'Floating Storage and Regasification Units (FSRU)' at *Moheshkhali*. The FSRUs will have a storage capacity of 1,38,000 cubic meters each.

Petroleum Products

Bangladesh Petroleum Corporation (BPC) imports, acquires, stores and markets petroleum products. It develops and maintains storage facilities to preserve sufficient stock of petroleum products. The current storage capacity of petroleum products is around 13.27 lakh metric tonnes. BPC has taken initiative to set up a new unit of existing refinery named ERL Unit-2 and total crude oil processing capacity will be 45 lakh metric tonnes of both units. Construction of the project Installation of Single Point Mooring (SPM) with double pipelines is going on. It will be possible to discharge annually 90 lakh metric tonnes crude and refined petroleum

through pipeline directly for mother tanker. A project is going on to construct pipeline for transporting diesel from *Chattogram* to Dhaka. Another pipeline construction is in progress to transport aviation fuel from *Pitolganj* to *Kurmitola* Aviation Depot, Dhaka. A pipeline will be constructed from *Shiliguri*, India to *Parbotipur* depot, Bangladesh to import diesel from India to ensure fast, smooth and uninterrupted supply of petroleum to northern region of Bangladesh.

Information regarding imported crude oil and refined petroleum products during FY2009-10 to FY2018-19 is shown in Tables 10.13 and 10.14.

Table 10.13: Import of Crude Oil

FY	Quantity (Metric tonnes)	C and F Value/ Million US\$	Crone Taka
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
2014-15	1303194	734.00	5739.35
2015-16	1093120	336.49	3225.92
2016-17	1391629	514.10	4132.35
2017-18	1173647	565.99	4603.81
2018-19*	873275	461.03	3779.12

Source: Energy and Mineral Resources Division * Up to February 2019.

Table: 10.14: Import of Refined Petroleum Products

FY	Diesel, Octane and Jet A-1		Lubricating Base Oil		Furnace Oil	
	Quantity (Metric tonne)	Value (Crore Taka)	Quantity (Metric tonne)	Value (Crore Taka)	Quantity (Metric tonne)	Value (Crore Taka)
2009-10	2634212	12024.18	7262	52.03	-	-
2010-11	2488456	21403.69	4749	43.75	230524	1123.17
2011-12	3409934	27111.24	4980	53.11	680982	3819.07
2012-13	2827160	21949.10	4853	38.56	803603	4367.26
2013-14	3158343	23485.56	-	-	1016101	5144.68
2014-15	3403890	18569.62	-	-	691705	2714.30
2015-16	3337426	11110.31	-	-	335150	660.52
2016-17	3871432	14433.91	-	-	521199	1240.66
2017-18	4892089	23300.67	-	-	650540	2091.52
2018-19*	2723289	15393.32			230593	915.57

Source: Energy and Mineral Resources Division *Up to February 2019.

Subsidy for Petroleum Products

Bangladesh Petroleum Corporation (BPC) imports crude and refined oil every year according to country's demand. There are ups and downs of refined and crude oil prices in international market. So BPC has continuously incurred losses due to non-adjustment of oil price as well as custom duty in the domestic market in conformity with increases of oil price in the international market. As a result, government had to give remarkable amount of subsidy for importing petroleum products. Since November 2014, the price of oil has fallen in the international market. So, government did not give any subsidy in the FY2015-16, FY2016-17 and FY2017-18. During running FY2018-19, BPC again start loss in furnace oil and diesel due to oil price increased gradually in international market. Table 10.15 shows the amount of subsidy given to BPC by the government from FY2009-10 to FY2018-19.

Table 10.15: Amount of Subsidy given to BPC by the government

(In Crore Taka)

FY	Amount of Subsidy
2009-10	900.00
2010-11	4000.00
2011-12	8550.00
2012-13	13558.00
2013-14	2478.00
2014-15	600.00
2015-16	0.00
2016-17	0.00
2017-18	0.00
2018-19*	0.00

Source: Bangladesh Petroleum Corporation * Up to February 2019.

Mineral Resources

The Bureau of Mineral Development (BMD) issues exploration license and grants mining lease and quarry lease for different minerals like coal, hard rock, peat, mineral sand, metallic minerals, white clay, silica sand, ordinary/sand mixed stone, limestone, clay etc.

Coal

In Bangladesh 5 coal field was discovered so far. The total reserve in these 5 coal field is about 7,962 million tonnes. The amount of total coal extracted from reserves till December 2018 was almost 10.40 million

tonnes. Coal is used in various sectors along with power generation and brick producing. Coal is being produced from coal mine of *Parbotipur, Dinajpur* through underground mining method till to date. By using the produced coal 525MW electricity is generated and supplied to national grid.

Peat

Peat is discovered in *Madaripur, Gopalganj, Sunamgonj, Sylhet, Brahmanbaria, Kishorgonj* and other part of the country. The total peat stock/reserve of the country is about 510 MT. Peat is used as auxillary fuel.

Hard Rock

Total reserves of hard rock is 171 million tonnes, of which 101 million tonnes is extractable. In 1994, BMD has given a lease of 5,400 Hectare area from *Parbatipur and Nawabganj upazila* of *Dinajpur* District to extract Hard Rock mining. Since the beginning of commercial production 2007 hard rock extraction is still going on.

Ordinary Stone

There are 50 stone/sand mixed stone gazetted quarries in *Sylhet, Sunamganj, Panchagarh, Lalmonirhat* and *Bandarban* districts. One in *Sylhet* district, nine in *Panchagarh* district and two stones/sand mixed stone quarries in *Sunamganj* district have been granted quarry lease.

White Clay

White Clay was discovered in *Netrokona, Sherpur, Habiganj, Maulvibazar* and *Chattogram* district. BMD provides quarry leases for extraction of white clay which is used in the ceramic industries of the country.

Silica Sand

Silica sand is available in *Habiganj, Maulvibazar, Chattogram, Cumilla* and *Sylhet*. *Habiganj, Moulvibazar* and *Sylhet* have 78 gazetted silica sand quarries. At present, 5 silica sand quarries have been given lease in which 2 gazetted and 2 private in *Habiganj* and 1 private in *Cumilla*. In addition, 15 more gazetted silica sand quarries are under lease process in *Habiganj*.

Heavy Minerals

Mineral sand/heavy mineral was found at *Teknaf, Maheshkhali* and *Bandarmokam* areas in *Cox's Bazar, Patuakhali, Bhola* and other coastal and riverside areas of our country. The chief heavy minerals are Zircon, Lucoxene, Monazite, Rutile, Illmenite and Magnetite. These heavy mineral are extremely valuable and have many uses.

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

In order to expedite exploration of mineral resources and evaluate the same the Geological Survey of Bangladesh (GSB) has been implementing various projects. Skilled manpower is being developed through local and overseas training under different projects. Research facilities have been expanded by procuring modern equipment to work in the micropaleontology, petrology-mineralogy, analytical chemistry, engineering geology, geophysics, remote sensing and GIS, sedimentology and clay mineralogy laboratories. Besides, Peat, Glass Sand, White Clay, Construction Sand, Gravel, Limestone, Heavy minerals have been discovered in different parts of the country. Discovered coal

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and peat by GSB are now being used in power generation and household activities.

Recent Achievements of GSB

In FY2018-19 geological and geomorphological mapping of 1,565 sq. km. areas and geophysical investigation of 200 sq. km. were completed so far as against 2,600 sq. km. and 200 sq. km. respectively.

Coal and peat discovered by GSB is now used in power generation and household necessities, which plays an important role in reducing the fuel consumption. Machines for landslide early warning systems have been installed in four places for public awareness and preventive measures.

On-going Projects of GSB

- Bangladesh with collaboration of German government is implementing a technical assistance project 'Geo-information for Urban Planning and Adaptation to Climate Change, Bangladesh (GeoUPAC)'. In FY2018-19 data has been collected from the field from about 300 Sq. km. in *Barisal* city corporation, *Shathkhira*, *Faridpur* and *Kushtia* town and adjacent area under this project. In this time about 220 geo-engineering boreholes has been drilled and sample has been collected accordingly. A total of 24 Multi Channel Analysis of Surface Wave (MASW) survey has been completed in *Barishal* and *Faridpur*. Through this project in GSB 1 workshop, 5 training, 5 seminar and 2 mechanical field test has been completed.
- Another ongoing project is 'Identification and Economic Assessment of the Valuable Minerals in the River Sands of

Bangladesh'. In FY2018-19, collection and analyses of different sand samples from 1,800 sq. km. areas have been completed from *Brahmapurta*, *Meghna*, *Someshawri* river basin and *Meghna* river delta from *Chandpur* to *Bhola*. From the analyses of samples collected from the mentioned areas valuable minerals like Zircon, Monazite, Ilmenite, Rutile, Leocoxin, Kyanite, Garnet, Magnetite etc. have been identified. The average percentage of heavy mineral is 8.92 percent which is internationally acceptable.

Hydrocarbon Unit

Hydrocarbon Unit of Energy and Mineral Resources Division provides technical recommendation to the Division for the development of oil, gas and mineral resources sector. In particular, hydrocarbon unit has been actively participating in the modernisation of national fuel policy, finalisation of draft policy of coal, development of gas sector, production distribution, supervision and monitoring of various agreements, purification and marketing management of petroleum, formulation of policy regarding development of mines and mineral resources. This unit maintains a mini databank containing the information of gas reserve, undiscovered gas resources etc. Hydrocarbon Unit publish monthly report on 'Gas Reserve and Production' and annual report on 'Annual Gas Production and Consumption'.

Explosive Control and Safety Management

The Department of Explosives is responsible for production, import, storage, transport,

transmission and use of hazardous substances such as explosive, gas, petroleum, flammable liquids, combustible solids, oxidising substances and so on to ensure safety of public life and national property. Explosive Substances Act, examining the evidence/ giving opinion in the cases filed under the Quick Trial Tribunal and providing expert services to the Armed Forces are the activities the Department provides.

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 in electricity generation, energy transmission, transportation and marketing as well as for management and operation of this sector. In addition, the BERC has been working to ensure transparency in tariff fixation, protect consumers' interests and create competitive market. Major activities of Bangladesh Energy Regulatory Commission are given below:

Tariff Determination

The Commission determines the wholesale (bulk) tariff rate for electricity generation entities /companies and retail tariff rate for electricity distribution entities /companies. Besides, the Commission also determines gas price at consumer's level. The Commission determines prices after public hearing in presence of consumers, licensees and stakeholders. The tariff is determined after analyzing the actual cost of past three years and considering other relevant matters. During past years, the Commission made adjustments of bulk and retail tariff rate of

electricity keeping in view the financial capability of the electricity distributors, protecting the interests of the consumers and above all, bringing financial discipline in this sector.

Introduction of Life-line Tariff for Poor and Low Income Group

Considering the socio-economic condition of the poor and lower middle income consumers, BERC has fixed the life-line tariff for residential user at 1-50 unit of electricity. It remained unchanged in the latest tariff order. The electricity bill of poor and low income residential subscribers has remained unchanged for taking this step by BERC.

Benchmark Pricing System

The commission has introduced Benchmark pricing system for enhancement of private participation in the power sector. Benchmark pricing is determined for other fuels such as gas, furnace oil, coal, dual fuel (gas, furnace oil) etc. This system has been introduced so that domestic and foreign private sector can easily participate to power generation. This is a step which is the first in the subcontinent.

Gas Development Fund

To augment the financial capacity for exploration and production of gas by the nationalised companies, the commission created 'Gas Development Fund' in 2009. An amount of about Tk. 5,714.32 crore has been deposited to this fund up to December 2018.

Creation of Electricity Maintenance and Development Fund

In order to increase the efficiency and capability of Bangladesh BPDB, the

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commission has created 'Electricity Maintenance and Development Fund' in 2011, with the increase of 5.17 percent of bulk tariff. The cumulative deposit in this fund up to January 2019 is TK. 8,490 crore.

Creation of Energy Security Fund

As the present gas reserve is depleting rapidly, the energy security is crucial for Bangladesh. To ensure the energy security and future development, the Commission has created 'Energy Security Fund' in 2015 by adjustment in gas tariff. An amount of Tk. 8,485.36 crore has been deposited to the Fund up to December 2018.

Providing License

The commission issued licenses during the FY2018-19 (up to February 2019) for different activities in the energy sector. Among them 426 (including renewal) licenses in the power sector, 241(including renewal) licenses in the gas sector and 332 (including renewal) licenses in the petroleum sector have been issued.

Arbitration Activities

Bangladesh Energy Regulatory Commission is empowered to settle disputes between licensees and between licensees and consumers of the energy sector. For this reason, the commission prepared the 'BERC Dispute Settlement Regulations 2014'. Already, the settlement of disputes under this regulation has begun and 32 awards have been given up to February 2019 out of 50 applications.

Establishing Transparency and Accountability

The commission has taken initiative to introduce Uniform System of Accounts to prepare financial account statements in the same standard for the transparency and accountability of utilities.

Preservation of Consumer's Rights

The commission is working relentlessly to preserve the consumer's rights. To establish the consumer's right BERC conduct regular outreach program, open meeting and public hearing in case of fixing tariff, protecting consumer harassment and avoiding unrealistic bill. Moreover, BERC has established pre-paid meter, mobile billing system and introduced yearly bill clearance certificates and so on.

Energy Efficiency

The commission has taken steps for proper maintenance of existing power plants, converting simple cycle power plants into combined cycle power plants, and others to increase energy efficiency all over the country. These steps will not only increase the electricity production but also will save primary energy.

Energy Auditing

Energy auditing will ensure energy efficiency in the energy sector by use of appropriate and improved technologies. Energy audit will provide the commission with the opportunity to review and regulate the energy waste through setting standard for machineries and instruments. For this reason, the commission has taken the plan to conduct energy audit related activities.

