CHAPTER TEN

POWER AND ENERGY

The role of power sector in socio-economic development, industrialisation and poverty alleviation of the country is immense. During FY 2021-22 (up to January 2022), total installed electricity generation capacity stood at 22,066 MW which was 25,284 MW including captive and renewable energy. Till now the maximum electricity generation was 13,792 MW (27 April 2021). Total net electricity production was 80,423 million kilowatt-hours in FY 2020-21 and in the first six months of FY 2021-22 (up to December 2021) total net electricity production stood at 42,395 million kilowatt-hours. Out of total net generation, 40.02 percent power was generated by public sector, 47.39 percent power from private sector, 4.10 percent from joint venture and 8.50 percent from power import. In addition, total system loss of transmission and distribution of electricity substantially declined to 9.54 percent in FY 2021-22 (up to January 2022) from 14.73 percent in FY 2010-11. At present, the total distribution line is 6.19 lakh kilometer and total consumer is 4.19 crore. Government has brought all the citizens under 100 percent electricity facility in 2021. According to Power System Master Plan (PSMP) 2016, the government has set a target to increase installed electricity generation capacity to 40,000 MW by 2030 and 60,000 MW by 2041. On the other hand, natural gas met almost 62 percent of the country's total commercial use of energy. A total of 28 gas fields have been discovered from which about 19.11 trillion cubic feet gas has been produced cumulatively (up to December 2021) leaving 9.30 trillion cubic feet recoverable. Besides, the country has about 13.60 lakh metric tons reserve fuel oil. Considering the country's energy security and fuel diversification plan, government is generating power from coal, LNG, dual-fuel, nuclear and renewable energy alongside establishing gas and liquid fuel-based power plants. Furthermore, electricity is being imported through regional and sub-regional cooperation.

Power Sector

Government has prioritised the power sector right from the beginning and undertaken immediate, short, medium and long-term plans to meet the increasing demand of electricity. At present, the installed generation capacity of the country has been increased to 25,284 MW including captive and renewable energy. Per capita power generation has increased to 560 kWh. The power distribution line has increased to 6.19 lakh km and the number of consumers has increased to 4.19 crore. The system loss has come down to 9.54 percent till December of FY 2021-22 which was 14.73 percent in FY 2010-11.

Extensive development in the power sector is due to timely and realistic planning and implementation through intensive supervision, provision of incentives and incentives to attract domestic and foreign investment in the private sector and measures for import of power on the basis of regional cooperation. At present government has brought all its citizen under 100 percent electricity facility. As per vision 2041, government is working towards to implement power generation capacity of 40,000 MW by 2030 and 60,000 MW by 2041 as per Power System Master Plan (PSMP).

Power Generation

Power Generation Capacity

Total grid based installed capacity was 22,031 MW in FY 2020-21 including 10,146 MW in public sector, 1,244 MW in Joint Venture (JV), 9,481 MW in private sector and 1,160 MW from cross-border power-trade from India. In FY 2021-22 (up to January 2022), the total grid based installed capacity was 22,066 MW including 9,996 MW in Public Sector, 1,244 MW

in JV, 9,481 MW in Private Sector and 1,160 MW power imported from India. Considering captive and renewable energy, the total installed capacity of Bangladesh is now 25,284 MW. Till to date the maximum generation was 13,792 MW (27 April 2021). The installed capacity of power generation by fuel type and ownership in FY 2021-22 (up to January 2022) is shown in Figures 10.1 and 10.2 respectively.

Figure 10.1: Installed Capacity (by Fuel Type)

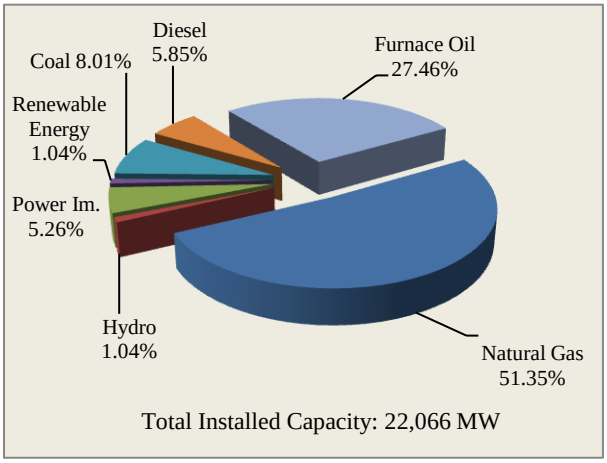
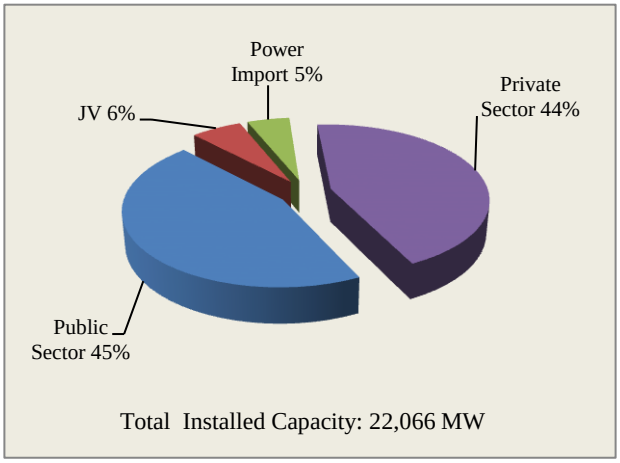


Figure 10.2: Installed Capacity (By Sector)



Source: Power Division *Up to January 2022.

Power Generation (Million kWh)

In FY 2021-22 (till December 2021), the total net generation from public and private sector power plants was 42,395 MkWh, of which 16,965 MkWh in the public sector, 1,737 MkWh in the JV, 23,693 MkWh in the private sector power generation. Out of total net generation, 40.02 percent power was generated by public sector power plants, 47.39 percent power from private power plants and 4.10 percent from JV power plants and 8.50 percent from power import. The share of fuel-based power generation were Gas 60.44 percent, liquid fuel 24.33 percent, Import 8.50 percent, Coal 5.31 percent, Hydro 1.14 percent and renewable energy generation 0.29 percent. Fuel wise and sector wise net energy generation in FY 2021-22 (up to December 2021) are shown in figure 10.3 and 10.4 respectively.

Figure 10.3: Energy Generation (National) by Fuel

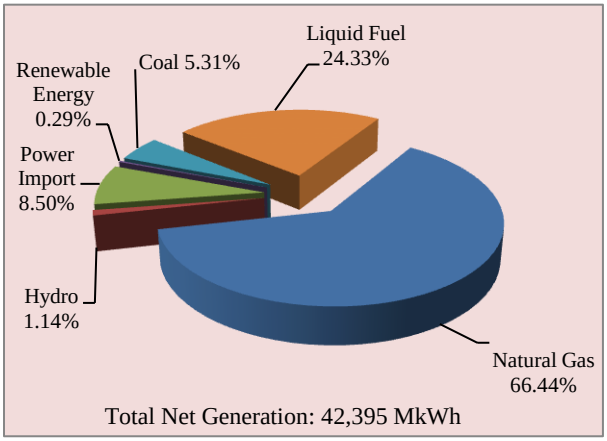
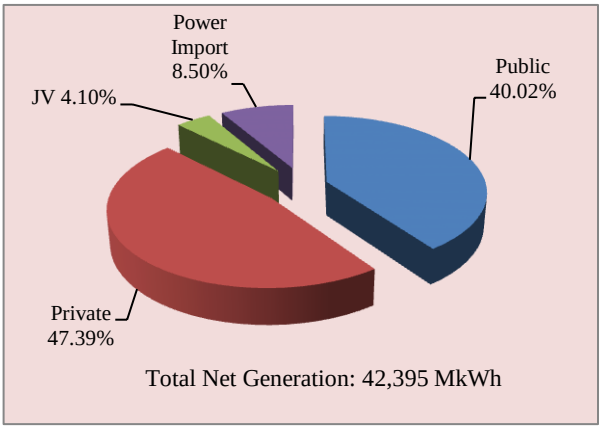


Figure 10.4: Energy Generation (National) by Sector



Source: Power Division *Up to December 2021.

Maximum Power Generation

In FY 2010-11 maximum power generation was 4,890 MW, which was increased to 13,525 MW in FY 2021-22. The installed capacity and maximum generation since FY 2010-11 are presented in Table 10.1.

Table 10.1: Installed Capacity and Maximum Generation

Fiscal Year	Installed capacity MW	Maximum generation MW
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	18961	12893
2019-20	20383	12738
2020-21	21395	13792
2021-22*	22066	13525

Source: Power Division, *up to January 2022.

Fuel Consumption for Power Generation

The natural gas consumption in public sector power plant was 150 billion cubic feet in FY 2010-11 which stood at 119 billion cubic feet during FY 2021-22 (upto December 2021). Coal has been used as fuel for the first-time during FY 2005-06. The total consumption of coal for electricity generation was 2.25 million ton during FY 2021-22 (upto December 2021). The amount of furnace oil and diesel used in power plants in the public sector in FY 2021-22 (upto December 2021) is 191 and 60 million liters respectively. The consumption of natural gas and liquid fuel since FY 2010-11 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
2010-11	150	410	119	138
2011-12	151	449	182	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	274	565	484	385
2019-20	268	1.24	301	12
2020-21	243	2.25	389	74
2021-22*	119	1.34	191	60

Source: Power Division * up to December 2021.

Power Generation Program 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 40,000 MW by 2030 and 60,000 MW by 2041. In order to secure the fuel supply, government has taken plan for fuel diversification. Electricity generation from gas/LNG, Liquid fuel, coal, nuclear, hydro, renewable energy and import from neighboring countries has also included in this plan. As per this plan, coal, nuclear, gas/LNG based combined cycle power plant will be used as base load power plants. On the other hand, liquid fuel and LNG/gas will be used for peak load power plants. Table 10.3 shows power sector development and future plan of the government up to 2041.

Table 10.3: Power Sector Generation Future plan

SL	Description	Year 2022 (Feb'22)	Year 2030	Year 2041
1.	Installed Capacity (MW)	25284*	40000	60000
2.	Electricity Demand (MW)	15500	33000	52000
3.	Transmission Line (Ckt. KM)	13017	27300	34850
4.	Grid Substation Capacity (MVA)	55307	120000	261000
5.	Distribution Line (KM)	619000	660000	783000
6.	Per Capita Power Generation (KWh)	560	815	1475
7.	Access to Electricity (%)	100%	100%	100%

Source: Power Division *Including Captive and RE.

Under Construction Power Generation Projects

At present, a number of power plants are under construction in both public and private sector. 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	12	4339
JV	3	3725
Private Sector	18	5155
Total (Under Construction)	**33**	**13219**

Source: Power Division

Among them mentionable projects are:

Public Sector

- *Khulna 336 MW CCPP*
- *Ghorasal 3rd & 4th Unit Repowering*
- *Rupsa 880 MW*
- *Bibiyana 383 MW CCPP*
- *Matarbari 1200 MW coal-based power plant*
- *Ashuganj 400 MW.*

Joint Venture

- *1200-1320 MW Bangladesh India Friendship Power Company Ltd (BIFPCL)*
- *Patuakhali (2nd Phase) 1320 MW coal based (BCPCL)*
- *Patuakhali 1320 MW coal-based power plant (RNPL)*
- *Rooppur 2x1200 MW nuclear based power plant.*

Private Sector

- *Meghnaghat 583 MW, 750 MW, 584 MW CCPP*
- *Chattogram 1,224 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 2022), the lengths of 400 kV, 230 kV and 132 kV transmission lines are 1,137 ckt km, 3,770 ckt km and 8,306 ckt km respectively. Now there is one HVDC back-to-back station with total capacity of 1,000 MW, 5 nos 400/230 kV grid substations of 5,330 MVA, 3 nos 400/132 kV grid substation of 1,950 MVA, 30 nos of 230/132 kV grid substations of 15,975 MVA capacity, 4 nos 230/33 kV grid substations of 11,90 MVA capacity, 162 nos 132/33 kV grid substations of capacity 30,862 MVA, 450 MVAR capacitor bank at 132 kV level and 1,340 MVAR capacitor bank at 33kV level in the country. At present, the total length of installed transmission line is 13,213 ckt km. A total of 204 (PGCB: 150 and others: 39) High Voltage Grid Substations owned by different organisations under Power Division and other private organisations with total capacity of 55,307 MVA and 1 no station with total capacity of 1,000 MW HVDC are connected to the national grid. 566 ckt km transmission line and 15 grid substations has been added to the transmission infrastructure in the last one year (Feb, 2021 to Feb, 2022). Table 10.5 shows year wise transmission system and sub-station infrastructure developed by PGCB.

Table-10.5: Transmission System and Substation Infrastructure by PGCB

Fiscal Year	Transmission System (ckt km)			400 kV HVDC Substation		400/230 kV & 400/132 KV Substation		230/132 kV & 230/33 KV Substation		132/33 kV Substation	
	400 kV	230 kV	132 kV	No	MW	No	MVA	No	MVA	No	MVA
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	01	1000	05	3900	26	13135.00	132	22641.50
2019-20	861.00	3500.00	7758.00	01	1000	06	5070	27	13385.00	145	25885.00
2020-21	861.00	3658.00	8128.00	01	1000	06	5070	30	15785.00	153	28529.00
2021-22*	1137.0	3770.00	8306.00	01	1000	08	7280	34	17165.00	162	30862.00

Source: Power Division *up to February 2022

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)

Inter-Utility Energy Import

The distribution utilities have imported 71,468 MKWh and 42,395 MKWh electricity at 33 KV and 132 KV level during FY 2020-21 and FY 2021-22 (up to Dcember 2021) respectively. which is shown in figure 10.5 and 10.6.

Figure 10.5: Inter Utility Energy Import FY (2020-21)

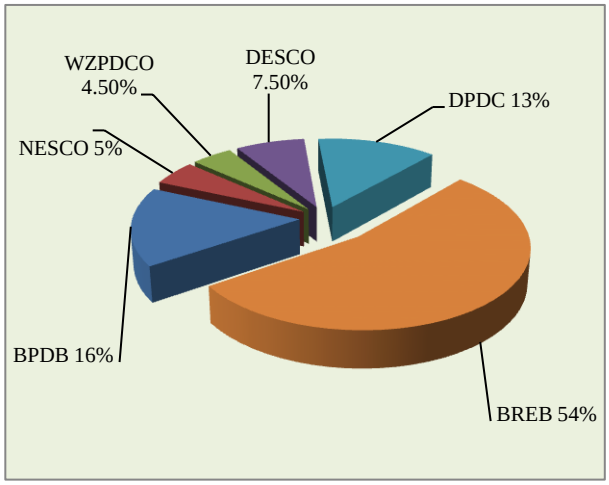
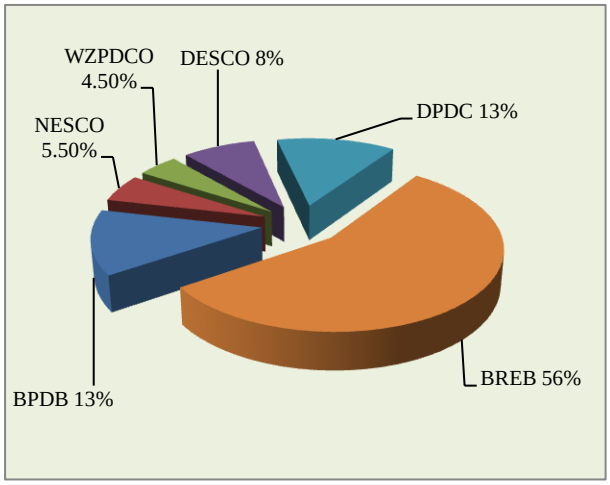


Figure 10.6: Inter Utility Energy Import FY (2021-22)



Source: Power Division

System Loss

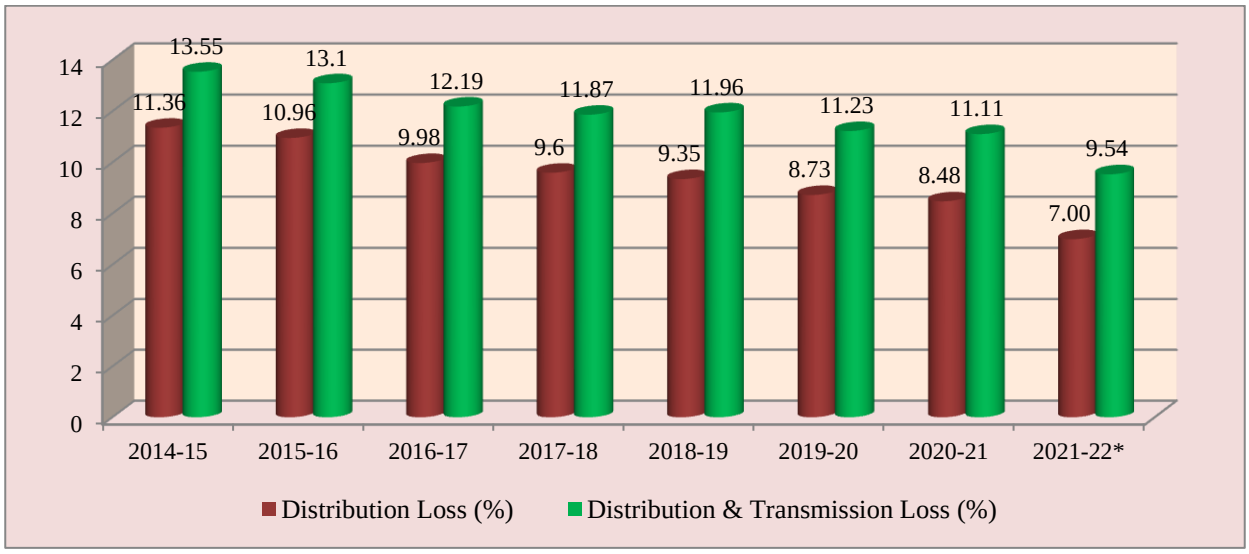
System loss is one of the key performance indicators of the distribution entities. To achieve desired performance of the sector, system loss needs to be further reduced. Various measures, such as continuous performance monitoring of the utilities reforms and target-oriented measures are being implemented to reduce the system loss. The system loss from FY2010-11 to FY 2021-22 (up to January 2022) is shown in Table 10.6 and in figure10.7

Table 10.6: Year- wise System Loss Statistics

Fiscal Year	Transmission Loss (%)	Distribution Loss (%)	Total Loss (T&D)%
2010-11	1.98	12.75	14.73
2011-12	2.35	12.26	14.61
2012-13	2.23	12.03	14.36
2013-14	2.17	11.96	14.13
2014-15	2.19	11.36	13.55
2015-16	2.14	10.96	13.10
2016-17	2.21	9.98	12.19
2017-18	2.27	9.60	11.87
2018-19	2.61	9.35	11.96
2019-20	2.5	8.73	11.23
2020-21	2.41	8.48	11.11
2021-22*	-	7.00	9.54

Source: Power Division * up to January 2022.

Figure 10.7: Year Wise System Loss Statistics



Source: Power Division. *Up to January 2022.

Accounts Receivable

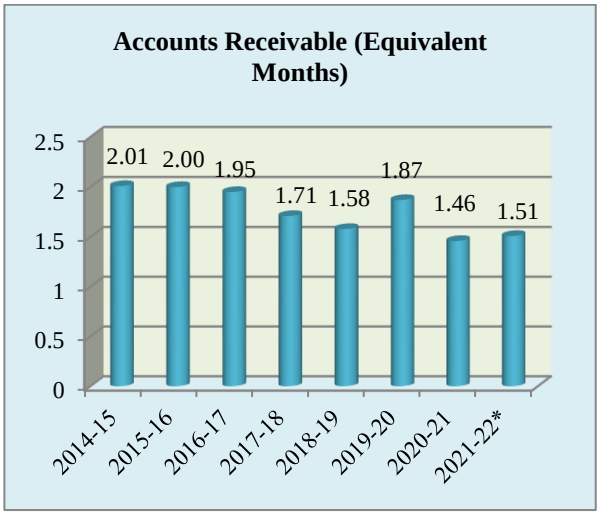
To improve financial viability and efficiency of the sector, the government adopts a financial action plan to maintain power sector receivable at no more than 2 months' billed amount equivalent and reduce receivables from autonomous, public entities and private customers to an acceptable limit. From FY 2010-11 to FY 2021-22 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)
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	1.58
2019-20	1.87
2020-21	1.46
2021-22*	1.51

Source: Power Division *Up to December 2021.

Figure 10.8: Year Wise Accounts Receivable



Source: Power Division *Up to December 2021

Pre-Paid Meter

To improve power distribution system, 46,77,658 prepaid meters have been installed by different entities. Till January 2022, BPDB, BREB, DPDC, DESCO, WZPDCL and NESCO installed 14,46,414, 13,10,568, 5,92,522, 6,04,557, 3,72,513 and 3,51,084 numbers of prepaid meters respectively. 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 2022 has been shown in table 10.8.

Table:10.8: Installation of prepaid meters

Utility	Single phase	Three phase	Total
BPDB	1411624	34790	1**446414**
REB	1296468	14100	1**310568**
DPDC	538542	53980	**592522**
DESCO	535983	68574	**604557**
WZPDCO	361602	10911	**372513**
NESCO	346483	4601	**351084**
Total	**4490702**	**186956**	**4677658**

Source: Power Division.

D. Bangladesh Rural Electrification Board (BREB)

Up to January 2022 Bangladesh Rural Electrification Board has connected total 3.29 crore of consumers by constructing 5.48 lakh km distributions lines through 80 *Palli Bidyut Samities*. Among them 2.97 crore are domestic, 299 lakh irrigations, 21.27 lakh commercial, 2.44 lakh industrial, 4.20 lakh charitable institute, 8.26 thousand constructions, 1.2 thousand temporary, 22.30 thousand street lights & water pumps, 9.22 thousand battery charging stations and 581 general of 88,580 villages become electrified. The total number of electricity consumers all over Bangladesh is 4.19 crore, of which BREB connects 3.29 crore i.e. 79 percent of the total consumer in Bangladesh. BREB's consumers use 56 percent of National Electricity Generation. Target and achievement of line construction and consumer connection of BREB from FY 2010-11 to FY 2021-22 is shown in Table 10.9.

Table 10.9: Physical Target and Achievement of BREB

FY	Distribution Line (Km)		Consumer Connection	
	Target	Achivement	Target	Achievement
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	25000	71326	2000000	3045593
2019-20	50000	50166	2000000	2405312
2020-21	30000	32736	1300000	2461134
2021-22*	10000	7494	800000	1060131

Source: Rural Electrification Board (REB)* Up to January 2022

Projects under Implementation of BREB

In order to achieve 100 percent electrification, presently 5 projects are running under Bangladesh Rural Electrification Board under guidance of Power Division of Ministry of Power, Energy and Mineral Resources (MPEMR). In FY 2021-22 Tk. 2,914.22 crore is allocated from Annual Development Program (ADP) of the Government of Bangladesh. Expansion of Rural Electrification and Development and up-gradation of existing distribution system is growing rapidly by implementing running projects, where 3 Projects are developed for Line Construction and Consumer Connection, 1 Project for Modernization and Capacity Enhancement in BREB Network and 1 Project for Solar Photovoltaic Pumping for Agricultural Irrigation. In FY 2021-22 target of 10,000 km new distribution line construction/renovation was undertaken where 7,494 km have been established (Up to January 2022). Through these projects in FY 2021-22 target of constructing 177 (2050 MVA) sub-stations has been set where 111 (1180 MVA) are already established (Upto January 2022). Till January 2022, 1.55 lakh consumers have been connected through sub-marine cable in 646 Off-Grid areas including establishment of 5,717 Solar Home System in 29 areas. Due to BREB's diversified program and integrated effort, 3.29 crore consumers have been connected in 462 *Upazillas* including the Off-Grid areas covering almost 99.85 percent (excluding *Chottogram* Hill Tracks) electrification throughout the country.

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)' 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. To fulfill the government target of generating electricity from renewable energy sources, SREDA is ready to provide any sorts of assistance within its purview to implement renewable energy projects. At present, 779.8 MW renewable energy system has been installed. Table 10.10 shows the progress of renewable energy:

Table 10.10: Progress of Renewable Energy

Technology	Off-grid (MW)	On-grid (MW)	Total (MW)
Solar	347.52	198.29	545.81
Wind	2	0.9	2.9
Hydro	0	230	230
Biogas	0.69	0	0.69
Biomass	0.4	0	0.4
Total	350.61	429.19	779.8

Source: Power Division

Energy Efficiency (EE) and Energy Conservation (EC)

In order to consolidate the sustainable energy system, SREDA has been working to achieve the energy saving targets set out in the 8th Five-Year Plan of Bangladesh, along with the formulation of various rules, regulations, guidelines and policies on energy efficiency and conservation. SREDA has formulated 'Energy Efficiency and Conservation Master Plan up to 2030' and working according to the plan to achieve the goal. The Master Plan has set a target of improving 20 percent energy intensity by 2030 (compared to FY 2013-14).

Achievement in Energy Efficiency Improvement:

- Preparation of Energy Efficiency and Conservation Master Plan up to 2030.
- 'Energy Efficiency and Conservation Rules 2016' has been formulated.
- Formulation of Energy Efficiency and Conservation Rules 2018.
- Conducting Training and Examination to prepare Energy Auditors and certifying them.
- Starting energy audit in state-owned industries and in public buildings
- Conducting Energy Efficiency & Conservation Promotion Financing Project, to facilitate low interest (4-6%) loan for industry, building and residential sector for purchasing energy efficient machineries;
- Introduction of awareness raising campaign for Energy Efficiency and Conservation.

Renewable Energy Program of BREB

BREB is the pioneer of Solar Home System through the first ever Renewable Energy project in Bangladesh in 1993. Till date BREB has installed 87,660 Solar Rooftop/Solar Home Systems with a total capacity of approximately

17,421 MWp. Out of the roofs of the 130 office buildings at the PBS headquarters and zonal offices, 11 on-grid rooftop solar generation plants (RSGPs) have already been installed with PBS's own funds. The capacity of each plant is 10 kWp. BREB is planning to install RSGPs on the rest of PBS's Office building roofs (Approximate capacity 3.57 MWp). ADB-funded agricultural irrigation through solar powered pumps project is underway. In this project 2,000 solar irrigation pumps will be installed within the project period (2022). The total capacity of these pumps are 19.30 MWp.

F. Rooppur Nuclear Power Plant (RNPP)

The *Rooppur* Nuclear Power Plant with a capacity of 2,400 MW in two units is being constructed to meet the growing demand of electricity in the country. The *Rooppur* Nuclear Power Plant construction project is underway in the midst of the global corona virus epidemic. Land development, soil stabilization, concrete bedding under all infrastructures and construction of residential buildings have already been completed in the project area. Construction of jetties and embankments along the banks of the Padma River and construction of an artificial water channel in the project area have been completed to facilitate the transportation of heavy machinery and fuel by waterways. The reactor is equipped with molten core catcher, reactor pressure vessel, steam generator and a full scale analytical simulator at the training center. Other plant-equipment manufacturing activities are underway in various factories of the Russian Federation. It is expected that power connection from this power plant to the national grid will be possible by 2023. The other significant activities carried out for the implementation of the construction work of 1st and 2nd units of the nuclear power plant within 2024 and 2025 are mentioned below:

- Concreting of Inner Wall of Auxiliary Reactor Building and other parts of Unit-1 has been completed up to +19.25m. Construction of foundation and reinforcement of Auxiliary Reactor Building of Unit-2 has been completed up to +8.3 m.
- Concreting work up to +44.5 m has been completed in the inner containment wall of Reactor Building of Unit-1. Lower part Dome at +44.1 m to + 51.6 m height and Upper part Dome installation at +51.6 m to +61.1 m height has been completed. 4 Steam Generators have been installed at a height of +14.5 m.
- Construction work of various columns, turbo-generator, embedded parts and installation of various equipments of turbine building of Unit-1 is in progress and construction of various partition wall, peripheral wall, turbo generator slab of Unit-2 is in progress.
- Concreting work has been completed up to +43.4 m height in the inner containment wall of Reactor Building of Unit-2. Polar crane has been installed at a height of +36.1 m.
- Foundation construction and reinforcement of Auxiliary Reactor Building of Unit-2 has been completed up to + 11.00 m.
- Nuclear Power Plant Company Bangladesh Limited has been formed for the operation and maintenance of *Rooppur* Nuclear Power Plant and other nuclear power plants. Necessary training has been arranged for a total of 1,424 manpower including 305 reserves for operation and maintenance of *Rooppur* Nuclear Power Plant. So far 805 people from different categories have been recruited. Another 524 people are in the process of being recruited. Since 2018, 572 people have been given higher training in Russia. So far, 417 people have returned to Bangladesh after

completing the training. Currently 155 trainees are taking training in Russia.

Regional Power Cooperation

To enhance the development of power sector, Bangladesh Government is working with neighboring countries as well as SAARC, BIMSTEC, SASEC and D-8 for regional cooperation. Collaboration effort with the SAARC countries is continuing. Also Bangladesh has taken initiative in cross border trade of electricity through bilateral cooperation with Nepal, Bhutan and India. Bangladesh has been working for the overall development of the power sector as an active member of the Regional, Sub-Regional Cooperation and various Cooperation Forums.

Electricity import from India

An inter-regional grid has been implemented to import electricity from *Baharampur*, India to *Bheramara, Kustia*. At present, 1,000 MW electricity has been imported through 400 KV transmission line from *Baharampur*, India and 160 MW electricity also imported from *Tripura*, India to *Cumilla*, Bangladesh. Initiatives have been taken to import 500 MW electricity through *Bheramara- Baharampur* 400 KV transmission line. A contract has been signed with Adani group, India to import 1,600 MW (net 1,496 MW) *Jharkhand* coal-based power plant and it is expected to receive from India by December 2022.

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.

Electricity import from Nepal

An initiative has been taken to import power from Nepal. A Memorandum of Understanding (MoU) has been signed to import 500 MW electricity from Nepal.

BIMSTEC's cooperation

An initiative has been taken for regional cooperation through BIMSTEC. In this regard, a Memorandum of Understanding (MoU) has been signed.

China cooperation in Bangladesh power sector and investment opportunity

A Memorandum of Understanding (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 enhanced. For this, both the countries will contribute to uplift the trade and economic cooperation. Electricity generation, transmission, distribution, energy efficiency, renewable energy has been identified as the scope of cooperation.

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 62 percent of the commercial energy of the country. Till now, 28 gas fields have been discovered in the country. According to the latest estimation of *Petrobangla* total initial gas in place (GIIP) is 39.90 trillion cubic feet (TCF), out of which 28.42 TCF is recoverable in proven and probable categories. From 1960 to December 2021, total 19.11 TCF gas was produced leaving 9.30 TCF recoverable. Status of field-wise gas production and reserves is presented in Table 10.11.

Table 10.11: Status of Gas Production and Reserve

(Billion Cubic Feet)

L. No.	Fields	Producing Well (PW)	GIIP (Gas initially in place)	Recoverable Reserve			Product. FY 2020-21	Cumulative Production (Dec, 2021)	Remaining Reserves w.r.t 2P (Jan, 2022)
				1P	2P	3P			
A. PRODUCING									
1	*Titash*	22	8148.9	5384.0	6367.0	6517.0	145.18	5072.51	1294.49
2	*Habiganj*	8	3684.0	2647.0	2647.0	3096.0	64.60	2634.25	12.75
3	*Bakhrabad*	6	1701.0	1052.9	1231.5	1339.0	13.87	867.97	363.56
4	*Koilashtila*	2	3610.0	2390.0	2760.0	2760.0	15.09	745.77	2014.23
5	*Rashidpur*	5	3650.0	1060.0	2433.0	3113.0	16.12	675.58	1757.42
6	*Sylhet/Haripur*	2	370.0	256.5	318.9	332.0	1.37	219.67	99.23
7	*Meghna*	1	122.1	101.0	101.0	101.0	2.70	79.49	21.51
8	*Narshingdi*	2	369.0	218.0	276.8	299.0	9.77	229.87	46.93
9	*Biyanibajar*	1	230.7	150.0	203.0	203.0	2.89	111.15	91.85
10	*Fenchuganj*	2	553.0	229.0	381.0	498.0	2.39	166.22	214.78
11	*Salda*	2	379.9	79.0	279.0	327.0	1.20	95.03	183.97
12	*Shahbajpur*	4	918.1	-	642.7	488.0	14.32	110.70	531.98
13	*Semutang*	1	653.8	151.0	317.7	375.1	0.34	13.92	303.78
14	*Sundalpur*	1	62.2	25.0	35.1	43.5	2.68	20.13	14.97
15	*Srikail*	4	240.0	96.0	161.0	161.0	12.03	117.12	43.88
16	*Begumganj*	1	100.0	14.0	70.0	0.0	2.17	8.28	61.72
17	*Jalalabad*	6	1499.0	1499.0	1499.0	-	37.82	1499.03	-
18	*Moulavibazar*	4	1053.0	405.0	428.0	812.0	3.43	338.44	89.56
19	*Bibiyana*	26	8350.0	4415.0	5755.4	7084.0	236.86	4991.60	763.83
20	*Bangura*	5	1198.0	379.0	714.0	941.0	12.30	515.54	198.46
	Sub-total A:	**105**	**36892.7**	**20551.4**	**26621.2**	**28489.6**	**597.13**	**18512.26**	**8108.90**
B. NON-PRODUCING									
21	*Kutubdia*		65.0	45.5	45.50	45.5	0.0	0.0	45.50
22	*Bhola North*		621.9	0.0	435.32	-	0.0	0.0	435.32
23	*Zakiganj*		759.0	-	53.13	-	0.0	0.0	53.13
	Sub-total B:		**762.8**	**45.5**	**534.0**	**45.5**	**0.0**	**0.0**	**533.95**
C. PRODUCTION SUSPENDED									
23	*Sangu*		1039.0	265.0	474.0	727.0	0.0	26.46	447.54
24	*Chattak*		71.8	50.3	50.3	50.3	0.0	21.1	29.20
25	*Kamta*		185.2	125.0	125.0	175.0	0.0	62.4	62.60
26	*Feni*		899.6	544.4	577.8	638.7	0.0	487.91	89.85
27	*Rupganj*		48.0	-	33.6	-	-	0.68	32.92
	Sub-total C:		**2243.6**	**984.7**	**1260.7**	**1591.0**	**0.0**	**598.5**	**662.11**
	Grand Total, BCF		**39899.1**	**21581.7**	**28415.77**	**30126.1**	**597.13**	**19110.81**	**9304.96**
	Grand Total, TCF		**39.90**	**21.58**	**28.42**	**30.13**	**0.60**	**19.11**	**9.30**

Source: Energy and Mineral Resources Division.

Natural Gas Production and Sector-wise Consumption

In FY 2019-20 total gas production was 882.61 billion cubic feet and R-LNG supply was 203 billion cubic feet (BCF), in total gas supply was 1,085.61 billion cubic feet. Then, In FY 2020-21 total gas production was 889 billion cubic feet and R-LNG supply was 215.1 billion cubic feet (BCF), in total gas supply was 1,104.1 billion cubic feet. Year-wise/sector-wise natural gas production and consumption are shown in Table 10.12 and sector wise gas consumption pattern are given in Figure 10.9 and Figure 10.10.

Table 10.12: Production of Natural Gas and its Consumption by Sector

(In billion cubic feet)

FY	Production (including R-LNG)	Consumption								
		Power	Captive Power	Fertiliser	Industry	Tea Estate	Com.	Dom.	CNG	Total
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
2018-19	1077.7	450.9	157.5	57.7	164.5	1.0	7.9	158.9	43.4	1041.8
2019-20	1085.61	455.9	151.6	54.6	155.7	1.1	6.7	132.7	36.1	994.4
2020-21	1104.1	425.8	169.1	64.7	181.7	0.9	6.0	134.2	35.1	1017.5

Source: Energy and Mineral Resources Division.

Figure: 10.9: Category-wise Gas Consumption FY2019-20

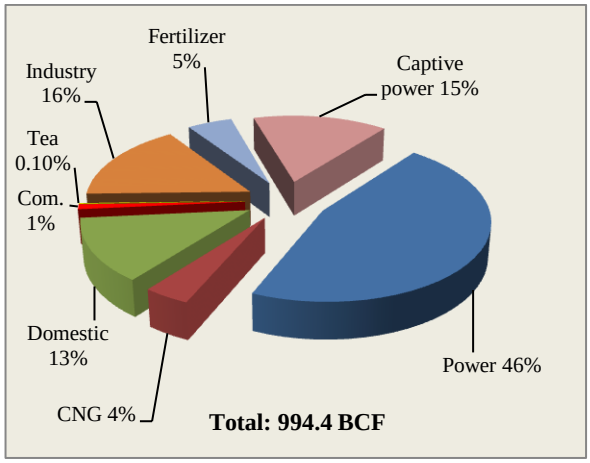
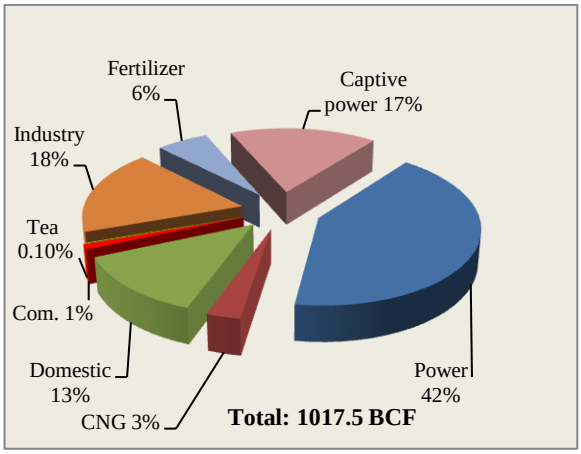


Figure: 10.10: Category-wise Gas Consumption FY 2020-21



Source: Petrobangla.

Sector wise Gas Demand Forcast

The gas demand in the power sector is increasing with the industrial development of the country. According to Gas Sector Master Plan Bangladesh 2017 (Scenario C), total gas demand is expected to rise to 4,610 mmcfd in FY 2021-22, 4,787 mmcfd in FY 2022-23, 4,931 mmcfd in FY 2023-24 and 5,079 mmcfd in FY 2024-25. Demand for natural gas in industry sector is considered to become 1,044 mmcfd in FY 2021-22 and 1,435 mmcfd in FY 2024-25. Moreover, Gas demand in Commercial and tea sectors is considered to become 38 mmcfd in FY 2021-22 and expected to remain the same upto FY 2024-25. Sector- wise gas demand forcast is given in table 10.13.

Table 10.13: Sector-wise Average Gas Demand Forecast

(mmcfd)

Sector	2021-22	2022-23	2023-24	2024-25
Power	2210	2266	2279	2285
Captive	432	389	350	315
Domestic	425	457	490	524
Industry	1044	1169	1299	1435
Fertiliser	316	316	316	316
CNG	145	152	159	166
Comercial & tea	38	38	38	38
Total	**4610**	**4787**	**4931**	**5079**

Source: Energy and Mineral Resources Division.

Liquefied Natural Gas (LNG)

To meet the growing energy demand of the country, necessary steps have been undertaken by the government to import Liquefied Natural Gas (LNG). As per decision of the government, two Floating Storage and Re-gasification Units (FSRU) have been installed having storage capacity of 1,38,000 cubic meter LNG each and re-gasification capacity of daily 500 Million Cubic Feet each. The first LNG terminal, installed by Excelerate Energy Bangladesh Ltd. (EEBL) was commissioned in August 2018. The second FSRU, with similar capacity, installed by Summit LNG Terminal Co. Ltd. was commissioned in April 2019. Both the FSRUs are in the Bay of Bengal near *Moheshkhali, Cox's Bazar*. Government also has a plan to construct a land based LNG Terminal with a re-gasification capacity of daily 1,000 Million Cubic Feet at *Matarbar*i, *Cox's bazar*. Petrobangla has signed two long term Sale Purchase Agreements (SPA) with Ras-Laffan Natural Gas Company Ltd. (3), Qatar and Oman Trading International, Oman (OTI) for LNG procurement. Besides, Master Sale Purchase Agreements (MSPA) have been signed with shortlisted suppliers/traders for purchase LNG from spot market.

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 13.60 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 about 131.50 km 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 FY 2010-11 to FY 2021-22 is shown in Tables 10.14 and 10.15

Table 10.14: Import of Crude Oil

FY	Quantity (Metric tonnes)	C and F Value/ Million US$	Crore Taka
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	1361877	721.28	6080.39
2019-20	1151963	455.91	3854.64
2020-21	1434613	584.64	4966.52
2021-22*	872211	493.57	4232.47

Source: Energy and Mineral Resources Division * Up to February 2022.

Table: 10.15: 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)
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	4281958	23376.50	-	-	318634	1282.49
2019-20	3873131	17045.18	-	-	175694	687.04
2020-21	4144762	16694.40	-	-	47924	151.41
2021-22*	2855798	17933.07			139728	647.78

Source: Energy and Mineral Resources Division *Up to February 2022

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 FY 2015-16 to FY 2021-22. Table 10.16 shows the amount of subsidy given to BPC.

Table 10.16: Amount of Subsidy given to BPC by the government

(In Crore Taka)

FY	Amount of Subsidy
2010-11	4000.00
2011-12	8550.00
2012-13	13558.00
2013-14	2478.00
2014-15	600.00

FY	Amount of Subsidy
2015-16	0.00
2016-17	0.00
2017-18	0.00
2018-19	0.00
2019-20	0.00
2020-21	0.00
2021-22*	0.00

Source: Bangladesh Petroleum Corporation * Up to February 2022.

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

Five coal fields have been discovered in Bangladesh till now. The total estimated reserves of these discovered coal fields are about 7,823 million tons which is equivalent to 185 Tcf of Natural gas. Out of these 5 coal fields, coal is being commercially extracted only from the *Barapukuria* coal field from september 2005. The Total amount of coal extracted till December 2021 is 12.76 million tons. Coal is mainly used in thermal power plant for electricity generation and also as fuel in brick field, steel industry and various other industries. At present coal is being extracted from the central basin area of *Barapukuria* coal field by Underground Mining Method (UMM) with an average target production of 0.8 million metric tons per year. A coal-based thermal power plant with a capacity of 525 MW has been set up near the mine from which electricity is being regularly supplied to the national grid.

Besides ,a feasibility study for the development of *Dighipara* coal field in *Nawabganj upazila* of *Dinajpur* district has been completed in 2020. According to the study report, out of the 706 million tons of coal in the *Dighipara* coal field, a total of 90 million tons could be extracted in 30 years at an annual rate of 3 million tons by UMM. Table 10.17 shows the location, depth and estimated reserve of the coal fields.

Table 10.17: Location, depth and estimated reserve of the coal fields

Sl. No	Coal field	Year of Discovery	Depth	Estimated Reserve
1.	*Barapukuria*	1985	118-509	410
2.	*Dighipara*	1995	328-455	706
3.	*Phulbari*	1997	141-270	572
4.	*Khalaspir*	1989	222-516	685
5.	*Jamalgonj*	1962	640-1158	5450
			Total	7823

Source: Energy and Mineral Resources Division

Hard Rock

The *Maddhapara* hard rock mining project is the first underground mine in Bangladesh. Geological Survey of Bangladesh (GSB) discovered this hard rock mine in the year of 1974 in the village of *Maddhapara*, *Parbatipur upazilla* in *Dinajpur* district at the depth of about 136 to 152 meters from the surface. The total reserve of hard rock is 174 million metric tons, of which 73 million metric tons of rock is extractable in the area of 1.2 square kilometer. The Bureau of Mineral Development (BMD) issued a license of lease to develop the hard rock mine in the area of 54 square km in *Parbatipur* and *Nawabganj upazilla* of *Dinajpur* district. Total 7.53 million metric tons of rock has been produced and total 7.36 million metric tons of rock has been sold during May 2007 to December 2021. According to the result of already completed feasibility study, 113.70 million metric tons of granite rock can be possible to produce during 40 years in the proposed new mining area of 2.25 square km.

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

GSB is the only government organisation under ministry of Power, Energy and Mineral resources to expedite the exploration of Mineral Resources except oil and gas, and also evaluate of that resources and carrying out geoscientific research works. GSB has implemented various development projects to strengthen the exploration and evaluation of mineral resources in the country. As a result, skilled manpower has been developed with foreign training under various projects of this department and Research facilities has made by procuring modern equipment to work in the petrology-mineralogy, engineering geology, sedimentology and clay mineralogy, remote sensing and GIS, micropaleontology, geophysics and analytical chemistry laboratories. Besides these, GSB has discovered Peat, Glass Sand, White Clay, Construction Sand, Gravel, Limestone, Heavy minerals in different parts of the country. Coal and Peat discovered by GSB is now used in power generation and household activities.

Recent Achievements of GSB

- In FY 2020-21 Geological and geomorphological mapping have been completed of 2,097 sq. km.
- GSB has discovered 30 meters thick limestone in 675 meters depth in *Tajpur* area of *Bilasbari* union of *Badalgachi upazila* under *Naogaon* district.
- Recently, GSB has also discovered a magnetic rock (magnetic, hematite) of 30 meters thick at a depth of 430 meters at *Hakimpur* Upazila under *Dinajpur* district.
- By the project titled *'Identification and Economic Assessment of the Valuable Minerals in the River Sands of Bangladesh'* collection of different sand samples from *Brahmapurta, Meghna, Someshawri* river basin and analyses of these samples, valuable minerals like Zircon, Monazite, Ilmenite, Rutile, Leocoxin, Kayanite, Garnet, Magnetite etc. has been identified. The average percentage of heavy mineral is 8.92 percent which is internationally acceptable.

Hydrocarbon Unit

Hydrocarbon Unit provides technical support to Energy and Mineral Resources Division to provide views/comments on different policies including Coal policy, MoU, preparation of SDG's Action plan, Gas demand, Gas sector development, Future plan of Gas Sector, Attend PSC's JRC/JMC's meeting, Supervision and Monitoring of Production Sharing Contract (PSC) and other Contracts; Petroleum Refining and Marketing Management, Mines and Minerals Development related Rules and Regulations.

Bureau of Mineral Development (BMD)

Bureau of Mineral Development (BMD) is an institution which is responsible for collecting revenue in favor of this government. It provides exploration license, lease of mines and quarries including management of the mineral resources (other than oil and gas) of the country under the Mine and Mineral (Control and Development) Act, 1992 and the Mine of Mineral Rules, 2012.

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, electricity transmission tariff for electricity transmission company and retail tariff rate for electricity distribution entities/companies as per law and regulations. By issuing tariff order on 27 February 2020, the Commission has adjusted bulk, transmission, and retail tariff rationally that became effective from March 2020. For patronising the charging of electrical vehicles, it is initiated separate tariff category for battery charging stations and the water pumps used for medium level irrigation/agriculture purposes under medium tension, low price tariff category has been introduced. Due to pandemic caused by COVID-19, the Commission has issued two supplementary orders on 24 March 2020 and 16 July 2020 to waive Late-Payment Surcharge of residential electricity users for the period of March 2020 to June 2020.

Gas Development Fund

To augment the financial capacity for exploration and production of gas by the nationalized companies, the Commission formed 'Gas Development Fund'. An amount of about Tk.16,775.88 crore has been deposited to the Gas Development Fund up to June 2021.

Creation of Electricity Maintenance and Development Fund

In order to increase the efficiency and capability of BPDB, the commission has created 'Electricity Maintenance and Development Fund' in 2011, with the increase of 5.17 percent of bulk tariff. Commission has re-fixed the rate of deposit Tk. 0.15 on selling price of per kWh which was effective from 1 December 2017. The cumulative deposit in this fund up to June 2021 is Tk. 11,644.66 crore.

Creation of Energy Security Fund

With a view to ensuring the energy security in Bangladesh the Commission formed 'Energy Security Fund'. Up to June 2021 Tk. 12,917.43 crore have been deposited in this fund. The fund will be used in the development process of the fuel sector according to the framework outline and investment guidelines.

Providing License

The numbers of issued license by the Commission from FY 2009-10 to FY 2021-22 (February 25, 2022) in the gas sector is 438, in the power sector is 3,126 and in the petroleum sector is 956.

Arbitration Activities

For settlement of dispute which may arise between the licensees or between a licensee and consumers, the Commission prepared the BERC Dispute Settlement Regulations, 2014 and published in the Bangladesh Gazette on 22 January, 2014. By this time, the settlement of disputes under this Regulation has begun and 197 awards were given from FY 2009-10 to FY 2021-22 (Up to February 2022) out of 346 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. The Commission has issued an order for the implementation of uniform accounting procedure for all licensees of the gas sector. The order includes guidelines to accounting, permanent asset and inventory management for each financial transaction. The Commission has also formulated a uniform accounting system for power sector. From the feedback of power distribution companies/organisation, the Commission has undertaken necessary steps for the review and amendment of the system to

accelerate speedy implementation of the system. The Commission has taken initiatives to introduce uniform accounting method in all gas and power utilities through computerised/web based software. In order to purchase Uniform System of Accounts system (Computerised/web-based software) for gas companies/utilities is under processed.

Preservation of Consumer's Rights

The Commission is working sincerely to protect the consumer's rights. With a view to establishing the consumer's right, the Commission regularly organise outreach program, conducts open meeting and public hearing in fixing tariff as well as to preparing regulations and guidelines in order to protect consumer interest. Others important steps taken by the Commission are pre-paid meter system, introduction of mobile billing system, online customer services and issuing bill clearance certificates yearly.

Energy Auditing

The Commission believes that 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. Three power plants of Bangladesh Power Development Board have already prepared energy audit related information and sent to the BERC in the prescribed form.

E-licensing activities

In order to make the licensing process easily accessible and fast to the service recipients, online e-licensing system software has been installed and training has been provided to the concerned officers/employees. From October 1, 2019, the application and issuance of licenses for various categories of energy sector is being maintained through e-licensing system. This reduces the time and cost for service recipients to obtain a license. As a result, service seekers are able to receive services without any hassle and harassment.

Research Activities

To find out the problems, solutions and prosperity of power and energy sector, the Bangladesh Energy Regulatory Commission has conducted some activities in research sector.