Revisiting PSMP 2016

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

Power Division

Ministry of Power, Energy & Mineral Resources

VISION 2041

Tokyo Size Generation Capacity

Achievement Developed Country

Per-Capita Generation

464 kWh → 2,100 kWh

No Power Shortage

High Thermal Efficiency
(World Top Quality)

30% → 50%

Frequency Fluctuation
(World Top Quality)

± 1.5 Hz → ± 0.2 Hz

Power Demand

10,500 MW → 72,000 MW

Generation Capacity

13,500 MW → 79,500 MW

Gas/LNG

34,000 MW

8,700 MW

Coal

25,500 MW

436 MW

Liquid Fuel

4,500 MW → 1,800 MW

Nuclear

5,500 MW

0 MW

Import

12,000 MW

1,160 MW

Renewable Energy

7,900 MW

300 MW

Power Division
Ministry of Power, Energy & Mineral Resources

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List of Abbreviations

Abbreviation	Full Title
APSCL	Ashuganj Power Station Company Limited
Bangladesh	The People's Republic of Bangladesh
BAU	Business as Usual
BCPCL	Bangladesh-China Power Company (Pvt.) Limited
BERC	Bangladesh Energy Regulatory Commission
BEZA	Bangladesh Economic Zones Authority
BIFPCL	Bangladesh-India Friendship Power Company (Pvt.) Limited
BPDB	Bangladesh Power Development Board
BREB	Bangladesh Rural Electrification Board
BR Powergen	BPDB and RPCL Joint Venture
CBET	Cross Border Electricity Trade
CC	Combined Cycle
CCPP	Combined Cycle Power Plant
CEB	Ceylon Electricity Board
CFL	Compact Fluorescent Lamp
Ckt. km	Circuit kilometer
CPGCBL	Coal Power Generation Company Bangladesh Limited
D. Coal	Domestic Coal
DC	Direct Current
DDF	Demand Diversity Factor
DESCO	Dhaka Electricity Supply Company Limited
D/F	Dual Fuel
DMS	Demand Management System
DPDC	Dhaka Power Distribution Company Limited
DSM	Demand Side Management
EECMP	Energy Efficiency and Conservation Master Plan
EE&C	Energy Efficiency and Conservation
EGAT	Electricity Generating Authority of Thailand
EGCB	Electricity Generation Company of Bangladesh
EPC	Engineering, Procurement and Construction
ESB	Enhanced Single Buyer
G.R.	Growth Rate
GDP	Gross Domestic Product
GNI	Gross National Income

Abbreviation	Full Title
GIS	Geographic Information System
GT	Gas Turbine
GW	Gigawatt
GWh	Gigawatt hours
HFO	Heavy Fuel Oil
HSD	High Speed Diesel
HVDC	High Voltage Direct Current transmission line
IEA	International Energy Agency
Imp. Coal	Imported Coal
IPP	Independent Power Producer
ISO	Independent System Operator
JV	Joint Venture
km	Kilometer
kV	kilo Volt
kWh	kilowatt Hour
LECB	Low Emission Capacity Building
LED	Light Emitting Diode
LNG	Liquefied Natural Gas
LOI	Letter of Intent
LOLE	Loss of Load Expectation
Ltd.	Limited
MW	Megawatt
MkWh	Million kilowatt hour
MVA	Mega Volt Ampere
MWp	Megawatt peak
NESCO	Northern Electricity Supply Company Limited
NGO	Non-Government Organization
NHPC	National Hydroelectric Power Corporation
NLDC	National Load Despatch Center
NPCBL	Nuclear Power Plant Company Bangladesh
NPCIL	Nuclear Power Corporation of India Limited
NTPC	National Thermal Power Corporation Limited
NWPGCL	North West Power Generation Company Limited
O&M	Operation and Maintenance
p.a.	Per Annum

Abbreviation	Full Title
PDP	Power Development Plan
PGCB	Power Grid Company of Bangladesh Limited
Ph	Phase
PP	Power Plant
PPA	Power Purchase Agreement
PSMP	Power System Master Plan
P&D	Planning and Development
RAJUK	Rajdhani Unnayan Kartri Pakkha
RPCL	Rural Power Company Limited
SC	Super Critical
SCADA	Supervisory Control and Data Acquisition
SCPP	Super Critical Power Plant
SDG	Sustainable Development Goal
SEB	State Electricity Board
SHS	Solar Home System
SPP	Small Power Producer
SREDA	Sustainable and Renewable Energy Development Authority
S/S	Sub-Station
ST	Steam Turbine
Tk /Tk.	Bangladeshi Taka
ToU	Time-of-Use
T&D	Transmission and Distribution
UN	United Nations
USA	United States of America
USC	Ultra-Super Critical
USCPP	Ultra-Super Critical Power Plant
UNDP	United Nations Development Programme
US$	United States Dollar
VAR	Voltage-Ampere Reactance
VAT	Value Added Tax
VSPP	Very Small Power Producer
WZPDCL	West Zone Power Distribution Company Limited

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Chapter I: Introduction

1.1 Background

Government of Bangladesh has a target to become a developed country by 2041. The development of energy and power infrastructure therefore is very important for the long-term economic development of the country. Draft Power System Master Plan (PSMP) 2016 is prepared in aiming at formulating a comprehensive energy and power development plan up to the year 2041, covering energy balance, power balance and tariff strategies. The new PSMP study has considered all the challenges and comes up with feasible and implementable proposals and action plans for Bangladesh.

Many of the power plants in Bangladesh cannot come to commercial operation within stipulated time due to many reasons. Moreover, some existing power plants cannot generate electricity as specified in terms of power, thermal efficiency etc. for each unit. As a result, shortage of power does not allow to stop facilities and to undertake periodical maintenance in a planned way. In order to secure an uninterruptible electricity supply, it is necessary to find out solutions to all of these issues and to establish a comprehensive institutional framework.

At this backdrop, Power Division decided to revisit the target of generation and transmission depicted in the PSMP 2016. Regional balances, fuel diversification, distribution infrastructure, demand side management, investment and generation cost issues will have to be addressed during examining the PSMP 2016.

1.1.1 Procedure Followed

The committee met in a number of formal meetings and had discussion with different sector entities and stakeholders to discuss and examine the targets and related data in order to ascertain demand to set a realistic target of power generation capacity. Future demand forecast and power generation plan from distribution and generation entities are considered in preparing the report. The report was presented in a workshop held on 25th February 2018. Advisor to the Hon'ble Prime Minister for Power, Energy and Mineral Resources was present in the workshop. Head of the Organizations, Companies, and representatives of the Independent Power Producers, Business Entities and Stakeholders were present in the workshop. Some relevant and substantive recommendations were made in the workshop which has been incorporated in the report.

The committee consulted with relevant persons, policymakers, experts and their opinion reflected in the report. The report was prepared based on the on-going plan in 2017. If this plan is updated it may change the scenarios of this report.

1.1.2 PSMP 2016

Draft PSMP 2016, aims at assisting Bangladesh in formulating an extensive energy and power development plan up to the year 2041. It covers energy balance, power balance, and tariff strategies. Bangladesh has a target to become an upper middle-income country by 2021 and high-income country by 2041. Since Bangladesh is facing the depletion of domestic gas supply, balance on

primary energy sources is to be reconsidered. In PSMP 2016, it is recommended that, meticulous analysis is required to find the best pathway to attain the sustainability of the energy and power sectors in balancing with the economic growth. So, Power Division has decided to further examine the generation targets and come up with best recommendations and action plans to implement.

1.1.3 Policy Vision of PSMP 2016

Government of Bangladesh has declared its intention to develop the country in order to become one of the developed countries by 2041 as the key goal of VISION 2041. To achieve the Vision, PSMP 2016 defines the intended goal and "five key viewpoints" mentioned below:

- Enhancement of imported energy infrastructure and its flexible operation
- Efficient development and utilization of domestic natural resources (gas and coal)
- Construction of a robust, high-quality power network
- Maximization of green energy and promotion of its introduction
- Improvement of human resources and mechanisms related to the stable supply of energy

1.1.4 Sustainable Development Goal (SDG)

At the seventieth session of the UN General Assembly on 25 September 2015, the member states have adopted the declaration '*transforming our world: the 2030 Agenda for Sustainable Development'*. In that declaration, 17 Goals with 169 Targets came into effect on 1 January 2016 and will guide the international development agenda over the next 15 years, i.e., up to 2030. The 7th goal of SDG is to *'Clean energy for everyone: Secure access to affordable, reliable, sustainable and modern energy for everyone.'*

For achieving goals of VISION 2041 and SDG, forecasting of power demand growth and sustainable generation plan is required. For that intention, present committee has examined demand forecast given by the distribution entities meticulously and come up with specific recommendations regarding power demand and generation planning. Therefore, power generation capacity is required to be increased with the growth of power demand proportionately. In addition, power transmission and distribution networks should be developed parallel to support the system.

Chapter II: Power Demand Forecast

2.1 Present Power Supply Situation

Maximum demand of Bangladesh in 2017 was about 9,000-9,500 MW (according to NLDC's report). According to PSMP-2016, in 2017, demands with and without Energy Efficiency and Conservation (EE&C) are about 10,300 MW and 10,600 MW respectively. So far, maximum generation is achieved 9,507 MW (including import) as on 18th October 2017. The demand is met by electricity generation from existing public and private power plants and import. However, demand for power is increasing in a rapid pace. Whether the growth rate of power demand is in accordance with the rate mentioned in the PSMP 2016, or more than that is the main issue which has been examined and depicted in this report.

2.2 Zone-wise Demand up to 2041 according to Distribution Utilities

According to the members of the committee, future demand projection will be more accurate if it is calculated based on demand forecast of distribution entities, as they know the nature of the growth of the number of consumers and their pattern of use. Distribution utilities have provided grid demand projection including a captive demand to the committee for the year 2017 to 2041 at 33 kV level as per their own Master Plan prepared based on the in-house study. The rate of demand growth from 2017 to 2041 at 33 kV level is forecasted to be as 14% - 5%. The loss of transmission 3.0% is considered for national grid demand at 132 kV. Forecasted demand growth rates are the same (14% to 5%) in national grid level for the same period. Year-wise demand and growth rates (national grid 132 kV level) are given in Table 1 and Figure 1. Zone wise demand and growth rate at 33 kV level from 2017 to 2041 are presented in Table 2 and Figure 2.

Table 1 : Year-wise Demand including Captive Demand & Growth Rates (National Grid 132 kV Level) from 2017 to 2041

Year	Demand (MW)	Growth rate (%)	Captive power to grid	Year	Demand (MW)	Growth rate (%)	Captive power to grid	Year	Demand (MW)	Growth rate (%)	Captive power to grid
2017	11,637		300	**2026**	30,765	9	1,471	**2035**	59,275	7	1,967
2018	13,260	14	400	**2027**	33,398	9	1,566	**2036**	62,818	6	1,967
2019	15,041	13	600	**2028**	36,106	8	1,663	**2037**	66,436	6	1,967
2020	17,015	13	700	**2029**	38,946	8	1,759	**2038**	70,185	6	1,967
2021	19,034	12	800	**2030**	41,890	8	1,860	**2039**	74,037	5	1,967
2022	21,193	11	1,099	**2031**	45,045	8	1,967	**2040**	78,118	5	1,967
2023	23,417	10	1,193	**2032**	48,367	7	1,967	**2041**	82,292	5	1,967
2024	25,762	10	1,284	**2033**	52,018	7	1,967				
2025	28,231	10	1,376	**2034**	55,542	7	1,967				

Figure 1: Year-wise Demand & Growth Rates (National Grid 132 kV Level) From 2017 To 2041

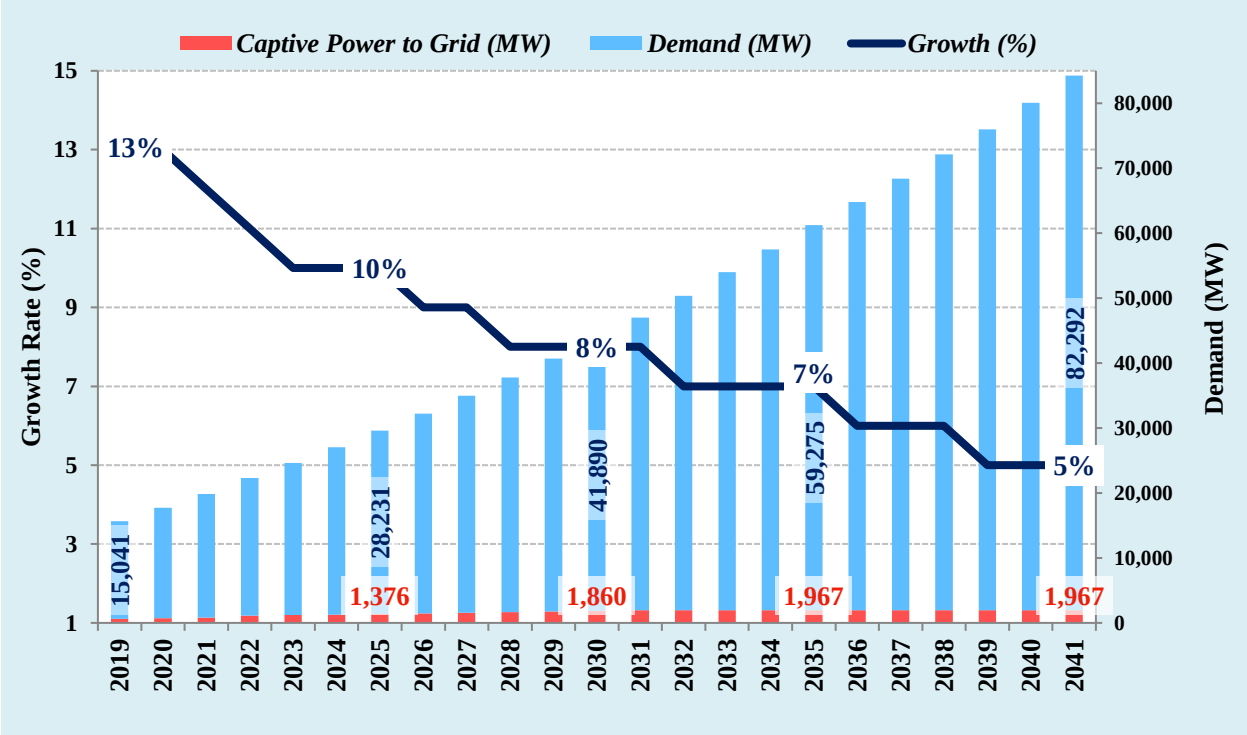
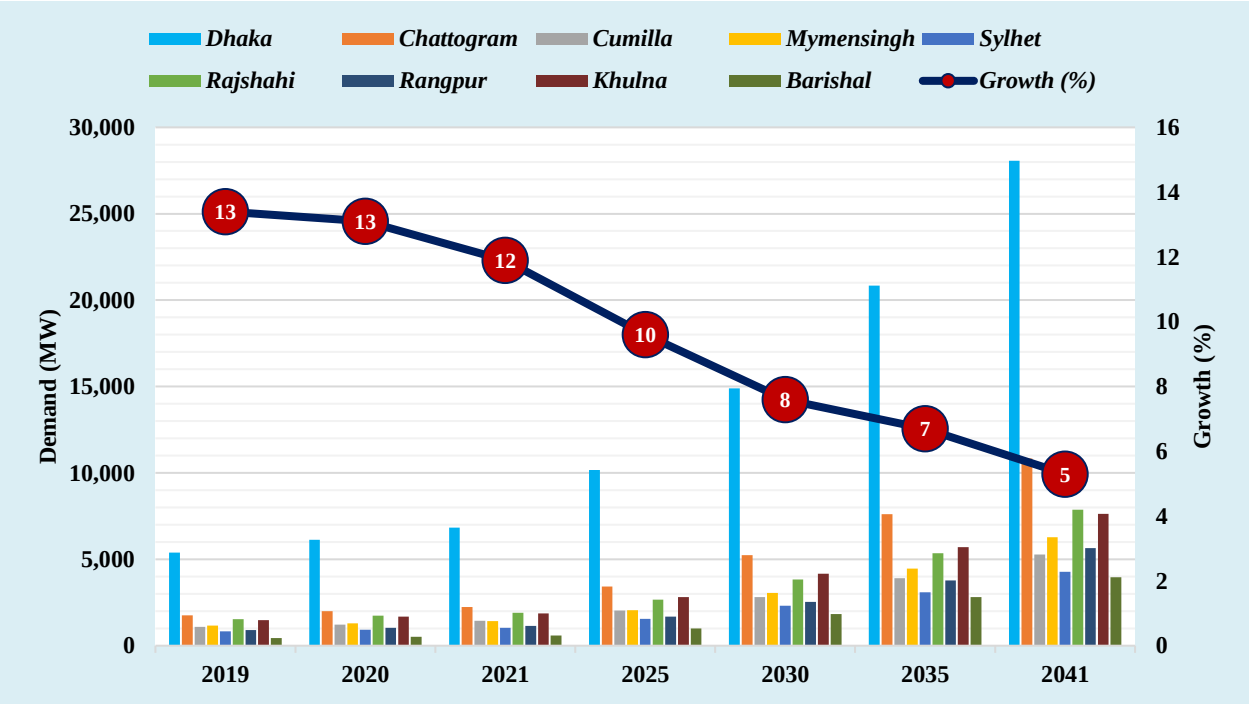


Table 2: Zone-wise Demand & Growth Rates (33 kV Level) from 2017 to 2041

Year	Dhaka	Chattogram	Cumilla	Mymensingh	Sylhet	Rajshahi	Rangpur	Khulna	Barishal	Total Demand (33 kV level)	Growth rate (%)
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2017	4149	1372	853	888	632	1201	703	1186	315	11298	
2018	4714	1554	968	1021	730	1374	806	1329	377	12874	13.9
2019	5383	1756	1096	1159	829	1537	913	1486	444	14603	13.4
2020	6121	1991	1228	1289	924	1739	1032	1681	515	16520	13.1
2021	6837	2235	1448	1424	1034	1903	1145	1861	593	18480	11.9
2022	7639	2495	1583	1564	1155	2078	1276	2108	678	20576	11.3
2023	8440	2780	1730	1719	1277	2290	1402	2326	772	22735	10.5
2024	9276	3083	1873	1889	1405	2475	1542	2585	882	25012	10.0
2025	10167	3419	2033	2054	1555	2669	1683	2822	1007	27409	9.6
2026	11042	3751	2163	2234	1736	2872	1844	3085	1143	29869	9.0
2027	11918	4109	2308	2450	1900	3115	2011	3322	1293	32425	8.6
2028	12841	4475	2485	2655	2031	3339	2184	3586	1458	35055	8.1
2029	13839	4855	2663	2864	2168	3576	2365	3863	1618	37812	7.9
2030	14886	5232	2823	3055	2307	3827	2544	4161	1834	40670	7.6
2031	15897	5671	3041	3294	2436	4130	2753	4475	2037	43733	7.5
2032	17008	6094	3263	3564	2596	4423	2998	4771	2242	46958	7.4
2033	18245	6634	3483	3914	2761	4702	3254	5068	2441	50503	7.3
2034	19507	7094	3678	4174	2915	4999	3523	5400	2634	53924	6.8
2035	20843	7604	3903	4454	3096	5360	3780	5702	2807	57548	6.7
2036	21969	8082	4123	4724	3271	5745	4055	6018	3003	60989	6.0
2037	23126	8574	4363	5004	3456	6135	4329	6333	3181	64501	5.8

Year	Dhaka	Chattogram	Cumilla	Mymensingh	Sylhet	Rajshahi	Rangpur	Khulna	Barishal	Total Demand (33 kV level)	Growth rate (%)
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
2038	24284	9124	4558	5304	3691	6522	4654	6648	3357	68141	5.6
2039	25500	9714	4769	5614	3882	6948	4959	6952	3542	71880	5.4
2040	26768	10324	5003	5964	4076	7403	5296	7270	3740	75843	5.4
2041	28070	10844	5273	6284	4286	7879	5655	7640	3965	79895	5.3

Figure 2: Zone-wise Demand & Growth Rates (33 kV Level) from 2017 to 2041



2.3 Peak Power Demand Forecast as per GDP Elasticity Method

Peak demand for PSMP 2016 has been forecasted, with and without Energy Efficiency and Conservation (EE&C) by "GDP elasticity method", which is an easier method than other methodologies. However, it has to be noted that this methodology disregards various factors, which may also have effect on the power demand; hence, the outcome may be significantly different from other methodologies. This report sets a target for energy efficiency to reduce the energy intensity of GDP by 15% by 2021 and by 20% by 2030. Nevertheless, this study sets a more simplified target of reducing the peak power demand by 20% from the BAU[1] case (GDP elasticity = 1.27) referring to Energy Efficiency & Conservation Master Plan (EECMP) and formulated the projection of peak power demand.

[1] *Business as Usual*

The comparison among high, base and low case peak demand forecast as per PSMP 2016 (without EE&C) is shown in Table 3. It is seen from Table 3 that, the maximum growth rate will be 10.2% in 2020 and gradually decreases.

Table 3: PSMP2016 Peak Demand' High, Base & Low case (Without EE&C measures)

Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)
2017	10,601	9.1	10,601	9.1	10,601	9.1
2018	11,597	9.4	11,597	9.4	11,597	9.4
2019	12,717	9.7	12,717	9.7	12,717	9.7
2020	14,009	10.2	14,009	10.2	14,009	10.2
2021	15,401	9.9	15,394	9.9	15,390	9.9
2022	16,896	9.7	16,875	9.6	16,861	9.6
2023	18,499	9.5	18,453	9.4	18,423	9.3
2024	20,212	9.3	20,129	9.1	20,074	9.0
2025	22,040	9.0	21,903	8.8	21,813	8.7
2026	23,984	8.8	23,776	8.5	23,638	8.4
2027	26,045	8.6	25,744	8.3	25,545	8.1
2028	28,225	8.4	27,806	8.0	27,529	7.8
2029	30,525	8.1	29,959	7.7	29,586	7.5
2030	32,945	7.9	32,198	7.5	31,709	7.2
2031	35,484	7.7	34,520	7.2	33,890	6.9
2032	38,139	7.5	36,916	6.9	36,120	6.6
2033	40,910	7.3	39,381	6.7	38,391	6.3
2034	43,791	7.0	41,906	6.4	40,691	6.0
2035	46,780	6.8	44,483	6.1	43,010	5.7
2036	49,871	6.6	47,101	5.9	45,334	5.4
2037	53,057	6.4	49,750	5.6	47,652	5.1
2038	56,424	6.3	52,526	5.6	50,068	5.1
2039	59,982	6.3	55,436	5.5	52,587	5.0
2040	63,741	6.3	58,486	5.5	55,211	5.0
2041	67,710	6.2	61,681	5.5	57,946	5.0

The comparison among high, base and low case peak demand forecast as per PSMP 2016 (with EE&C) is shown in Table 4. It is also seen from Table 4 that, the maximum growth rate will be 10.2% in 2020 and gradually decreases. The demand of high, base and low case (with EE&C) will be lower than high, base and low case demand of - without EE&C.

Table 4: PSMP2016 Peak Demand' High, Base & Low case (With EE&C measures)

Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)	Effect of EE&C measures
2017	10,400	9.1	10,400	9.1	10,400	9.1	2.7%
2018	11,200	9.4	11,200	9.4	11,200	9.4	4.0%
2019	12,100	9.7	12,100	9.7	12,100	9.7	5.3%
2020	13,300	10.2	13,300	10.2	13,300	10.2	6.7%

Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)	Effect of EE&C measures
2021	14,500	9.9	14,500	9.9	14,500	9.9	8.0%
2022	15,800	9.7	15,800	9.6	15,800	9.6	9.3%
2023	17,200	9.5	17,100	9.4	17,100	9.3	10.7%
2024	18,600	9.3	18,500	9.1	18,500	9.0	12.0%
2025	20,000	9.0	19,900	8.8	19,800	8.7	13.3%
2026	21,600	8.8	21,400	8.5	21,300	8.4	14.7%
2027	23,100	8.6	22,900	8.3	22,700	8.1	16.0%
2028	24,700	8.4	24,400	8.0	24,100	7.8	17.3%
2029	26,400	8.1	25,900	7.7	25,600	7.5	18.7%
2030	28,000	7.9	27,400	7.5	27,100	7.2	20.0%
2031	30,100	7.7	29,300	7.2	28,800	6.9	20.0%
2032	32,200	7.5	31,200	6.9	30,600	6.6	20.0%
2033	34,400	7.3	33,200	6.7	32,400	6.3	20.0%
2034	36,700	7.0	35,200	6.4	34,200	6.0	20.0%
2035	39,100	6.8	37,300	6.1	36,100	5.7	20.0%
2036	41,600	6.6	39,400	5.9	38,000	5.4	20.0%
2037	44,100	6.4	41,500	5.6	39,800	5.1	20.0%
2038	46,800	6.3	43,700	5.6	41,700	5.1	20.0%
2039	49,700	6.3	46,000	5.5	43,800	5.0	20.0%
2040	52,700	6.3	48,500	5.5	45,900	5.0	20.0%
2041	55,900	6.2	51,000	5.5	48,000	5.0	20.0%

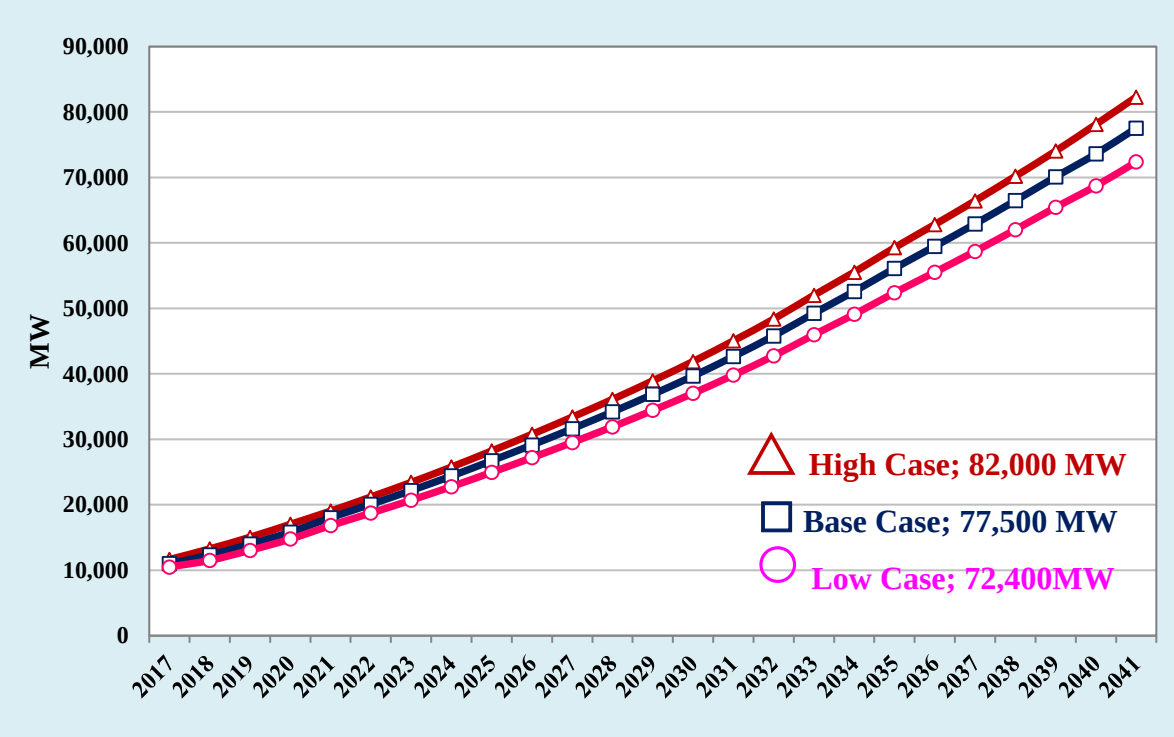
High, base and low case peak power demand have been forecasted based on collected data from distribution utilities. The comparisons between the peak power demand of high, base and low case without EE&C are shown in Table 5 and Figure 3. The low case demand growth rate will be significantly lower than high case demand.

Table 5: Forecasted Collected Demand High Case, Base Case & Low Case (Without EE&C)

Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)
2017	11,637		11,000		10,500	
2018	13,260	14	12,320	14	11,500	10
2019	15,041	13	13,975	13	13,044	13
2020	17,015	13	15,809	13	14,757	13
2021	19,034	12	18,023	12	16,823	14
2022	21,193	11	20,067	11	18,731	11
2023	23,417	10	22,173	10	20,697	10
2024	25,762	10	24,393	10	22,769	10
2025	28,231	10	26,731	10	24,952	10
2026	30,765	9	29,130	9	27,191	9
2027	33,398	9	31,623	9	29,519	9

Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)
2028	36,106	8	34,188	8	31,912	8
2029	38,946	8	36,876	8	34,422	8
2030	41,890	8	39,663	8	37,024	8
2031	45,045	8	42,651	8	39,812	8
2032	48,367	7	45,797	7	42,748	7
2033	52,018	7	49,254	7	45,976	7
2034	55,542	7	52,590	7	49,090	7
2035	59,275	7	56,125	7	52,389	7
2036	62,818	6	59,480	6	55,521	6
2037	66,436	6	62,905	6	58,718	6
2038	70,185	6	66,456	6	62,032	6
2039	74,037	5	70,102	5	65,436	5
2040	78,118	5	73,607	5	68,708	5
2041	82,292	5	77,540	5	72,379	5

Figure 3: Forecasted Collected Demand High Case, Base Case & Low Case (Without EE&C)

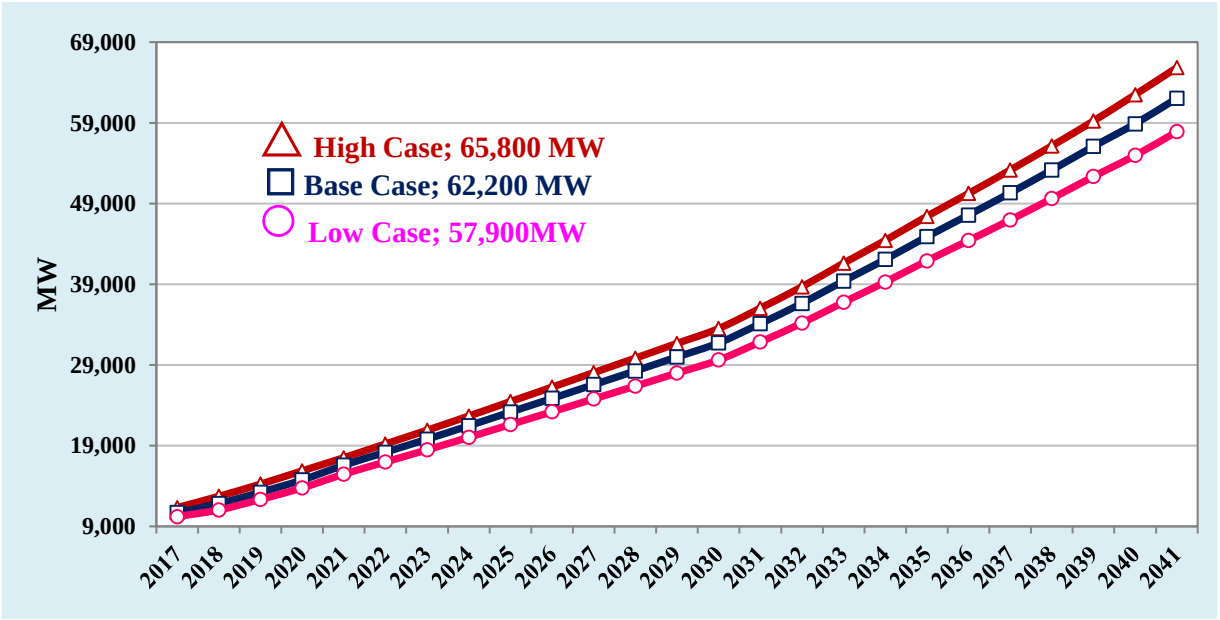


The comparison among the peak power demand of high, base and low case with EE&C are shown in Table 6 and Figure 4. The low case demand growth rate will be significantly lower than high case demand.

Table 6: Forecasted Collected Demand High Case, Base Case and Low Case (With EE&C)

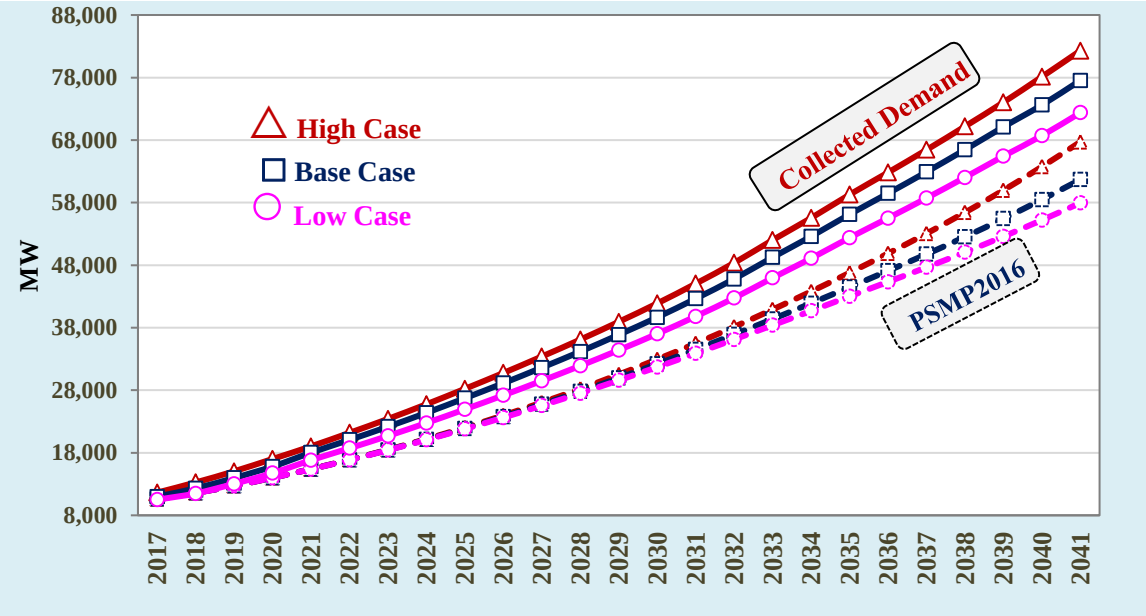
Year	Peak Demand (MW) [High Case]	G.R (%)	Peak Demand (MW) [Base Case]	G.R (%)	Peak Demand (MW) [Low Case]	G.R (%)
2017	11,327		10,707		10,220	
2018	12,729	12	11,827	10	11,040	8
2019	14,239	12	13,229	12	12,348	12
2020	15,881	12	14,755	12	13,773	12
2021	17,511	10	16,581	12	15,477	12
2022	19,215	10	18,194	10	16,983	10
2023	20,920	9	19,808	9	18,489	9
2024	22,671	8	21,466	8	20,037	8
2025	24,467	8	23,167	8	21,625	8
2026	26,253	7	24,858	7	23,203	7
2027	28,055	7	26,564	7	24,796	7
2028	29,848	6	28,262	6	26,381	6
2029	31,676	6	29,993	6	27,997	6
2030	33,512	6	31,731	6	29,619	6
2031	36,036	8	34,121	8	31,850	8
2032	38,694	7	36,637	7	34,198	7
2033	41,615	8	39,403	8	36,781	8
2034	44,433	7	42,072	7	39,272	7
2035	47,420	7	44,900	7	41911	7
2036	50,255	6	47,584	6	44,417	6
2037	53,149	6	50,324	6	46,974	6
2038	56,148	6	53,164	6	49,626	6
2039	59,230	5	56,082	5	52,349	5
2040	62,494	5	58,886	5	54,966	5
2041	65,834	5	62,032	5	57,903	5

Figure 4: Forecasted Collected Demand High Case, Base Case & Low Case (With EE&C)



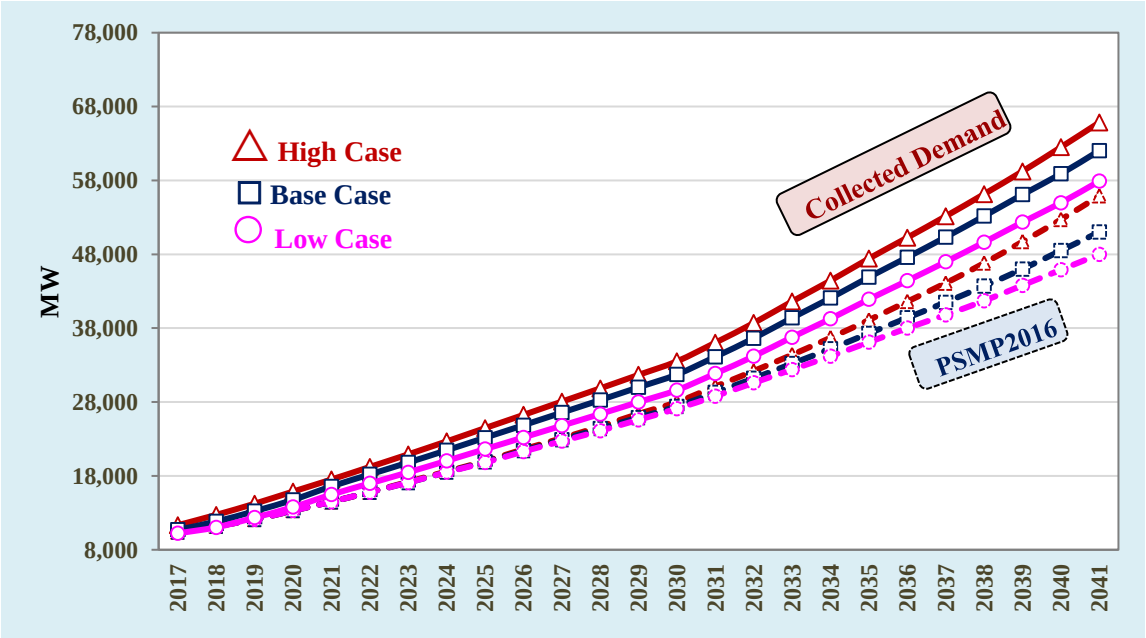
The comparison between peak demand forecast as per collected data from distribution utilities and PSMP 2016 (without EE&C) is shown in Figure 5. The maximum growth rate of peak power demand collected from Utilities is higher in comparison to maximum growth rate of peak power demand in PSMP 2016.

Figure 5: Comparison between Collected Demand & PSMP 2016 Peak Demand (Without EE&C Measures)



The comparison between peak demand forecast as per collected data from distribution utilities and PSMP 2016 (with EE&C) is shown in Figure 6. The maximum growth rate of peak power demand collected from utilities is higher in comparison to maximum growth rate of peak power demand in PSMP 2016.

Figure 6: Comparison between Collected Demand &PSMP 2016 Peak Demand (With EE&C Measures)



2.4 Electricity for Economic Growth

Everybody knows that electricity use and access are strongly correlated with economic development of any country. There is an indication that reliability of electricity supply is important for economic growth. Effects of lack of availability of electricity can be a constraint to growth. In a report, on 'Electricity and Economic growth' by National Research Council, National Academy of Sciences, USA, it is mentioned that "Electricity use and gross national product have been, and probably will continue to be strongly correlated"[2].It is to be said that high economic growth proportionately increases electricity demand; on the other hand, availability of electricity has a direct influence on economic growth.

In a newspaper report, it is mentioned that, "Bangladesh has the potential to be among the fastest growing economies in coming years, which will help it take 28th place among the world's most powerful economies by 2030"[2], In another report, it is cited that "Bangladesh might be the 23rd largest economy of the world by 2050 with a gross domestic product (GDP) of $3.064 trillion by purchasing power parity (PPP), says a report of global services giant PricewaterhouseCoopers (PwC)"[3].However, without a supply of sufficient uninterrupted and quality electricity, this prediction will not come into reality. So, realistic prediction, planning, and implementation are essential to meet up the future requirement of electricity. The following important factors are affecting power demand.

2.5 Economic Development

In PSMP 2016, average 6% GDP growth up-to 2041 is considered. But in the financial year 2016-17 GDP growth was 7.1. In 7th 5-Year Plan it is expected that very soon GDP growth will grow up to 8%. This evidence indicates that, economic development is taking place faster than the prediction of PSMP 2016. So, it is clear that, growth of electricity demand will be more than the demand predicted in PSMP 2016.

2.6 Per Capita Income

According to PSMP 2016, per capita GDP will be US$ 1,063 in the year 2020, US$ 1,444 in the year 2025, US$ 2,357 in the year 2035 and US$ 2,970 in the year 2041 (at the price of 2005). According to the Bangladesh Bureau of Statistics (BBS), per capita income rose to $1,610 in the FY 2016-17 from $1,465 in the FY 2015-16. This rate is much higher than the rate predicted in PSMP 2016. So, it is clear that, if the per capita income increases in this pace, demand of electricity will be much more than the demand predicted in PSMP 2016.

2 https://www.nap.edu/read/900/chapter/1
3 http://www.daily-sun.com/post/206533/Bangladesh-may-be-world%E2%80%99s-23rd-largest-economy-by-2050

2.7 Industrialization

As land for agriculture is limited and there is almost no scope for generating more employment in this sector, so employment generation is greatly dependent on industrialization. There is no debate about the employment generation by industrialization is the most important way for the rapid economic development of the country. Electricity is the prime requirement for industrialization, more electricity required for rapid industrialization. In the financial year 2016-17, the contribution of Industries into GDP was 32.42%, which increases to 33.66% in the FY 2017-18[4]. According to PSMP 2016, contribution of Industries into GDP will be 37%. It is expected by the committee, that contribution of industries into GDP will be 40%; moreover size of the GDP will be much larger than that of present. So, much more electricity will be required, which should be considered during planning.

2.8 Population Growth

According to "World Population Prospects (WPP) 2015", population of Bangladesh will be 202 Million in 2050. With growth of population, demand of electricity will increase proportionately, sometimes more than that. As the purchasing power is going up and percentage of poor and ultra-poor people is going down, demand of electricity will increase in rapid pace in comparison to population growth.

2.9 Some Other Factors Affecting Power Demand

Government has a target for turning the country into a developed country by 2041. To become a developed country, per capita GNI is required to be increased to at least US$ 12,736, which is more than the income considered by PSMP 2016 team. So, the present committee considers that the demand of electricity will be more than the prediction of PSMP 2016, if the present rate of progress continues. This report based on the following factors, which are supposed to affect the demand of electricity:

- Reduction of poor and ultra-poor population
- Bringing new area into electricity coverage
- Increasing contribution of manufacturing industries into GDP
- Construction of new Economic Zones
- Setting up of heavy industries, e.g., Steel and Iron Industries
- Employment Generation and reduction of unemployment
- Increasing purchasing power of people
- Electrification of more irrigation pumps
- Urbanization of new areas and creation of satellite towns
- Vertical expansion of buildings
- Construction of new Shopping Complexes
- Introduction of Metro Rail
- Increasing numbers of Electric Vehicles

[4] *Bangladesh Bureau of Statistics (http://www.bbs.gov.bd)*

- Increasing trend of using appliances which consumes more electricity (Fridge, AC, Oven, Induction Heater etc.)

2.10 According to Opinions of Distribution Entities

- 3-5 lacs new households are coming under electricity coverage every month. For these new connections, about 100 MW of electricity is being added to total demand.
- Old connection holders are purchasing new electrical appliances, for which additional 50 MW of electricity is being added to total demand.

However, there is no detailed and accurate study, the information and data about demand growth is given by the distribution entities might be very close to accuracy. These distribution offices or units are working at grass-root level; they know the consumption pattern of the consumers. It is also known to them about the number of households are waiting for electricity connection. There are some new township/satellite town projects are taken by RAJUK and other private companies, which will create additional demand for electricity. As a result huge amount of demand will be increased in upcoming few years.

2.11 GDP Growth Forecasted Through Collected Peak Demand & PSMP2016 Demand

The elasticity has been considered 1.27 (2017-2041) for calculating the GDP growth rate in this report. PSMP 2016 has also considered the elasticity to be 1.27 (2016-2041). GDP growth rate is calculated by electricity growth rate divided by elasticity. PSMP 2016 followed the same methodology in this regard.

To be an upper middle-income country by 2031, the economy of Bangladesh will require an average real GDP growth rate of 8.4 during 2018-2031. To be a high-income country by 2041, the economy of Bangladesh will require an average real GDP growth rate of 9.0% during 2021-2041 as per draft Macroeconomic Framework for the Perspective Plan of Bangladesh (2021-2041): Growth Outlook up to 2041. GDP growth rate is low at Macro Projections BAU scenario compared to Macro Projections Perspective Plan scenario. The comparison in this regard is shown in the following Table 7.

Table 7: Electricity & GDP Growth Rate through Collected Peak Demand case and PSMP2016 Peak Demand in high case (without EE&C measures)

Year	Electricity and GDP growth rate (Demand collected from Utilities) in high case		Electricity and GDP growth rate GDP growth rate (PSMP 2016) in high case		Macroeconomic Framework for the Perspective Plan of Bangladesh (2021-2041): Growth Outlook up to 2041	
					Macro Projections Perspective Plan scenario	Macro Projections BAU scenario
	Electricity G.R (%)	GDP G.R (%)	Electricity G.R (%)	GDP G.R (%)	GDP G.R (%)	GDP G.R (%)
2017						
2020	13	10	10	8.0	8	7.3
2021	12	9	10	7.8	8.1	7.3
2025	10	8	9	7.1	8.5	7.3
2026	9	7	9	6.9	8.6	7.3
2030	8	6	7	6.2	8.9	7.2
2031	8	6	7	6.1	9.0	7.1

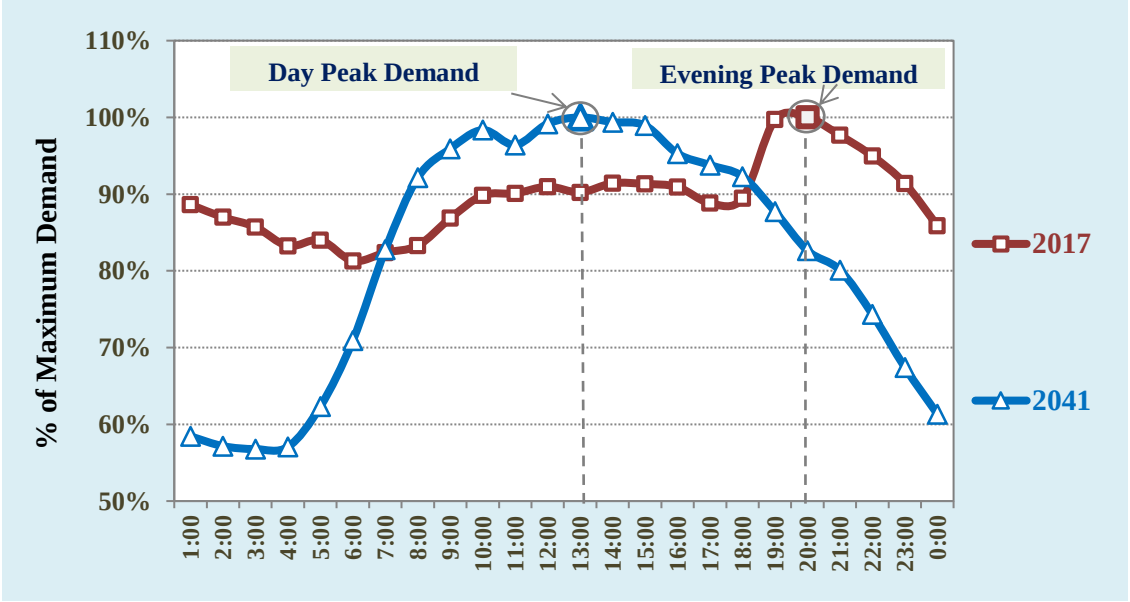
Year	Electricity and GDP growth rate (Demand collected from Utilities) in high case		Electricity and GDP growth rate GDP growth rate (PSMP 2016) in high case		Macroeconomic Framework for the Perspective Plan of Bangladesh (2021-2041): Growth Outlook up to 2041	
					Macro Projections Perspective Plan scenario	Macro Projections BAU scenario
	Electricity G.R (%)	GDP G.R (%)	Electricity G.R (%)	GDP G.R (%)	GDP G.R (%)	GDP G.R (%)
2035	7	5	6	5.4	9.4	6.7
2036	6	5	6	5.2	9.5	6.6
2040	6	4	6	4.9	9.8	5.8
2041	5	4	5	4.9	9.9	5.5

Attachment 1 **Zone-wise forecasted demand and growth rate of distribution utilities from 2017 to 2041 has been shown in Attachment 1**

2.12 Estimating Daily Load Curve

The daily load curves are estimated during the 2017-2041 period. It is seen from Figure 7 that, in 2017 the maximum demand occurs in the evening time. However, in 2017-2041, maximum demand will be shifted gradually and the load curve would be like the load curve of developed countries. It has also been observed that, the maximum demand in the developed countries is found in the daytime.

Figure 7: Estimated Load Curves During the Period 2017-2041



According to the PGCB data, power demand reaches the highest level in April. Therefore, April is the highest and December is the lowest consumption month of power. The Max/Average/Min data will be standardized so that the Max value of demand in April will be 100%. There is assumed to be a proportionate increase or decrease in power demand on a time-of-day basis for the preparation of the daily load curve (2017-2041). The estimated monthly load curves for some specific years during the period 2017-2041 have been shown in Figure 8 and Figure 9.

Figure 8: Estimated Load Curves During the Period 2017-2041

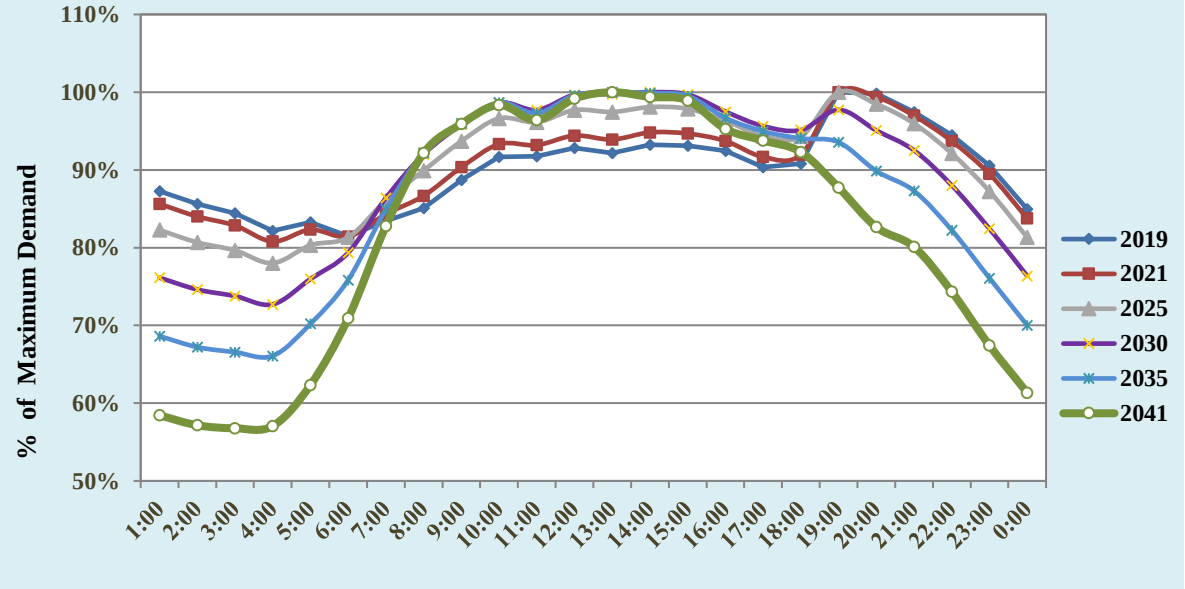
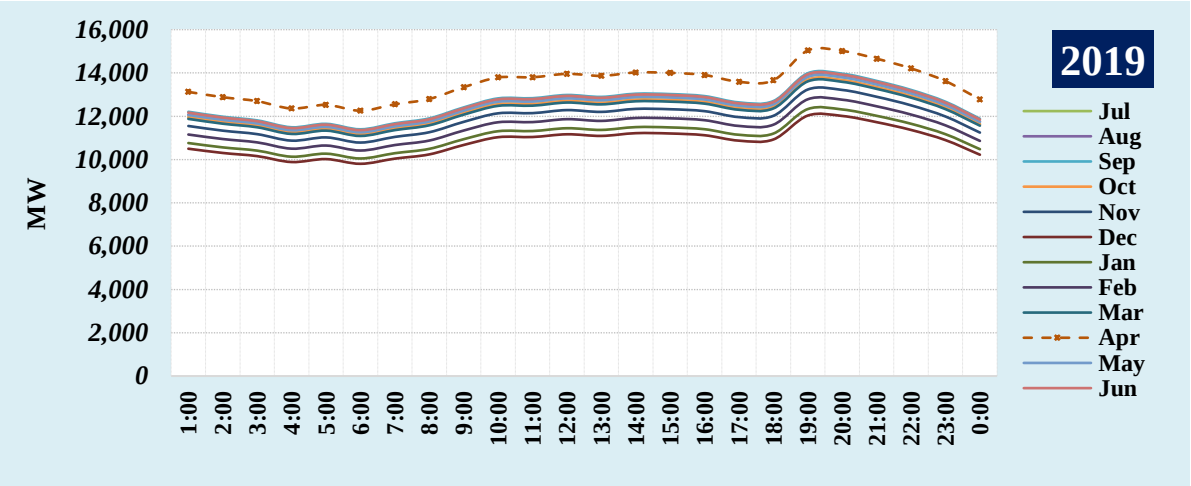
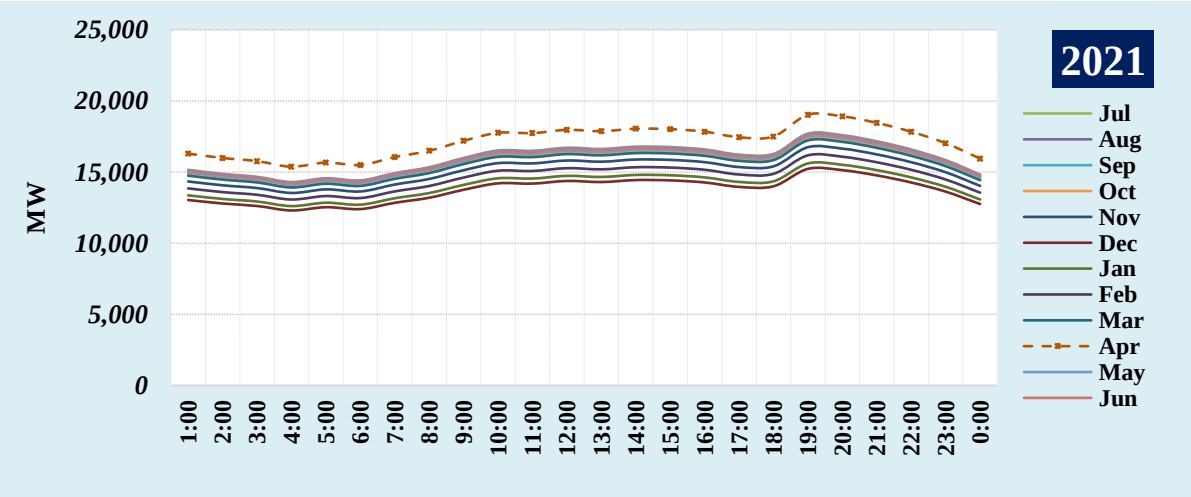
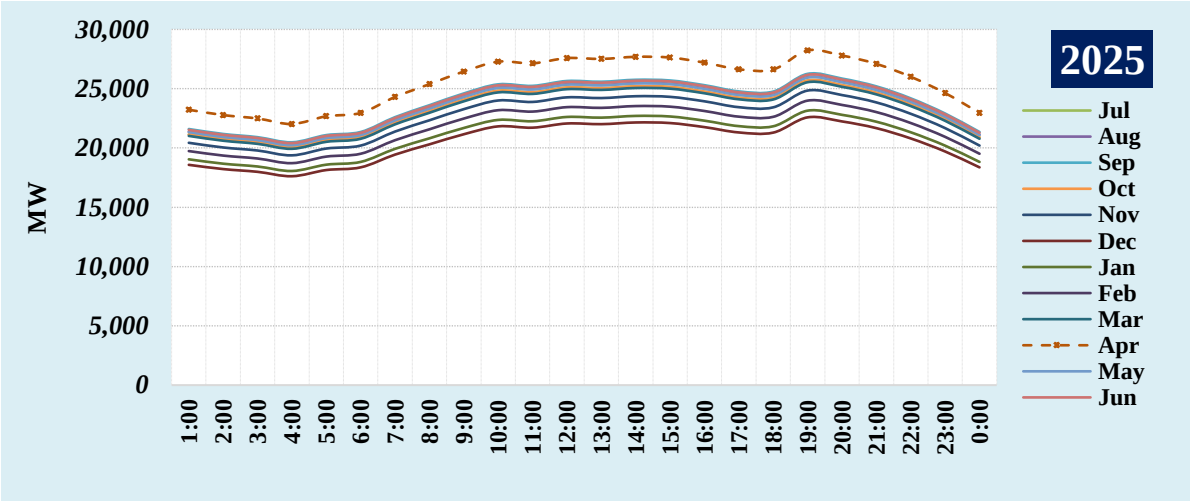


Figure 9: Month-wise Estimated Load Curves for 2019, 2021, 2025, 2030, 2035 and 2041






2025
MW
30,000
25,000
20,000
15,000
10,000
5,000
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
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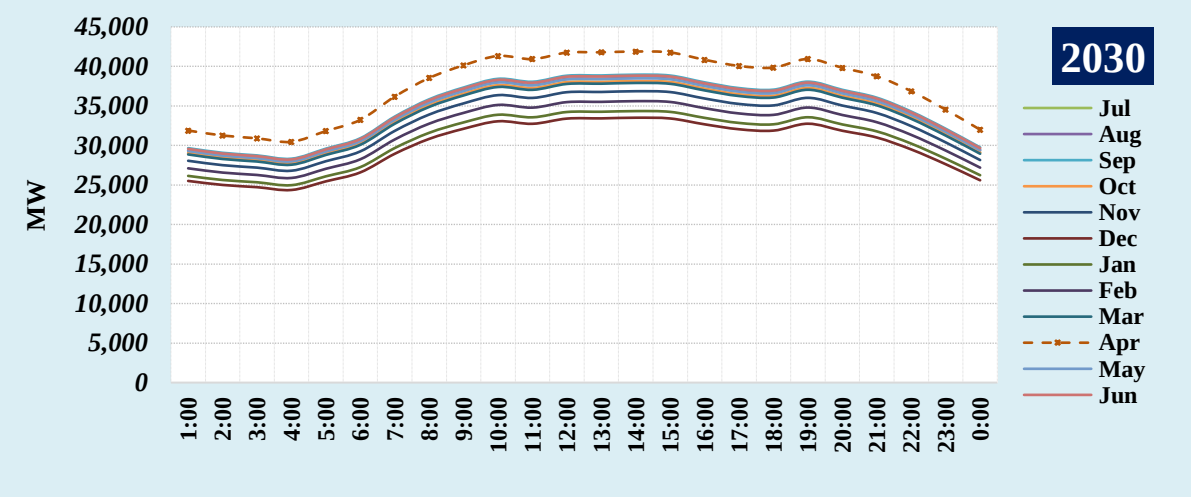
2030
MW
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
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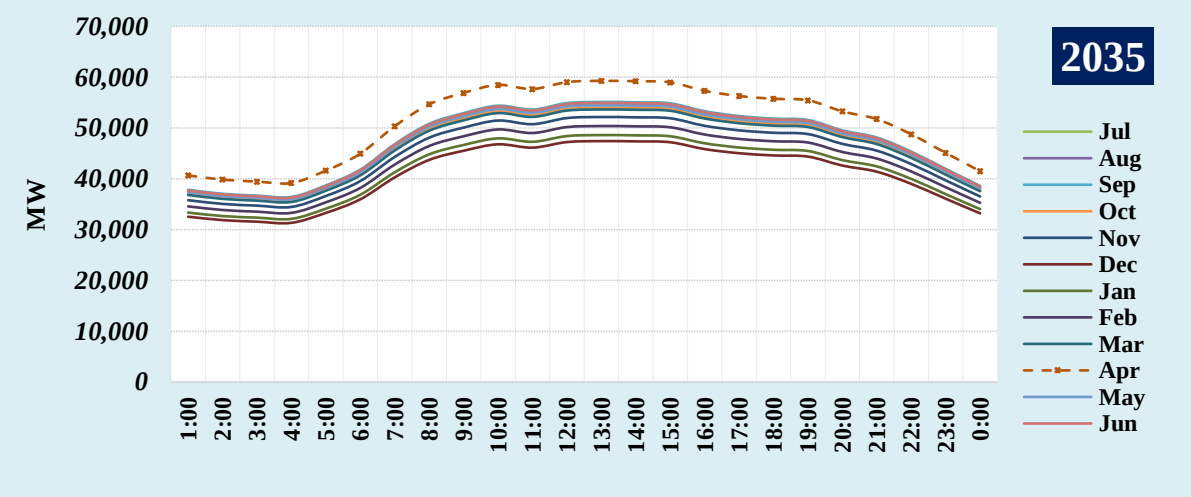
2035
MW
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
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16:00
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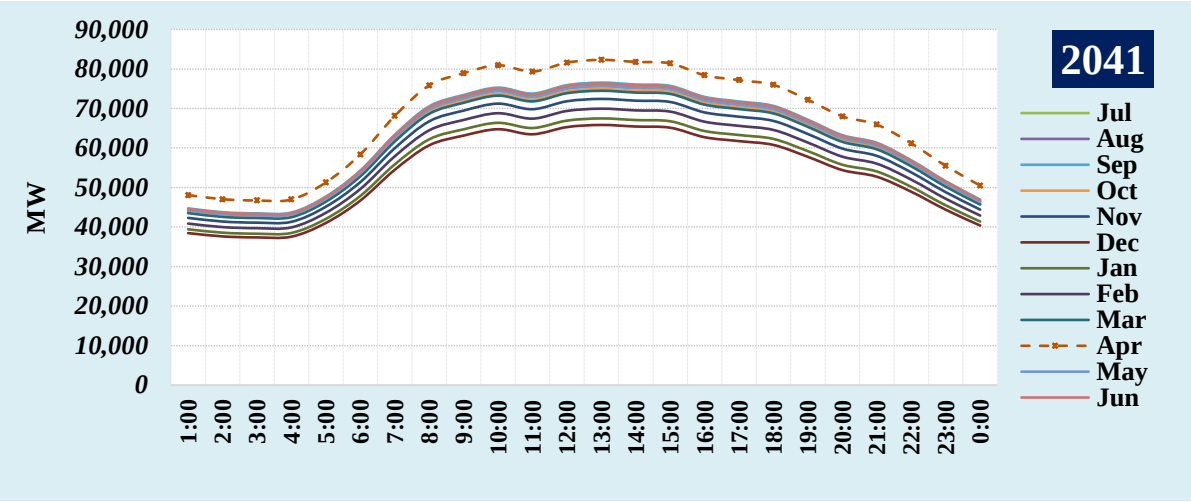


2.13 Forecasted Energy Generation Demand &Load factor of High, Base and Low Case

Year-wise energy generation demand and load factor of high, base and low case have been forecasted based on calculated demand (without EE&C measures) which are shown in Table 8. It has also been observed that, energy generation demand and load factor will gradually increase during the period 2018-2041, which is shown in Figure 10.

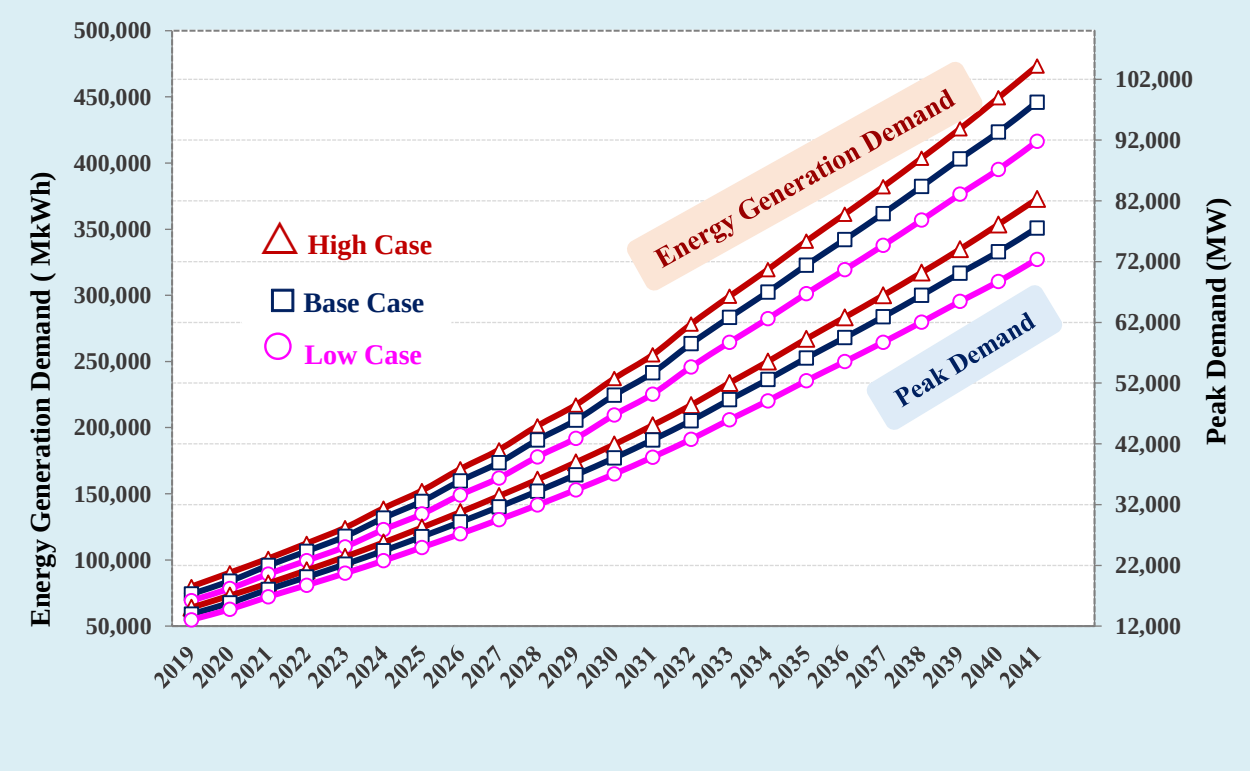
Table 8: Forecasted Energy Generation Demand, Peak Demand and Load Factor

	High Case			Base Case			Low Case		
Year	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)
2019	15,041	60.63	79,883	13,975	60.63	74,222	13,044	60.63	69,277
2020	17,015	60.63	90,367	15,809	60.63	83,962	14,757	60.63	78,375
2021	19,034	60.63	101,090	18,023	60.63	95,721	16,823	60.63	89,348
2022	21,193	60.63	112,557	20,067	60.63	1,06,577	18,731	60.63	99,481
2023	23,417	60.63	124,369	22,173	60.63	1,17,762	20,697	60.63	109,923
2024	25,762	61.63	139,087	24,393	61.63	1,31,696	22,769	61.63	122,928
2025	28,231	61.63	152,417	26,731	61.63	1,44,319	24,952	61.63	134,714
2026	30,765	62.63	168,781	29,130	61.63	1,59,811	27,191	62.63	149,174
2027	33,398	62.63	183,226	31,623	62.63	1,73,488	29,519	62.63	161,946
2028	36,106	63.64	201,276	34,188	63.64	1,90,584	31,912	63.64	177,896
2029	38,946	63.64	217,108	36,876	63.64	2,05,568	34,422	63.64	191,888
2030	41,890	64.62	237,113	39,663	64.62	2,24,507	37,024	64.62	209,570
2031	45,045	64.62	254,972	42,651	64.62	2,41,421	39,812	64.62	225,351
2032	48,367	65.66	278,216	45,797	65.66	2,63,433	42,748	65.66	245,894

Year	High Case			Base Case			Low Case		
	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)	Peak Demand (MW)	Load Factor (%)	Energy Generation Demand (MkWh)
2033	52,018	65.66	299,217	49,254	65.66	2,83,318	45,976	65.66	264,463
2034	55,542	65.66	319,488	52,590	65.66	3,02,507	49,090	65.66	282,375
2035	59,275	65.66	340,961	56,125	65.66	3,22,841	52,389	65.66	301,351
2036	62,818	65.66	361,341	59,480	65.66	3,42,140	55,521	65.66	319,367
2037	66,436	65.66	382,152	62,905	65.66	3,61,841	58,718	65.66	337,757
2038	70,185	65.66	403,717	66,456	65.66	3,82,267	62,032	65.66	356,820
2039	74,037	65.66	425,875	70,102	65.66	4,03,240	65,436	65.66	376,400
2040	78,118	65.66	449,349	73,607	65.66	4,23,401	68,708	65.66	395,221
2041	82,292	65.66	473,359	77,540	65.66	4,46,025	72,379	65.66	416,338

Source: Revisiting Study Team

Figure 10: Forecasted Energy Generation & Peak Demand [High, Base and Low Case]



2.14 Forecasted Energy Consumption Demand of High, Base and Low Case

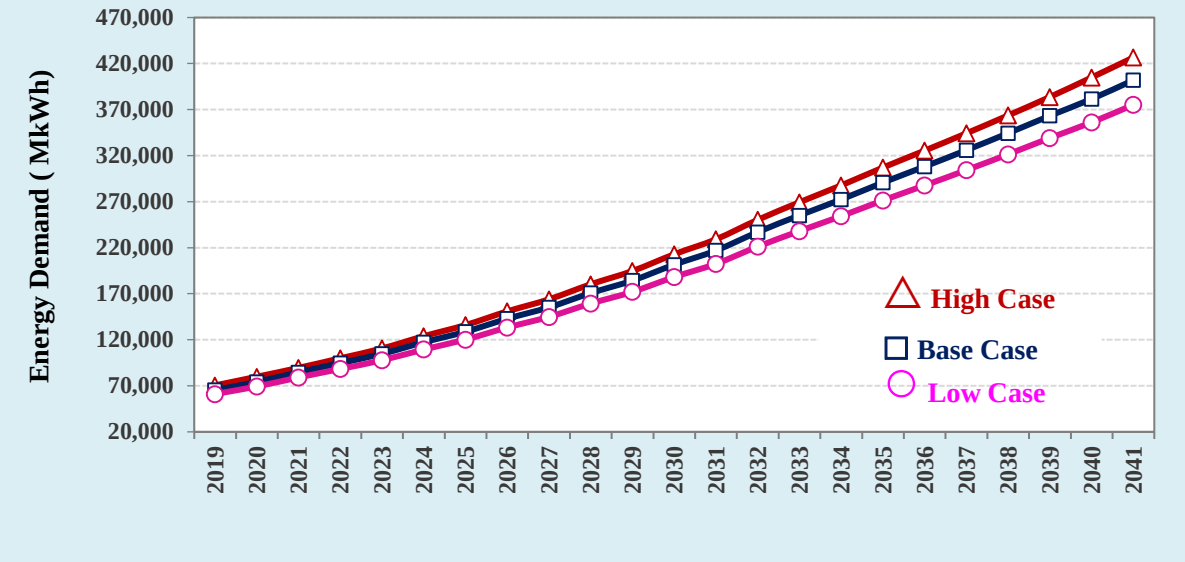
Year-wise energy consumption demand of high, base and low case have been forecasted based on calculated energy generation demand (without EE&C measures) which are shown in Table 9. It has been observed that energy consumption demand of those cases will gradually increase during the period 2019-2041, which is shown in Figure 11. The transmission and distribution losses will gradually decrease during the period 2019-2041.

Table 9: Forecasted Energy Consumption Demand of High, Base & Low Case

Year	High Case			Base Case			Low Case		
	Energy Consumption Demand (MkWh)	G.R (%)	T and D Loss (%)	Energy Consumption Demand (MkWh)	G.R (%)	T and D Loss (%)	Energy Consumption Demand (MkWh)	G.R (%)	T and D Loss (%)
2019	70,497	13	12	65,501	13	12	61,137	13	12
2020	79,885	13	12	74,223	13	12	69,284	13	12
2021	89,515	12	11	84,761	14	11	79,118	14	11
2022	99,951	11	11	94,640	11	11	88,339	11	11
2023	1,10,626	10	11	1,04,749	10	11	97,777	10	11
2024	1,23,927	10	11	1,17,341	10	11	109,529	10	11
2025	1,36,032	10	11	1,28,805	10	11	120,232	10	11
2026	1,50,890	9	11	1,42,871	9	11	133,362	9	11
2027	1,63,987	9	11	1,55,272	9	11	144,942	9	11
2028	1,80,343	8	10	1,70,763	8	10	159,395	8	10
2029	1,94,746	8	10	1,84,395	8	10	172,124	8	10
2030	2,12,928	8	10	2,01,608	8	10	188,194	8	10
2031	2,29,194	8	10	2,17,013	8	10	202,568	8	10
2032	2,50,311	7	10	2,37,010	7	10	221,231	7	10
2033	2,69,415	7	10	2,55,100	7	10	238,122	7	10
2034	2,87,731	7	10	2,72,438	7	10	254,307	7	10
2035	3,07,103	7	10	2,90,783	7	10	271,427	7	10
2036	3,25,496	6	10	3,08,200	6	10	287,686	6	10
2037	3,44,281	6	10	3,25,983	6	10	304,285	6	10
2038	3,63,749	6	10	3,44,423	6	10	321,495	6	10
2039	3,83,756	5	10	3,63,359	5	10	339,174	5	10
2040	4,04,953	5	10	3,81,569	5	10	356,173	5	10
2041	4,26,638	5	10	4,02,002	5	10	375,245	5	10

Source: Revisiting Study Team

Figure 11: Forecasted Energy Consumption Demand of High, Base & Low Case



2.15 Forecasted Population & Per Capita Generation

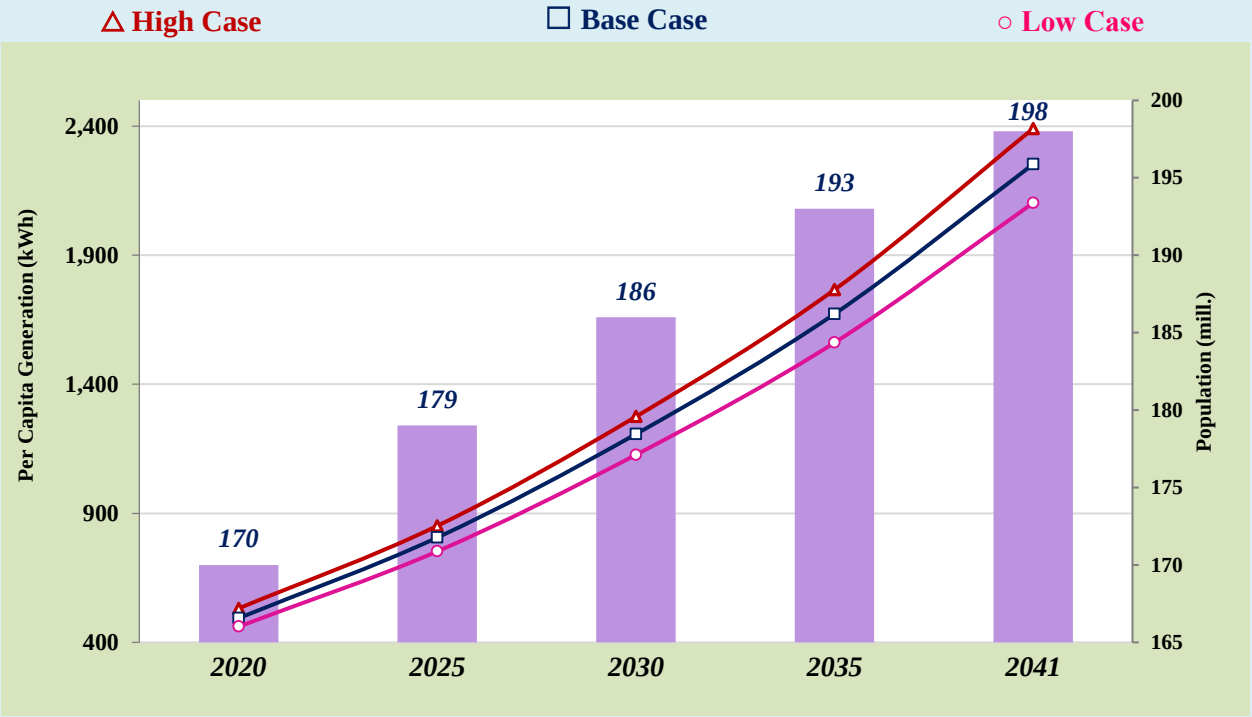
Year wise population growth rate was incorporated in PSMP 2016. Year wise per capita generation and consumption have been forecasted based on PSMP 2016 population growth rate and calculated high, base and low case energy generation and consumption demand which are shown in Table 10 and Figure 12.

Table 10: Per Capita Generation and Consumption Projection up to 2041 [High, Base & Low case]

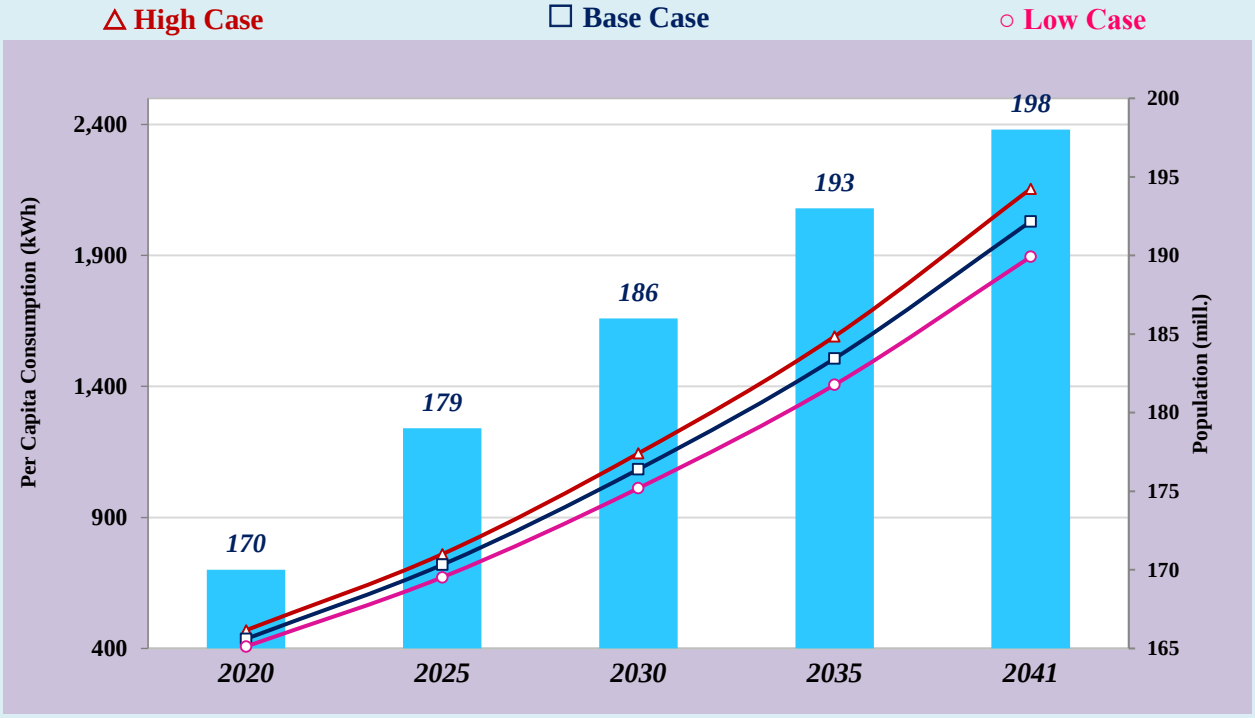
	Year	2020	2025	2030	2035	2041
	Population (Million)	170	179	186	193	198
	Average growth rate (p.a.)	1.1	1.0	0.8	0.6	0.5
High Case	Energy Generation Demand (MkWh)	90,367	152,417	237,113	340,961	473,359
	Per Capita Generation (kWh)	532	851	1,275	1,767	2,391
	Energy Consumption Demand (MkWh)	79,885	136,032	212,928	307,103	426,638
	Per Capita Consumption (kWh)	470	760	1,145	1,591	2,155
Base Case	Energy Generation Demand (MkWh)	83,962	144,319	224,507	322,841	446,025
	Per Capita Generation (kWh)	494	806	1,207	1,673	2,253
	Energy Consumption Demand (MkWh)	74,223	128,805	201,608	290,783	402,002
	Per Capita Consumption (kWh)	437	720	1,084	1,507	2,030
Low Case	Energy Generation Demand (MkWh)	78,375	134,714	209,570	301,351	416,338
	Per Capita Generation (kWh)	461	753	1,127	1,561	2,103
	Energy Consumption Demand (MkWh)	69,284	120,232	188,194	271,427	375,245
	Per Capita Consumption (kWh)	408	672	1,012	1,406	1,895

Source: Revisiting Study Team

Figure 12: (a) Per Capita Generation Projection up to 2041



(b) Per Capita Consumption Projection up to 2041



Source: Revisiting Study Team

Chapter III: Power Generation Planning for High Case Studies

3.1 New Generation Addition Plan to meet high case demand without EE&C measures

3.1.1 Utility-wise New Generation Capacity Addition (Committed Power Plants)

Year-wise new generation capacity addition is forecasted as per data collected from generation utilities which are presented in Table 11. It is found that, total new generation capacity addition from committed power plants from 2017 to 2041 will be 23,909 MW. Under this committed capacity of the plants, some of the projects are now under construction stage and some of the projects are now in the various stages of procurement process. Contract of these projects which are under procurement process will be signed in phase.

Table 11: Year-wise New Generation Capacity Addition (Committed Power Plants) from 2017 to 2041

Utility / Year	BPDB	APSCL	EGCB	NWPGCL	RPCL	BR Powergen	BIFPCL	CPGCBL	NPCBL	Private	Import	Total
2017	672	360		410						325	60	**1,827**
2018	640	100	435	540	100	100				2,276	500	**4,691**
2019	1,444			1,214		150				2,116		**4,924**
2020	372									2,445		**2,817**
2021	248	400					1,214			307		**2,169**
2022	388									2,653		**3,041**
2023								1,104				**1,104**
2024	1,104											**1,104**
2025									1,116			**1,116**
2026									1,116			**1,116**
2030												**0**
2035												**0**
2041												**0**
Total	**4,868**	**860**	**435**	**2,164**	**100**	**250**	**1,214**	**1,104**	**2,232**	**10,122**	**560**	**23,909**

Source: Revisiting Study Team

3.1.2 Fuel-wise New Capacity Addition (Committed Power Plants)

Fuel-wise new generation capacity addition from 2017 to 2041 is forecasted as per the data collected from generation utilities which is presented in Table 12. It is found that, total new generation capacity addition from committed power plants from 2017 to 2041 will be 23,909 MW. Out of this capacity, nuclear-based generation capacity will be 2,232 MW and Gas/LNG based generation capacity will be 7,077 MW.

Table 12: Fuel-wise New Generation Capacity Addition (Committed Power Plants) from 2017 to 2041

Fuel / Year	Gas/LNG	Liquid Fuel	Coal	Import	Hydro	Nuclear	Total (MW)
2017	1,505	262	0	60	0	0	**1,827**
2018	1,163	2,776	252	500	0	0	**4,691**
2019	2,228	1,482	1,214	0	0	0	**4,924**
2020	1,145	108	1,224	340	0	0	**2,817**
2021	648	0	1,521	0	0	0	**2,169**
2022	388	0	1,157	1,496	0	0	**3,041**

Fuel / Year	Gas/LNG	Liquid Fuel	Coal	Import	Hydro	Nuclear	Total (MW)
2023	0	0	1,104	0	0	0	**1,104**
2024	0	0	1,104	0	0	0	**1,104**
2025	0	0	0	0	0	1,116	**1,116**
2026	0	0	0	0	0	1,116	**1,116**
2030	0	0	0	0	0	0	**0**
2035	0	0	0	0	0	0	**0**
2041	0	0	0	0	0	0	**0**
Total	**7,077**	**4,628**	**7,576**	**2,396**	**0**	**2,232**	**23,909**

3.1.3 New Generation Capacity Addition (Candidate Power Plants)

3.1.3.1 Year-wise New Generation Addition Plan

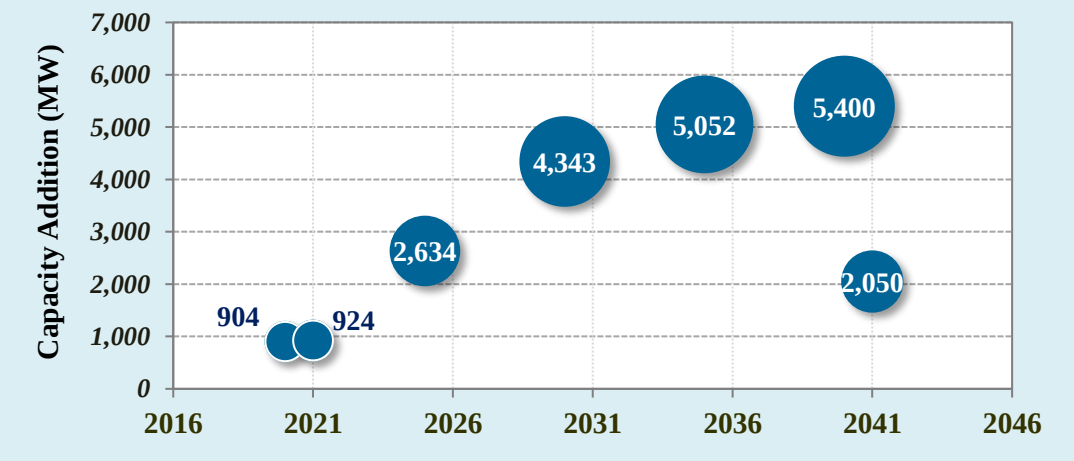
To meet up future demand and maintain optimum reserve margin, another 74,524 MW generation capacity addition will be required from candidate power plants starting from 2020. Under this candidate capacity of the plants, the projects are now in the various stages of planning process, not in the procurement or construction stage. These projects will go for procurement process in phases. Year-wise new generation capacity addition plan of candidate power plants from 2017 to 2041 is presented in the Table 13 and Figure 13.

Table 13: Year-wise New Generation Capacity Addition (Candidate Power Plants) from 2017 to 2041

Year	Capacity addition (MW)	Year	Capacity addition (MW)	Year	Capacity addition (MW)
2017	0	**2026**	4,018	**2035**	5,052
2018	0	**2027**	4,018	**2036**	5,220
2019	0	**2028**	4,438	**2037**	2,866
2020	904	**2029**	3,164	**2038**	5,086
2021	924	**2030**	4,343	**2039**	3,550
2022	2,840	**2031**	3,408	**2040**	5,400
2023	2,999	**2032**	2,120	**2041**	2,050
2024	4,028	**2033**	2,816	**Total**	**74,524**
2025	2,634	**2034**	2,646		

Source: Revisiting Study Team

Figure 13: Year-wise New Generation Capacity Addition (Candidate Power Plants) from 2017 to 2041



3.1.3.2 Fuel-wise New Capacity Addition (Candidate Power Plants)

To meet up future demand and maintain reserve margin, generation capacity addition of 74,524 MW will be required from candidate power plants starting from 2020. Out of this capacity, 34,124 MW will be from Gas/LNG based, 2,121 MW from liquid fuel based, 22,590 MW from coal based, 100 MW from hydro based and 4,464 MW will be from nuclear based. Fuel-wise capacity plan is shown in Table 14.

Table 14: Fuel-wise New Capacity Addition (Candidate Power Plants) from 2017 to 2041

Fuel / Year	Gas/LNG	Liquid Fuel	Coal	Import	Hydro	Nuclear	Total (MW)
2017	0	0	0	0	0	0	**0**
2018	0	0	0	0	0	0	**0**
2019	0	0	0	0	0	0	**0**
2020	583	321	0	0	0	0	**904**
2021	574	0	350	0	0	0	**924**
2022	2,840	0	0	0	0	0	**2,840**
2023	1,135	0	1,864	0	0	0	**2,999**
2024	1,600	0	2,428	0	0	0	**4,028**
2025	1,230	300	1,104	0	0	0	**2,634**
2026	800	0	2,718	500	0	0	**4,018**
2027	810	0	2,208	1,000	0	0	**4,018**
2028	1,730	0	2,208	500	0	0	**4,438**
2029	1,660	0	1,504	0	0	0	**3,164**
2030	800	0	2,318	1,125	100	0	**4,343**
2031	980	0	2,428	0	0	0	**3,408**
2032	0	0	1,620	500	0	0	**2,120**
2033	1,000	200	0	500	0	1,116	**2,816**
2034	930	100	0	500	0	1,116	**2,646**
2035	3,452	100	0	1,500	0	0	**5,052**
2036	3,500	300	920	500	0	0	**5,220**
2037	250	0	0	1,500	0	1,116	**2,866**
2038	2,050	0	920	1,000	0	1,116	**5,086**
2039	2,550	0	0	1,000	0	0	**3,550**
2040	4,100	300	0	1,000	0	0	**5,400**
2041	1,550	500	0	0	0	0	**2,050**
Total	**34,124**	**2,121**	**22,590**	**11,125**	**100**	**4,464**	**74,524**

Attachment 2 **List of Committed and Candidate Power Plants (2017-2041) has been shown in Attachment 2 for High case studies.**

Chapter IV: Power Generation Planning for Low Case Studies

4.1 New Generation Addition Plan to low case demand without EE&C measures

4.1.1 Utility-wise New Generation Capacity Addition (Committed Power Plants)

Year-wise new generation capacity addition is forecasted as per updated data collected from generation utilities which is presented in Table 15. It is found that, total new generation capacity addition from committed power plants from 2017 to 2041 will be 30,155 MW. Under this committed capacity of the plants, some of the projects are now under construction stage and some of the projects are now in the various stages of procurement process. Contract of these projects which are under procurement process will be signed in phase.

Table 15: Year-wise New Generation Capacity Addition (Committed Power Plants) from 2017 to 2041 [Low Case]

Utility / Year	BPDB	APSCL	EGCB	NWPGCL	RPCL	BR Powergen	BIFPCL	CPGCBL	NPCBL	Private	Import	Total
2017	318	360	0	410	0	0	0	0	0	271	60	**1,419**
2018	606	0	335	540	100	0	0	0	0	2,171	500	**4,252**
2019	1,506	0	0	0	0	150	0	0	0	2,594	0	**4,250**
2020	859	0	0	1,214	0	150	0	0	0	220	340	**2,783**
2021	0	400	0	0	360	0	1,214	0	0	1,901	0	**3,875**
2022	388	0	0	800	0	0	0	0	0	0	1,496	**2,684**
2023	0	0	0	1,214	0	0	0	0	0	1,547	0	**2,761**
2024	0	0	0	0	1,214	0	0	1,200	0	1,224	0	**3,638**
2025	0	0	0	0	0	0	0	0	1,116	0	0	**1,116**
2026	1,104	0	0	0	0	0	0	0	1,116	0	0	**2,220**
2027	0	0	0	0	0	0	0	0	0	0	0	**0**
2028	0	0	0	0	0	0	0	0	0	0	0	**0**
2029	0	0	0	0	0	0	0	0	0	0	0	**0**
2030	0	0	0	0	0	0	0	0	0	522	0	**522**
2031	0	0	0	0	0	0	0	0	0	635	0	**635**
2032-2041	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**4,781**	**760**	**335**	**4,178**	**1,674**	**300**	**1,214**	**1,200**	**2,232**	**11,085**	**2,396**	**30,155**

Source: Revisiting Study Team

4.2 Fuel-wise New Capacity Addition (Committed Power Plants)

Fuel-wise new generation capacity addition from 2017 to 2041 is forecasted as per the updated data collected from generation utilities which is presented in Table 16. It is found that, total new generation capacity addition from committed power plants from 2017 to 2041 will be 30,155 MW. Out of this capacity, nuclear-based generation capacity will be 2,232 MW and Gas/LNG based generation capacity will be 9,266 MW.

Table 16: Fuel-wise New Generation Capacity Addition (Committed Power Plants) from 2017 to 2041 [Low Case]

Fuel / Year	Gas/LNG	Liquid Fuel	Coal	Import	Hydro	Nuclear	Total (MW)
2017	1,151	208	0	60	0	0	**1,419**
2018	1,278	2,222	252	500	0	0	**4,252**
2019	2,070	2,180	0	0	0	0	**4,250**
2020	918	311	1,214	340	0	0	**2,783**
2021	2,661	0	1,214	0	0	0	**3,875**
2022	1,188	0	0	1,496	0	0	**2,684**
2023	0	0	2,761	0	0	0	**2,761**
2024	0	0	3,638	0	0	0	**3,638**
2025	0	0	0	0	0	1,116	**1,116**
2026	0	0	1,104	0	0	1,116	**2,220**
2027	0	0	0	0	0	0	**0**
2028	0	0	0	0	0	0	**0**
2029	0	0	0	0	0	0	**0**
2030	0	0	522	0	0	0	**522**
2031	0	0	635	0	0	0	**635**
2032-2041	0	0	0	0	0	0	**0**
Total	**9,266**	**4,921**	**11,340**	**2,396**	**0**	**2,232**	**30,155**

Source: Revisiting Study Team

4.2.1 New Generation Capacity Addition (Candidate Power Plants)

4.2.1.1 Year-wise New Generation Addition Plan

To meet up future demand and maintain optimum reserve margin, another 53,755 MW generation capacity addition will be required from candidate power plants starting from 2022. Under this candidate capacity of the plants, the projects are now in the various stages of planning process, not in the procurement or construction stage. These projects will go for procurement process in phases. Year-wise new generation capacity addition plan of candidate power plants from 2017 to 2041 is presented in Table 17.

Table 17: Year-wise New Generation Capacity Addition (Candidate Power Plants) [Low Case]

Year	Capacity addition (MW)	Year	Capacity addition (MW)	Year	Capacity addition (MW)
2017-2021	0	**2029**	1,504	**2037**	2,866
2022	2,224	**2030**	400	**2038**	3,586
2023	2,187	**2031**	1,104	**2039**	2,800
2024	1,164	**2032**	3,814	**2040**	3,300
2025	1,814	**2033**	4,850	**2041**	2,850
2026	4,382	**2034**	3,244	**Total**	**53,755**
2027	3,753	**2035**	2,875		
2028	2,668	**2036**	2,370		

Source: Revisiting Study Team

4.2.1.2 Fuel-wise New Capacity Addition (Candidate Power Plants)

To meet up future demand and maintain reserve margin, generation capacity addition of 53,755 MW will be required from candidate power plants starting from 2022. Out of this capacity, 25,751 MW will be from Gas/LNG based, 1,300 MW from liquid fuel based, 14,256 MW from coal based, 100 MW from hydro based and 3,348 MW will be from nuclear based. The fuel-wise capacity plan is shown in Table 18.

Table 18: Fuel-wise New Capacity Addition (Candidate Power Plants) from 2017 to 2041 [Low Case]

Fuel / Year	Gas/LNG	Liquid Fuel	Coal	Import	Hydro	Nuclear	Total (MW)
2017-2021	0	0	0	0	0	0	**0**
2022	2,224	0	0	0	0	0	**2,224**
2023	2,187	0	0	0	0	0	**2,187**
2024	1,164	0	0	0	0	0	**1,164**
2025	1,164	0	650	0	0	0	**1,814**
2026	1,564	0	2,318	500	0	0	**4,382**
2027	2,249	0	1,504	0	0	0	**3,753**
2028	1,564	0	1,104	0	0	0	**2,668**
2029	0	0	1,504	0	0	0	**1,504**
2030	400	0	0	0	0	0	**400**
2031	0	0	1,104	0	0	0	**1,104**
2032	900	0	1,914	1,000	0	0	**3,814**
2033	1,530	0	1,104	1,000	100	1,116	**4,850**
2034	1,330	200	1,214	500	0	0	**3,244**
2035	1,175	200	0	1,500	0	0	**2,875**
2036	650	300	920	500	0	0	**2,370**
2037	250	0	0	1,500	0	1,116	**2,866**
2038	1,050	0	920	500	0	1,116	**3,586**
2039	1,800	0	0	1,000	0	0	**2,800**
2040	2,500	300	0	500	0	0	**3,300**
2041	2,050	300	0	500	0	0	**2,850**
Total	**25,751**	**1,300**	**14,256**	**9,000**	**100**	**3,348**	**53,755**

Source: Revisiting Study Team

Attachment 3 **List of Committed and Candidate Power Plants (2017-2041) has been shown in Attachment 3 for Low case studies.**

Chapter V: Existing Generation Capacity for High & Low Case Demand

5.1 Net Generation Capacity of Existing Power Plants (2016 to 2041)

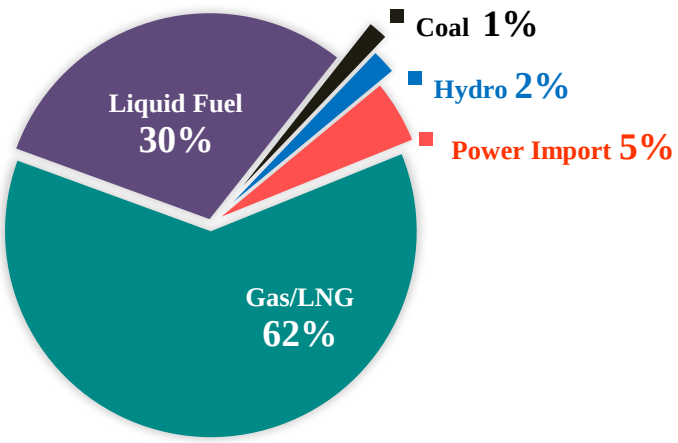
The total generation capacity from existing power plants was 12,282 MW in 2016. Fuel-wise net generation capacity is presented in Table 19 and Figure 14.

Table 19: Fuel-wise Net Generation Capacity of Existing Power Plants (2016)

Fuel	Net Generation Capacity (MW)
Gas/LNG	7,576
Liquid Fuel	3,692
Coal	184
Total	**11,452**
Hydro	230
Power Import	600
Grand Total	**12,282**

Source: Revisiting Study Team

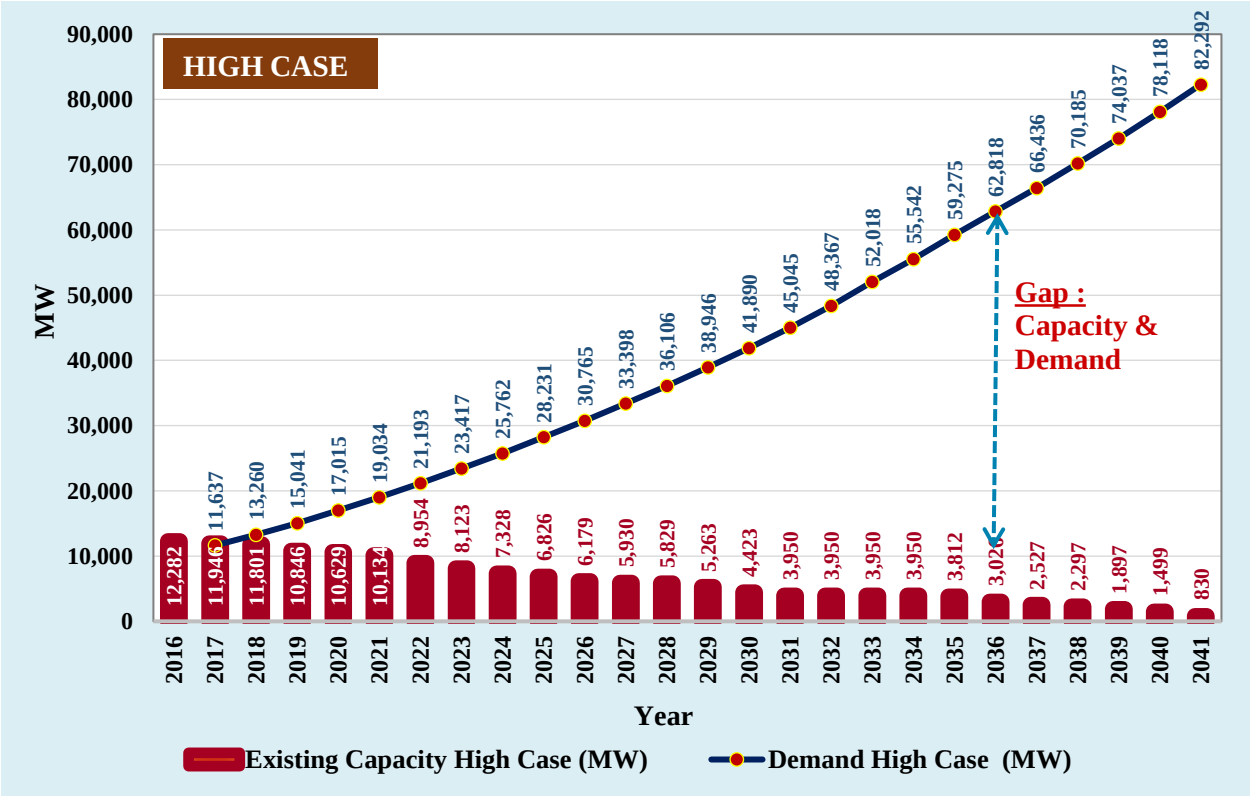
Figure 14: Fuel-wise Net Generation Capacity of Existing Power Plants (2016)



5.2 Existing Generation Capacity and Forecasted High case Demand

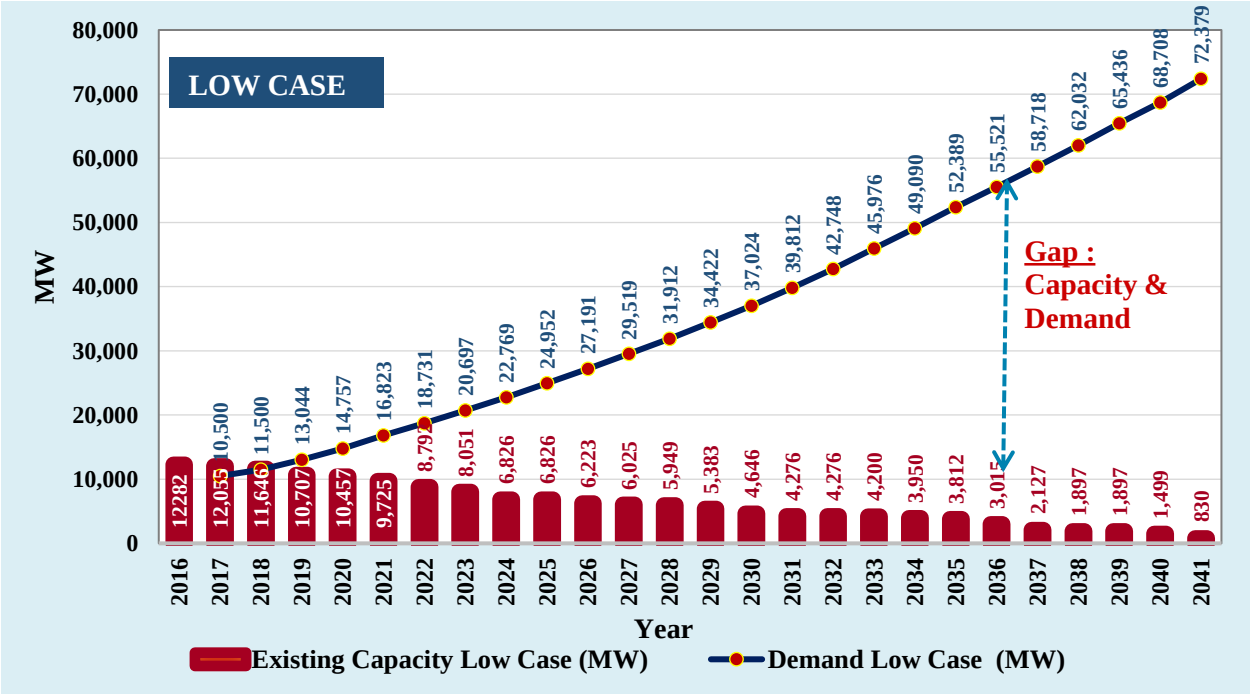
It appears that, generation capacity from existing power plants will decrease gradually and consequently widens the gap between generation capacity and demand. So, to meet up future demand and maintain sufficient reserve margin, new generation capacity addition will be required from committed and candidate power plants. Due to regular retirement of these power plants, this capacity will be decreased gradually and will stand at, only 830 MW in 2041. Existing generation capacity and forecasted high and low case demand (without EE&C) up to 2041 is shown in Figure 15 and Figure 16.

Figure 15 : Comparison between Existing Generation Capacity and High case Demand



Source: Revisiting Study Team

Figure 16: Comparison between Existing Generation Capacity and Low case Demand



Source: Revisiting Study Team

5.3 What should be the Reserve Margin?

Reserve margin and reserve capacity of a power generation system is a measure of available capacity over and above the capacity needed to meet normal peak demand levels. Reserve margin is calculated by the formula:

$$Reserve\ Margin = \frac{(Capacity\text{-}Demand)}{Demand};$$

Where, 'Capacity' is the expected maximum available supply and 'Demand' is expected peak demand.

Most of the countries usually maintain reserve margin 10-20% of maximum demand as insurance against breakdowns in part of the system or sudden increases in energy demand. Huge financial involvement requires for maintaining reserve margin in order to pay capacity and other fixed charges. It is true that for make the power supply smooth and healthy certain percentage of reserve margin is essential, but unplanned and aggressive increase in generation could make reserve margin more than optimum limit resulted into extra pressure in economy of the country. So, it is recommended for having a thorough study to ascertain which level of reserve margin is actually require for continuing uninterruptible and reliable power supply to the customers with minimum pressure on country's economy.

It must be kept in the mind that there should be at least 50% higher transmission facilities than total generation capacity with sufficient redundancy. Otherwise, the generation capacity as well as reserve margin will have of no use.

Chapter VI: Integrated Power Development Plan

6.1 Strategy for Preparation of Integrated Development Plan

In the PSMP 2016, it has been recommended to formulate an integrated power development plan and update this plan in a regular interval basis. Based on the recommendation and as per directive of Power Division, an integrated power development plan is prepared based on total net generation capacity, retirement; reserve margin and forecasted high and low case demand (without EE&C measures). Generation capacity from existing power plants will decrease gradually due to regular retirement of the power plants. So, to meet up future demand and keep sufficient reserve margin, new generation capacity addition is required from committed and candidate power plants.

Power sector utilities employ a simple strategy of maintaining reserve margin for ensuring system reliability, that means, always make more power available than requirement. But it is difficult to forecast future electricity demand accurately, moreover adding new generating capacity can take several years, so, adequate reserve margin may give comfort to the authority. The power sector regularly monitors the supply situation using reserve margin. National estimates of reserve margins are compared to pre-determined target levels to assess adequate power supply. But more reserve margin requires huge amount of investment for not only for constructing power plants, but also for paying capacity and other applicable charges. So, reserve margin should be determined through meticulous demand forecast and financial analysis. In the opinion of this committee, Reserve margin of power generation capacity should be more or less 20-25% higher than actual peak demand.

Loss of Load Expectation (LOLE) is a probabilistic measure that indicates the intimidation at which the generation capacity fails to meet the required power demand and its assessment involves specific parameters such as the plant generation capacity and outage rate of each generating unit.

6.2 Power Development Plan to meet high case demand (without EE&C measures)

Some feature of this plan is summarized below:

- The total net generation capacity of existing power plants is 11,946 MW in 2017, which is supposed to decrease to 830 MW only in 2041 that is shown in Figure 17. Total generation capacity of committed power plants is 1,827 MW in 2017 and 19,281 MW in 2041. However, total generation capacity of candidate power plants is projected to be 904 MW in 2020 and 74,049 MW in 2041. It is to be mentioned that some power plants will be retired from the system after expiry of the economic life of the plants.

- Considering generation capacity of existing, committed, candidate power plants and retirement, total net generation capacity in 2017 was 13,773 MW which is increasing gradually, it supposed to become 94,160 MW in 2041. An integrated power development plan is shown in Table 20.

- Gas/LNG based generation capacity is projected to be higher compared to coal-based capacity because LNG is clean fuel.

- Year-wise reserve margin is calculated considering year-wise net generation capacity of existing power plants, new generation capacity addition from committed and candidate power plants, retirement of power plants and forecasted peak demand of the same period. It may be mentioned here that if the growth of demand slows down due to any reason (such as recession or any other factor), reserve margin will be higher.

- Actual reserve margin is considered 18% in 2017. From 2028, reserve margin is supposed to be decreased gradually and will become 14% in 2041. During the period 2020-2028, the new capacity of the coal and nuclear-based power plants will be added to the system as a result, the reserve margin in this period will be high. The comparison between total demand, total net generation capacity and reserve margin is shown in Figure 17.

- If the value of LOLE is set at the standard value for developing countries of 1.0 to 1.5, the reserve margin theoretically appropriate for the current state is about 20-25. If international linkage and nuclear power generation are to be introduced in 2025, reliability of the power supply will be improved. A reserve margin of 8% and 15% will be required in order to attain the target of LOLE = 0.3, which will be very challenging target. As a result, it is assumed that the reserve margin shall be reduced from 25% in 2027 to the target of 12% by 2035 and shall be maintained up to 2041. The comparison between actual and targeted reserve margins are shown in Figure 18.

Table 20: Integrated Power Development Plan (2016 to 2041)-High Case Studies

Year	Demand collected from Distribution Utilities (132 kV level) (MW)	Total Net generation capacity of Existing power plants (MW)	Total New net generation capacity from Committed Power plants (MW)	Total New net generation capacity from Candidate Power plants (MW)	Grand Total Net Generation capacity (MW)	Net retired capacity (MW)	Actual Reserve Margin (MW)	Actual Reserve Margin (%)
2016		12,282	0	0	**12,282**			
2017	**11,637**	11,946	1,827	0	**13,773**	336	2,136	**18**
2018	**13,260**	11,801	6,518	0	**18,319**	145	5,059	**38**
2019	**15,041**	10,846	11,442	0	**22,288**	955	7,247	**48**
2020	**17,015**	10,629	14,259	904	**25,792**	217	8,777	**52**
2021	**19,034**	10,134	16,428	1,828	**28,390**	495	9,356	**49**
2022	**21,193**	8,954	19,469	4,668	**33,091**	1,180	11,898	**56**
2023	**23,417**	8,123	19,773	7,667	**35,563**	831	12,146	**52**
2024	**25,762**	7,328	20,877	11,695	**39,900**	795	14,138	**55**
2025	**28,231**	6,826	21,993	14,329	**43,148**	502	14,917	**53**
2026	**30,765**	6,179	23,109	18,347	**47,635**	647	16,870	**55**
2027	**33,398**	5,930	23,109	22,365	**51,404**	249	18,006	**54**
2028	**36,106**	5,829	23,109	26,803	**55,741**	101	19,635	**54**
2029	**38,946**	5,263	23,109	29,967	**58,339**	566	19,393	**50**
2030	**41,890**	4,423	23,109	34,310	**61,842**	840	19,952	**48**
2031	**45,045**	3,950	23,109	37,718	**64,777**	473	19,732	**44**

Year	Demand collected from Distribution Utilities (132 kV level) (MW)	Total Net generation capacity of Existing power plants (MW)	Total New net generation capacity from Committed Power plants (MW)	Total New net generation capacity from Candidate Power plants (MW)	Grand Total Net Generation capacity (MW)	Net retired capacity (MW)	Actual Reserve Margin (MW)	Actual Reserve Margin (%)
2032	**48,367**	3,950	23,001	39,838	**66,789**	0	18,422	**38**
2033	**52,018**	3,950	22,901	42,654	**69,505**	0	17,487	**34**
2034	**55,542**	3,950	21,674	45,300	**70,924**	0	15,382	**28**
2035	**59,275**	3,812	19,281	50,352	**73,445**	138	14,170	**24**
2036	**62,818**	3,026	19,281	55,397	**77,704**	786	14,886	**24**
2037	**66,436**	2,527	19,281	58,263	**80,071**	499	13,635	**21**
2038	**70,185**	2,297	19,281	63,349	**84,927**	230	14,742	**21**
2039	**74,037**	1,897	19,281	66,899	**88,078**	400	14,041	**19**
2040	**78,118**	1,499	19,281	71,999	**92,779**	398	14,661	**19**
2041	**82,292**	830	19,281	74,049	**94,160**	669	11,868	**14**

Source: Revisiting Study Team

Figure 17: Year-wise Total Demand, Net Generation and Actual Margin (2017 to 2041)

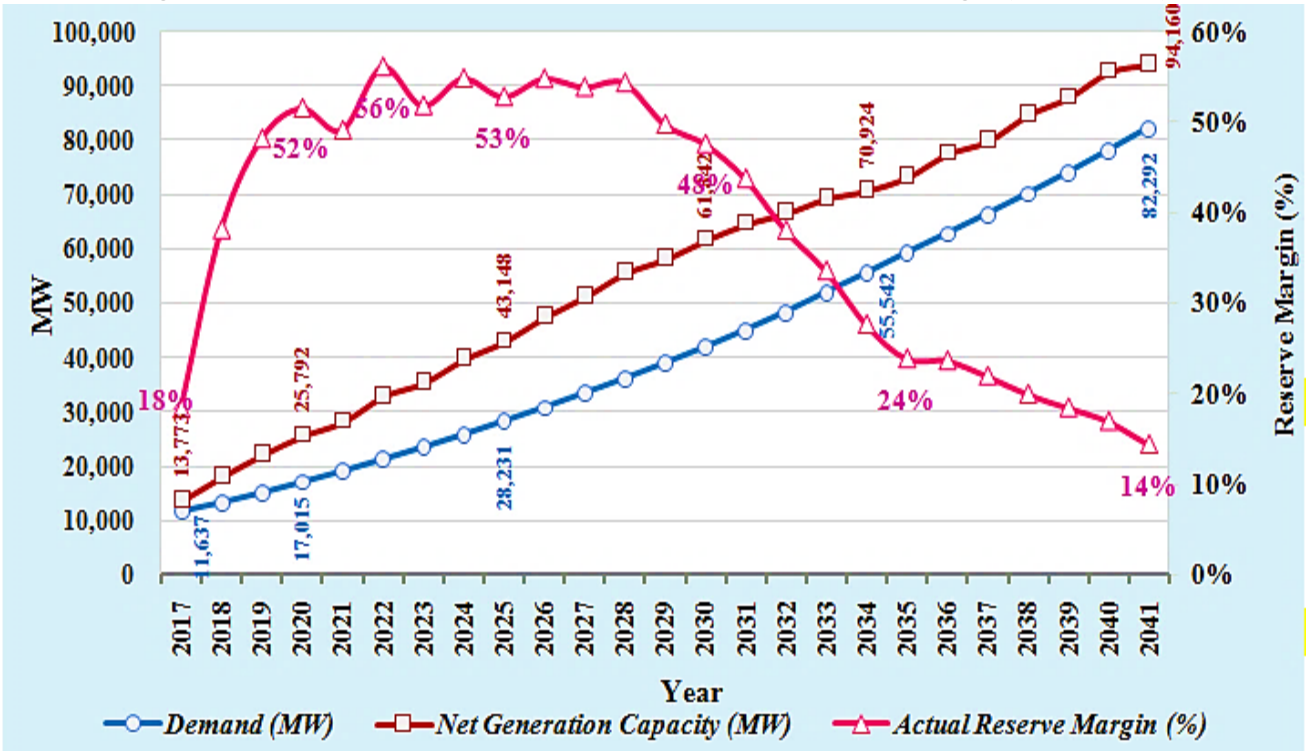
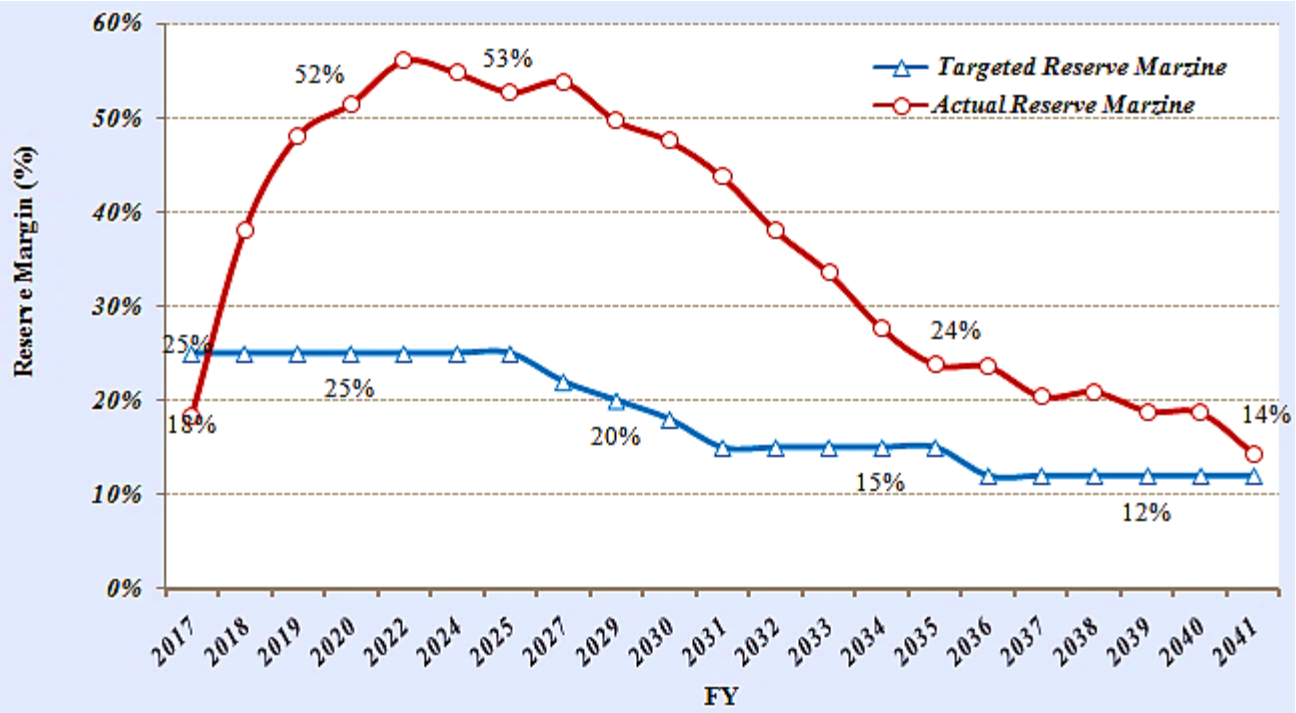


Figure 18: Year-wise Actual and Targeted Reserve Margin (2017 to 2041)



6.3 Power Development Plan to meet low case demand (without EE&C measures)

- The total net generation capacity of existing power plants is 11,946 MW in 2017, which is supposed to decrease to 830 MW only in 2041 that is shown in Table 21. Total generation capacity of committed power plants is 1,419 MW in 2017 and 24,922 MW in 2041. However, total generation capacity of candidate power plants is projected to be 2,224 MW in 2022 and 53,755 MW in 2041. It is to be mentioned that some power plants will be retired from the system after expiry of the economic life of the plants.

- Considering generation capacity of existing, committed, candidate power plants and retirement, total net generation capacity in 2017 was 13,474 MW which is increasing gradually, it is supposed to become 79,507 MW in 2041. Gas/LNG based generation capacity is projected to be higher compared to coal-based capacity because LNG is clean fuel.

- Actual reserve margin is considered 28% in 2017. From 2026, reserve margin is supposed to be decreased gradually and will become 10% in 2041. During the period 2020-2028, the new capacity of the coal and nuclear-based power plants will be added to the system as a result, the reserve margin in this period will be high. It may be mentioned here that if the growth of demand slows down due to any reason (such as recession or any other factor), reserve margin will be higher. Year-wise net generation capacity, retirement, committed and candidate capacity and reserve margin are shown in Table 21 and Figure 19.

- If the value of LOLE is set at the standard value for developing countries of 1.0 to 1.5, the reserve margin theoretically appropriate for the current state is about 20-25%. If international linkage and nuclear power generation are to be introduced in 2025, reliability of the power supply will be improved. A reserve margin of 8% and 15% will be required in order to attain the target of LOLE

= 0.3, which will be very challenging target. As a result, it is assumed that the reserve margin shall be reduced from 25% in 2027 to the target of 12% by 2035 and shall be maintained up to 2041. The comparison between actual and targeted reserve margins has been shown in Figure 20.

Table 21: Integrated Power Development Plan (2016 to 2041) -Low Case Studies

Year	Demand collected from Distribution Utilities (132 kV level) (MW)	Total Net generation capacity of Existing power plants (MW)	Total new Net generation capacity from Committed Power plants (MW)	Total new Net generation capacity from Candidate Power plants (MW)	Grand Total Net Generation capacity (MW)	Net retired capacity (MW)	Actual Reserve Margin (MW)	Actual Reserve Margin (%)
2016		12,282	0	0	12,282			
2017	10,500	12,055	1,419	0	13,474	227	2,974	28%
2018	11,500	11,646	5,671	0	17,317	409	5,817	51%
2019	13,044	10,707	9,921	0	20,628	939	7,584	58%
2020	14,757	10,457	12,704	0	23,161	250	8,404	57%
2021	16,823	9,725	16,579	0	26,304	732	9,481	56%
2022	18,731	8,792	19,263	2,224	30,279	933	11,548	62%
2023	20,697	8,051	21,224	4,411	33,686	741	12,989	63%
2024	22,769	6,826	24,662	5,575	37,063	1,225	14,294	63%
2025	24,952	6,826	25,778	7,389	39,993	0	15,041	60%
2026	27,191	6,223	27,998	11,771	45,992	603	18,801	69%
2027	29,519	6,025	27,998	15,524	49,547	198	20,028	68%
2028	31,912	5,949	27,998	18,192	52,139	76	20,227	63%
2029	34,422	5,383	27,998	19,696	53,077	566	18,655	54%
2030	37,024	4,646	28,520	20,096	53,262	737	16,238	44%
2031	39,812	4,276	29,155	21,200	54,631	370	14,819	37%
2032	42,748	4,276	28,893	25,014	58,183	0	15,435	36%
2033	45,976	4,200	27,576	29,864	61,640	76	15,664	34%
2034	49,090	3,950	27,414	33,108	64,473	250	15,383	31%
2035	52,389	3,812	25,246	35,983	65,042	138	12,653	24%
2036	55,521	3,015	25,246	38,353	66,614	798	11,093	20%
2037	58,718	2,127	25,246	41,219	68,593	887	9,875	17%
2038	62,032	1,897	25,246	44,805	71,949	230	9,917	16%
2039	65,436	1,897	25,246	47,605	74,749	0	9,313	14%
2040	68,708	1,499	25,083	50,905	77,488	398	8,780	13%
2041	72,379	830	24,922	53,755	79,507	669	7,128	10%

Source: Revisiting Study Team

Figure 19: Year-wise Total Demand, Net Generation and Actual Margin-Low Case (2017 to 2041)

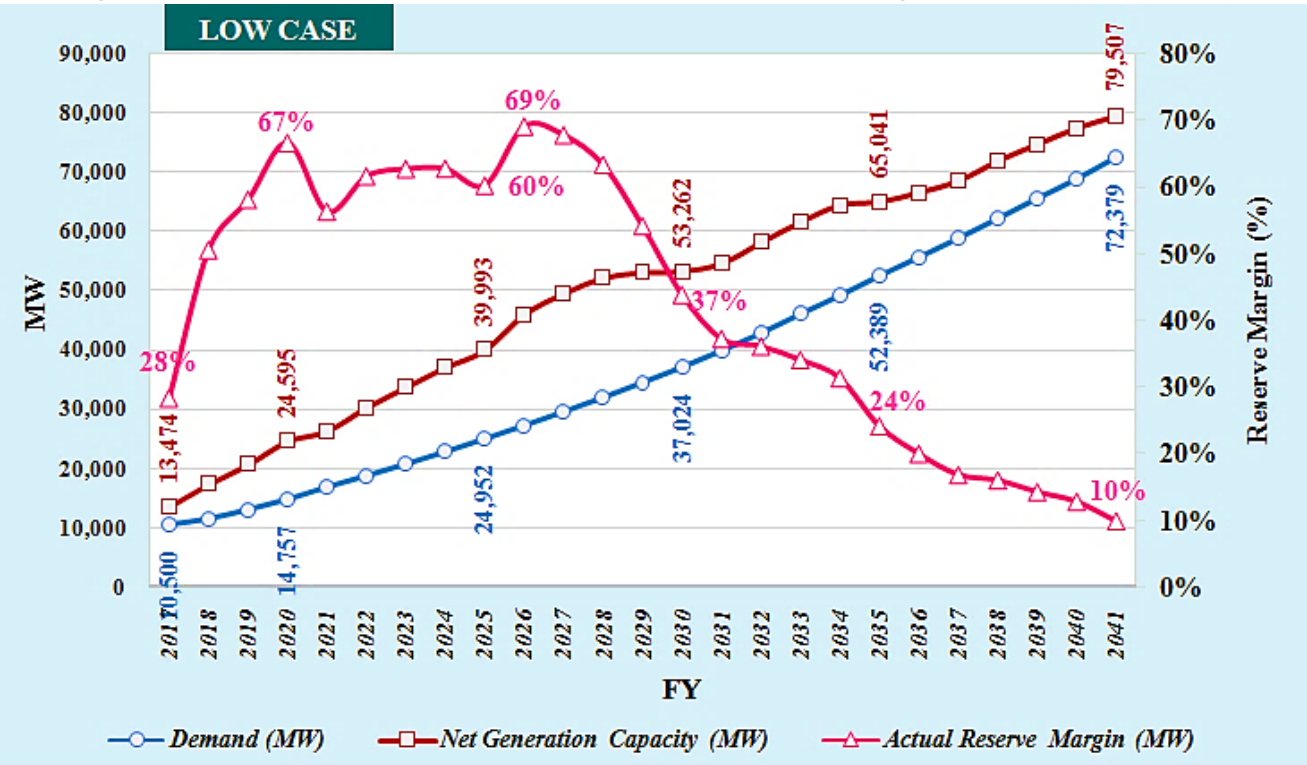
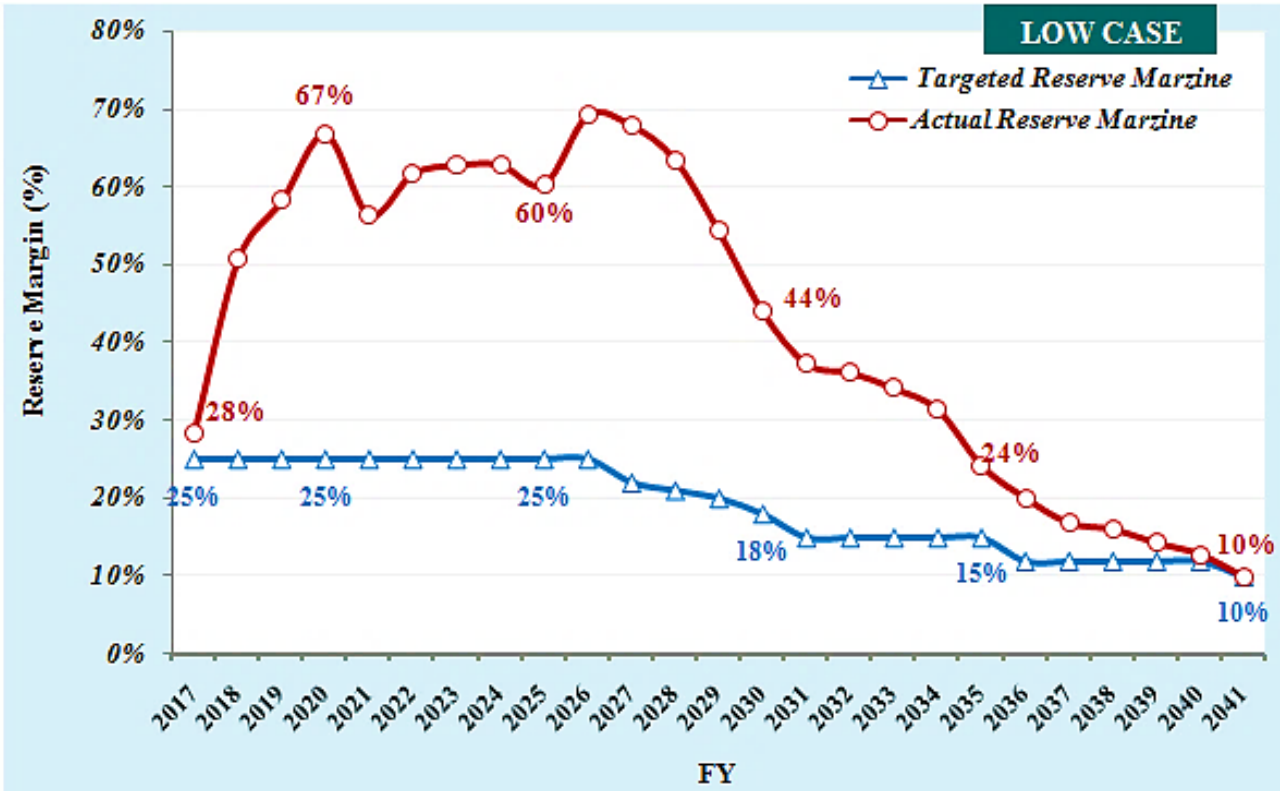


Figure 20: Year-wise Actual and Targeted Reserve Margin- Low Case (2017 to 2041)



6.4 Year-wise Fuel Mix in Total Net Power Generation Capacity

Due to depleting gas reserve and future grim scenario of gas sector development, along with the problems of domestic coal development, the following factors are considered to prepare the fuel-based generation plan for the high and low case studies.

- Economic issues
- Environmental issues
- Constraint of transmission facilities
- Regional balance
- Fuel transportation
- Cost of generation

However, as it is recommended in PSMP 2016, the total amount of imported power in connection to the cross-border trade shall not exceed 15% of total generation capacity. It is also recommended that, power import through single connecting point to the fullest extent is economically efficient However, if a huge amount of power is imported through one connecting point, it can lead to the risk of massive blackout, such as blackout across the entire country during the shutdown of the connecting line. In order to avoid this risk, the limit of the power loss level needs to be worked out, by checking sufficiently continuous power generators' operation during frequency drop and the load shedding scheme during large-scale power supply loss. Based on this result, the maximum level of import capacity in one inter-connection point has to be decided. It is strongly recommended that the amount of imported power through one connecting point is within 10% of the demand.

In order to maintain grid system stability of the power system, the above recommendation is applied in this study.

6.4.1 Year-wise Fuel Mix in Total Net Generation Capacity for High Case Studies

Based on the above issues, fuel wise forecasted generation capacity may be 94,100 MW which will require for meeting up demand of 82,292 MW in 2041. Out of this generation capacity, Gas/LNG based capacity will be higher compared to other fuels like coal, power import etc. in 2041. To meet the future demand, 2% power will be required from liquid fuel-based power plants and 15% from imported power of total net generation capacity in 2041. Considering demand forecast and issues mentioned above, year-wise fuel mix in power generation plan is shown in Table 22 and Figure 21.

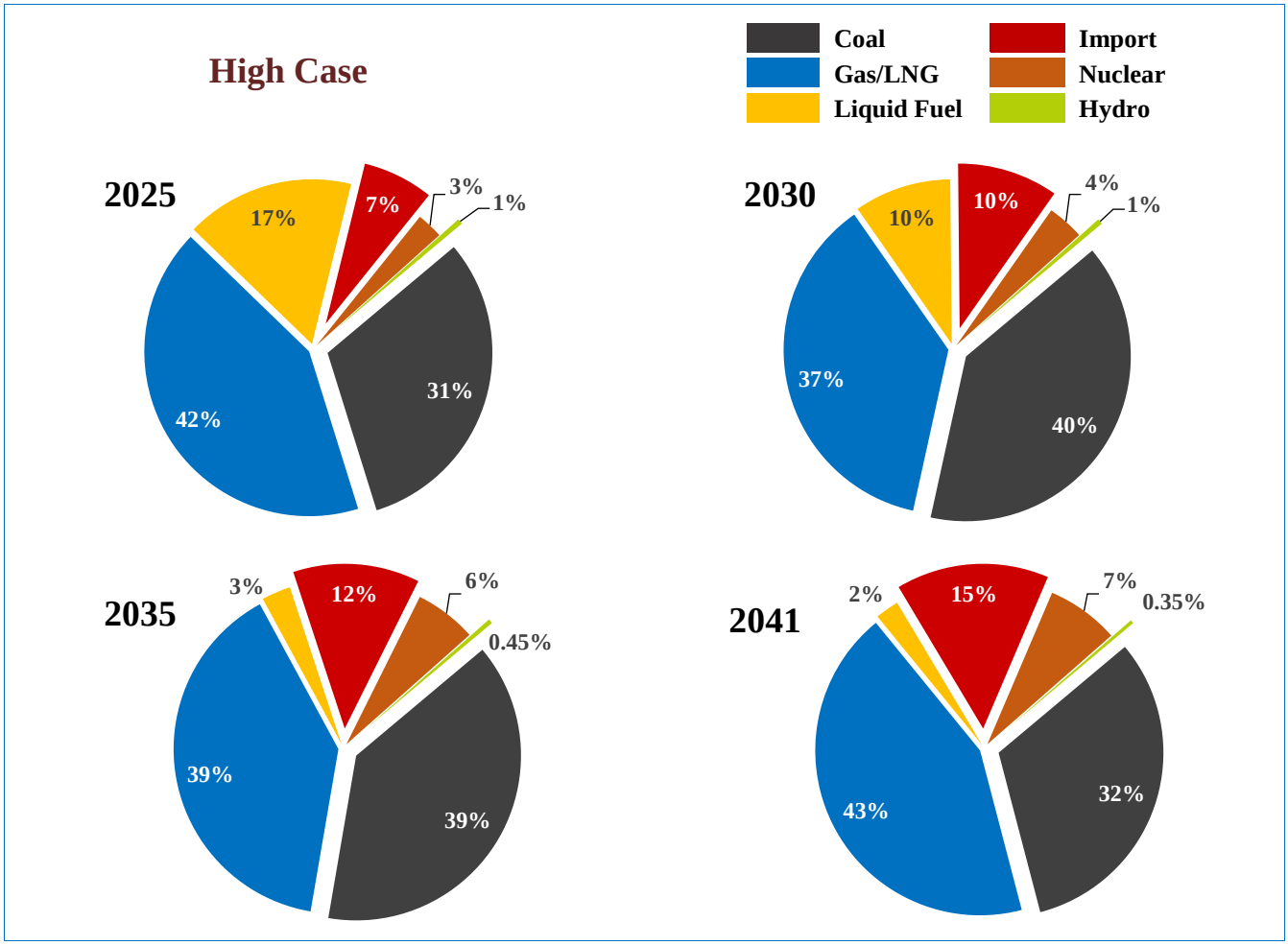
Table 22: Year-wise Fuel Mix in Power Generation Plan-High Case Studies

Fuel-wise composition (MW)	**2016**	**2020**	**2021**	**2025**	**2030**	**2035**	**2041**
Coal	184	2,874	4,745	13,506	24,462	28,510	30,166
Gas/LNG	7,576	12,514	13,187	18,143	22,803	28,924	40,661
Liquid Fuel	3,692	8,674	8,728	7,157	5,894	2,096	2,186
Import	600	1,500	1,500	2,996	6,121	9,121	14,121
Nuclear	0	0	0	1,116	2,232	4,464	6,696
Hydro	230	230	230	230	330	330	330
Total	**12,282**	**25,792**	**28,390**	**43,148**	**61,842**	**73,445**	**94,160**
Fuel-wise composition (%)	**2016**	**2020**	**2021**	**2025**	**2030**	**2035**	**2041**
Coal	1	11	17	31	40	39	32
Gas/LNG	62	49	46	42	37	39	43
Liquid Fuel	30	34	31	17	10	3	2

Import	5	6	5	7	10	12	15
Nuclear	0	0	0	3	4	6	7
Hydro	2	1	1	1	1	0.4	0.4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Revisiting Study Team

Figure 21: Year-wise Fuel Mix in Power Generation-High Case Studies



Source: Revisiting Study Team

6.4.2 Year-wise Fuel Mix in Total Net Generation Capacity-Low Case Studies

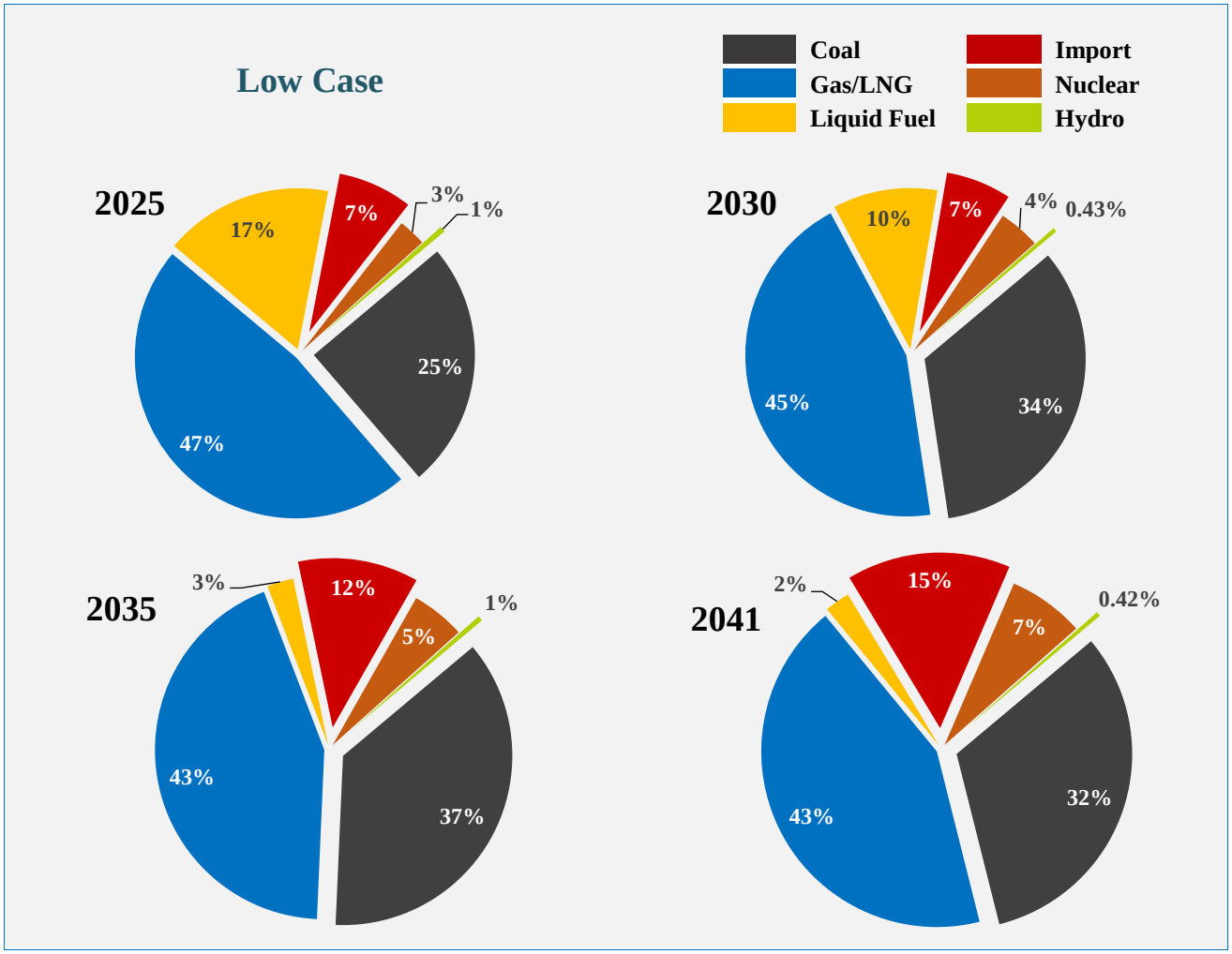
Based on the above discussion of the high case studies, fuel wise forecasted generation capacity may be 79,507 MW which will require for meeting up demand of 72,379 MW in 2041. Out of this generation capacity, Gas/LNG based capacity will be higher compared to other fuels like coal, power import etc. in 2041. To meet the future demand, 2% power will be required from liquid fuel-based power plants and 15% from imported power of total net generation capacity in 2041. Year-wise fuel mix in power generation plan is shown in Table 23 and Figure 22.

Table 23: Year-wise Fuel Mix in Power Generation Plan- Low Case Studies

Fuel-wise composition (MW)	2016	2020	2021	2025	2030	2035	2041
Coal	184	1,650	2,864	9,913	17,969	23,940	25,596
Gas/LNG	7,576	11,462	13,846	18,960	23,744	28,292	34,165
Liquid Fuel	3,692	8,319	7,864	6,778	5,591	1,636	1,840
Import	600	1,500	1,500	2,996	3,496	7,496	11,996
Nuclear	0	0	0	1,116	2,232	3,348	5,580
Hydro	230	230	230	230	230	330	330
Total	12,282	23,161	26,304	39,993	53,262	65,042	79,507
Fuel-wise composition (%)	**2016**	**2020**	**2021**	**2025**	**2030**	**2035**	**2041**
Coal	1.5%	7.1%	10.9%	24.8%	33.7%	37.0%	32.2%
Gas/LNG	61.7%	49.5%	52.6%	47.4%	44.6%	43.5%	43%
Liquid Fuel	30.0%	35.9%	29.9%	16.9%	10.5%	2.5%	2.3%
Import	4.9%	6.5%	5.7%	7.5%	6.6%	11.5%	15.1%
Nuclear	0.0%	0.0%	0.0%	2.8%	4.2%	5.0%	7%
Hydro	1.9%	1.0%	0.9%	0.6%	0.4%	0.5%	0.4%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Revisiting Study Team

Figure 22: Year-wise Fuel Mix in Power Generation-Low Case Studies



Source: Revisiting Study Team

6.5 Captive Power Generation Capacity

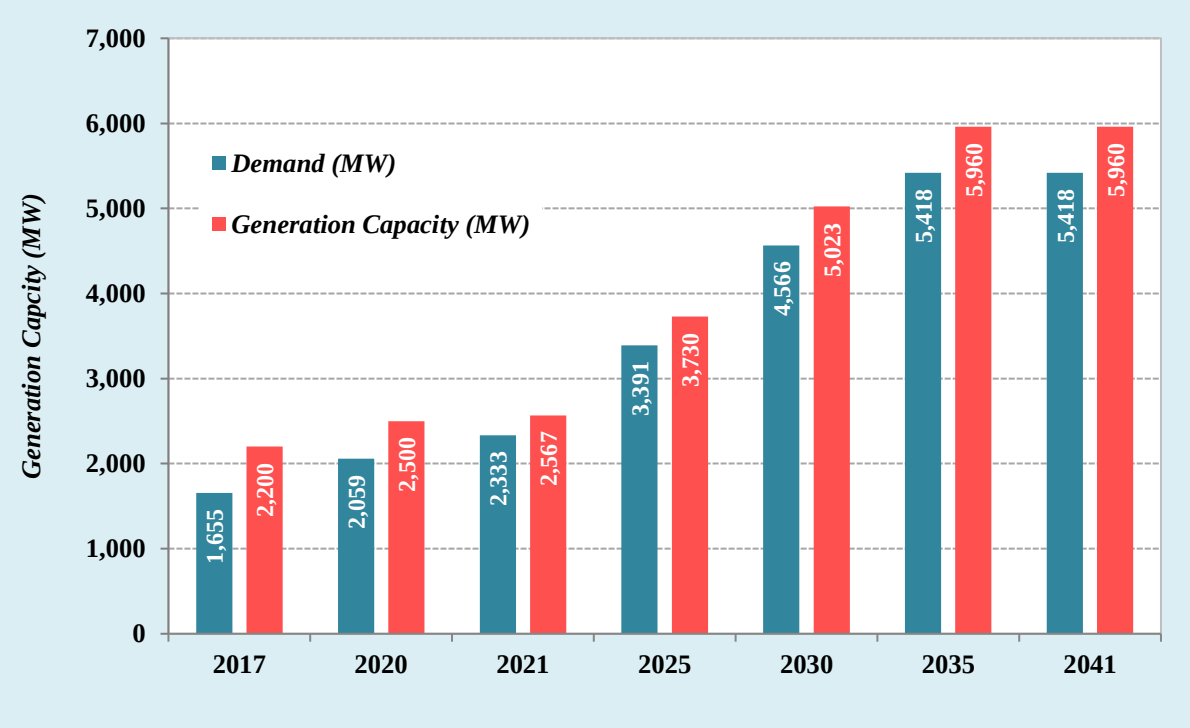
According to data provided by BERC, the captive power generation capacity was 2,200 MW in 2017. Therefore, to meet up future demand and keep sufficient reserve margin, total generation capacity of captive power plants is projected to be around 2,500 MW in 2021 and about 5,900 MW in 2041. It is to be mentioned that the projection of the captive demand including on and off-grid will be 2,300 MW in 2021 and 5,400 MW in 2041. Out of the demand 30-35% will be shifted to national grid. The total captive generation capacity, demand and reserve margin are shown in Table 24.

Table 24: Captive Power Generation Capacity and Reserve Margin (2017-2041)

Year	Demand (MW) (Off and On grid)	Generation Capacity (MW)	Reserve Margin (%)
2017	1,655	2,200	33
2018	1,777	2,500	41
2019	1,911	2,500	31
2020	2,059	2,500	21
2021	2,333	2,567	10
2022	2,741	3,016	10
2023	2,955	3,250	10
2024	3,178	3,496	10
2025	3,391	3,730	10
2026	3,620	3,982	10
2027	3,856	4,242	10
2028	4,088	4,497	10
2029	4,323	4,755	10
2030	4,566	5,023	10
2031	4,817	5,298	10
2032	4,961	5,457	10
2033	5,105	5,616	10
2034	5,258	5,783	10
2035	5,418	5,960	10
2036	5,418	5,960	10
2037	5,418	5,960	10
2038	5,418	5,960	10
2039	5,418	5,960	10
2040	5,418	5,960	10
2041	5,418	5,960	10

Source: Revisiting Study Team

Figure 23: Captive Power Generation Capacity and Demand (2017-2041)



Source: Revisiting Study Team

http://www.berc.org.bd
https://www.researchgate.net/publication/271416333_Study_on_gas_based_captive_power_generation_in_Bangladesh

Chapter VII: Private Sector Investment in Generation Sector

7.1 Introduction

The developing counties around the world are continuously trying to mobilize private investment to proficiently and quickly meet the rapid growth in electricity demand and to facilitate both the efficiency and quality of service. In developed countries, the prime objective of private sector investment in power generation is to keep downward trend in generation costs and associated prices, as well as enhancing efficiency through the capture of competitive market forces. The other purpose of the participation of private sector (IPPs) in the power generation is to reduce the burden of investment of governments and to promote the competitive environment, which could result in greater power sector efficiency and affordable prices for mass consumers.

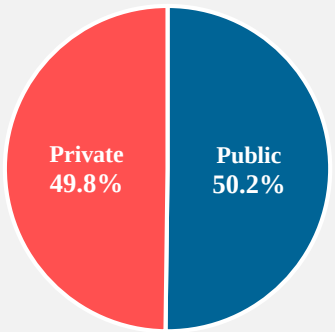
A reasonable ratio of public and private sector generation may be fixed for ensuring healthy competition regarding price and efficiency between two sectors. Similarly, abnormal high dependence on IPPs may jeopardize the balance in power system. Both developing and developed countries, generally there are restrictions in share between public and private sector power generation capacity set by the regulatory bodies or governments to maintain balance.

7.1.1 Sector-wise Generation Capacity in Bangladesh

At present, in Bangladesh, there is no limiting line for the share of generation capacity by private sector. In 2017, the share of generation capacity in the private sector is approximately 50%, which tends to increase in a manner which may cross 50% in forthcoming years. Government may adopt essential measures to set a demarcation line for the public and private share of total generation capacity. The capacity share of public sector should be more than private sector to ensure the energy security of the country. The generation capacity share of public and private sector is shown in below.

BANGLADESH

Sector	*Generation Capacity (MW)*	*Share*
Public	6,167	50.2%
Private (IPPs)	6,115	49.8%
Total	**12,282**	**-**



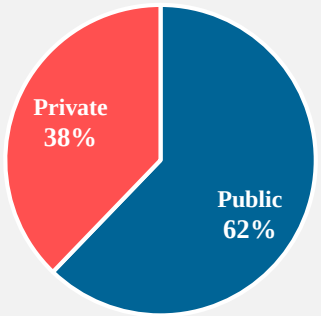
The observations regarding public and private share of generation capacity of some neighboring countries are as follows:

7.1.2 Sector-wise Generation Capacity in Sri-Lanka

In Sri-Lanka, Ceylon Electricity Board (CEB) and Private sector generate electricity and feed the national grid. Apart from generation, CEB is also the only buyer of electricity in the country; it purchases electricity from private power producers which are similar as power sector of Bangladesh. At present, over 62% of installed generation capacity in Sri Lanka is carried out by the public sector; rest power supplied by the private sector.

SRI-LANKA

Sector	*Generation Capacity (MW)*	*Share*
Public (CEB)	2,890	62.2%
Private (IPPs)	1,760	37.8%
Total	**4,650**	-

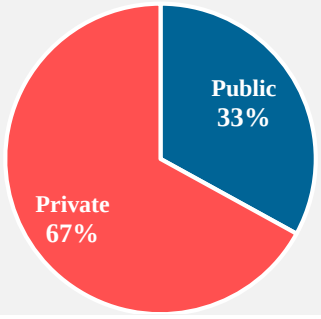


7.1.3 Sector-wise Generation Capacity in Thailand

The largest state-owned entity in the power sector is Electricity Generating Authority of Thailand (EGAT). EGAT is the key power generator and the sole operator of the national transmission network while the latter two are responsible for the distribution in provincial areas, and metropolitan areas and vicinity, respectively. Thailand has adopted the Enhanced Single Buyer (ESB) structure. The private sector participation has been allowed in Thailand since early 1990s when the government privatized the power generation business. The government liberalized the sector by introducing open bidding for power projects in 1994 under the Independent Power Producer (IPP) scheme to reduce EGAT's investment burden in building power plants to revitalize the fast growth. In addition to IPP, smaller-scale private-owned power plants operate under Small Power Producer or SPP (mostly 90 MW contracted capacity) and Very Small Power Producer (VSPP).

THAILAND

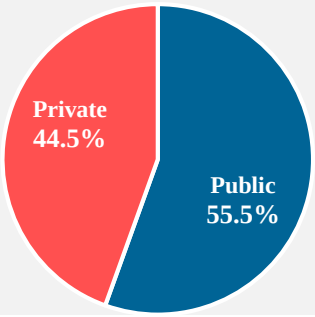
Sector	*Generation Capacity (MW)*	*Share*
Public (EGAT)	16,385	32.7%
Private	33,684	67.3%
Total Installed	**50,069**	-



7.1.4 Sector-wise Generation Capacity in India

Indian power sector has 330.86 GW installed capacity with more than half i.e., 55.5% under State Electricity Boards, which is followed by Public Sector Unit's like NTPC, NHPC, and NPCIL etc. Over 55% of installed generation capacity in Sri Lanka is carried out by the public sector; rest is being carried out by the private sector.

	Sector	Generation Capacity (MW)	Share
INDIA	Public (Central & State)	1,83,725	55.5%
	Private (IPPs)	1,47,125	44.5%
	Total	**3,30,860**	-



7.1.5 Shared Capacity of Public and Private Sector in Bangladesh

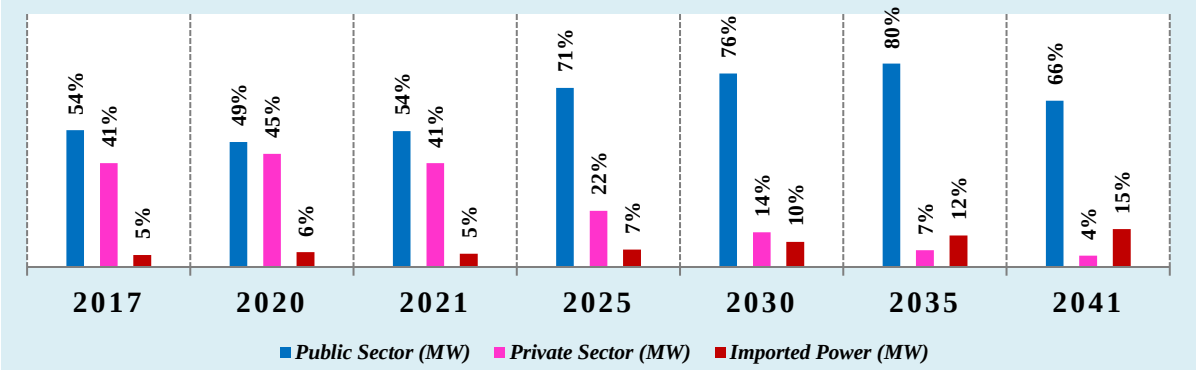
As per high case study, total generation capacity from public, private, import and candidate power plants will be 94,160 MW in 2041. Out of this capacity, public sector 61,882 MW (66%), private sector 4207 MW (4%), imported power 14,121 MW (15%) in 2041. In the long-term plan, the ownership of the candidate plants will not be possible to identify. So, the ownership of the total 13,950 MW capacity of the candidate plants will not be identified in this analysis. The sharing capacity of public and private sector up-to 2041 is shown in Table 25 and Figure 24.

Table 25: Shared Capacity of Public and Private Sector for High Case Studies

Year	2017	2020	2021	2025	2030	2035	2041
Total net generation capacity of public sector (MW)	7,451	12,752	15,253	30,563	47,270	59,071	61,882
Total net generation capacity of private sector (MW)	5,662	11,540	11,637	9,589	8,451	4,853	4,207
Total net generation capacity from imported power (MW)	660	1,500	1,500	2,996	6,121	9,121	14,121
Total net generation capacity from Candidate power plants (MW), Ownership not known	0	0	0	0	0	400	13,950
Grand total net generation capacity (MW)	13,773	25,792	28,390	43,148	61,842	73,445	94,160
Year	**2017**	**2020**	**2021**	**2025**	**2030**	**2035**	**2041**
Public Sector (MW)	54	49	54	71	76	80	66
Private Sector (MW)	41	45	41	22	14	7	4
Imported Power (MW)	5	6	5	7	10	12	15
Total net generation capacity from Candidate power plants (MW), Ownership not known	0	0	0	0	0	1	15
Grand total net generation capacity (MW)	100	100	100	100	100	100	100

Source: Revisiting Study Team

Figure 24: Shared Generation Capacity of Public and Private Sector



7.1.6 Shared Capacity of Public and Private Sector Investment in Bangladesh

A striking characteristic of private investment in electricity sector of the country has been the concentration of investments and projects in generation compared with transmission and distribution. So, transmission and distribution systems are still far behind in comparison to power generation. If similar situation continues for a long period, it will be difficult to get full benefit of increased generation. However, private investment is required in developing transmission and distribution systems parallels with generation. In fact, transmission capacity must be at least 50% higher than actual generation capacity. Similarly, distribution capacity should not be less than 100%higher than generation capacity.

7.1.7 Fair Competition between Public and Private Sector Initiatives

In power generation, there should be fair competition in public and private projects; so that, country and its people could get maximum benefit of less costly power as a derivative of fair competition. According to Private Sector Power Generation Policy of Bangladesh 1996, private entrepreneurs get Income Tax, VAT, any other surcharges and other benefits; which is not applicable for public sector agencies. Moreover, some IPPs have been permitted to import liquid fuel with some special condition, which is undoubtedly favorable to profitability of their projects. However, public sector power plants don't enjoy such facilities.

As per Public Procurement Act (PPA) 2006, public sector power plants are procured considering quality and cost-based tariff. It could be resulted to inefficiency in selecting EPC contractor and high implementation cost. So, in case of public sector power plants, tariff-based PPA should be introduced for bringing transparency and ensure fair competition with private plants.

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http://www.ceb.lk/publications;UNDP-LECB-Assessment-Sri-Lanka-Power-Sector
Malaysia Energy Information Hub; http://meih.st.gov.my/statistics
Asian Insights Spar, Thailand Power Industry, Published on 26th Apr 2017
http://www.cea.nic.in/monthlyinstalledcapacity.html
Probate Sector Power Generation Policy in Bangladesh
Public Procurement Act (PPA) 2006

Chapter VIII: Regional Balance

8.1 Zone-wise Total Net Generation Capacity & Demand for High Case Studies

Projection on power supply and demand balance by region for the years from 2017 to 2041 is presented in Table 26. From Table 26 it is found that, Dhaka and Chattogram are the highest and second highest in power demand. In 2017, Dhaka has net generation capacity of 4,940 MW corresponding to 4,149 MW demand and Chattogram has net generation capacity of 1,507 MW corresponding to 1,372 MW demand. In 2041, Dhaka has net generation capacity of 9,437 MW corresponding to 28,070 MW demand and Chattogram has net generation capacity of 21,888 MW corresponding to 10,844 MW demand.

8.1.1 Zone-wise Power Demand Supply Balance

From Table 26, it is observed that, in 2025, generation capacity in Dhaka region will be 10,078 MW but maximum demand will be 10,167 MW and there will be a total power shortage of 89 MW. In 2035, generation capacity in Dhaka region will be 10,292 MW but maximum demand will be 20,843 MW and there will be a total power shortage of 10,551 MW. However, in 2041, generation capacity in Dhaka region will be 9,437 MW but maximum demand will be 28,070 MW and there will be a total power shortage of 18,633 MW.

Moreover, there will also be shortages in Mymensingh and Rangpur region and other corresponding regions. However, Khulna region has many large-scale power resources, including DC interconnection from Bheramara, power from nuclear, Payra project, and others, with excess power in comparison to demand. In addition, Chattogram region is supposed to have large-scale power plants, including Matarbari and S. Alam, and then this area will be surplus in power. This excess power will be sent to Dhaka, Cumilla, and Rangpur and other zones to meet up the shortages in those areas. Therefore, it is very essential that, sufficient transmission capacity is to be planned and implemented in time.

More than 21,814 MW generation capacity is considered from the candidate plants to meet future demand, whose locations are not finalized yet. It is to be noted here that, usually power plants in different zones are constructed considering power demand of those zones, availability of fuel, power evacuation facilities etc. After generation electricity from power plants, electricity is first supplied to the national grid. Further, electricity is supplied from national grid according to requirement of zonal demand. The capacity of the candidate power plants (unknown location) required for mitigation of the zonal balance of power demand is shown in Table 27.

Attachment 4	**Zone wise total Generation Capacity (existing, committed and candidate) and power demand at 33 kV level has been shown in Attachment 4 for high case Studies.**

Table 26: Power Supply and Demand Balance by Region

Year	2018			2021			2025		
Zone	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)
Dhaka	6,379	4,714	1,665	8,571	6,837	1,734	10,078	10,167	-89
Chattogram	1,761	1,554	207	3,624	2,235	1,389	7,387	3,419	3,968
Cumilla	2,922	968	1,954	3,594	1,448	2,146	3,059	2,033	1,026
Mymensingh	519	1,021	-502	994	1,424	-430	972	2,054	-1,082
Sylhet	1,878	730	1,148	2,405	1,034	1,371	2,165	1,555	610
Rajshahi	1,449	1,374	75	2,024	1,903	121	4,423	2,669	1,754
Rangpur	476	806	-330	810	1,145	-335	810	1,683	-873
Khulna	2,575	1,329	1,246	4,095	1,861	2,234	6,759	2,822	3,937
Barishal	360	377	-17	2,273	593	1,680	7,495	1,007	6,488
Total	**18,319**	**12,873**	**5,446**	**28,390**	**18,480**	**9,910**	**43,148**	**27,409**	**15,739**

Year	2030			2035			2041		
Zone	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)	Generation Capacity (MW)	Demand (33 kV) (MW)	Interchange (Not considering loss) (MW)
Dhaka	10,569	14,886	-4,317	10,292	20,843	-10,551	9,437	28,070	-18,633
Chattogram	18,068	5,232	12,836	19,598	7,604	11,994	21,888	10,844	11,044
Cumilla	4,279	2,823	1,456	3,487	3,903	-416	2,770	5,273	-2,503
Mymensingh	770	3,055	-2,285	360	4,454	-4,094	360	6,284	-5,924
Sylhet	2,640	2,307	333	3,912	3,096	816	3,168	4,286	-1,118
Rajshahi	5,268	3,827	1,441	5,717	5,360	357	5,903	7,879	-1,976
Rangpur	2,435	2,544	-109	7,041	3,780	3,261	8,257	5,655	2,602
Khulna	9,103	4,161	4,942	9,593	5,702	3,891	9,338	7,640	1,698
Barishal	8,709	1,834	6,875	9,813	2,807	7,006	11,225	3,965	7,260
Total	**61,842**	**40,669**	**21,173**	**69,813**	**57,549**	**12,264**	**72,346**	**79,896**	**-7,550**

Source: Revisiting Study Team

Table 27: Capacity addition (Candidate Power Plants) from 2017 to 2041 (Unknown Location)

Year	New Addition (MW)	Cumulative Capacity (MW)
2017-2032	0	0
2033	1,316	1,316
2034	1,216	2,532
2035	1,100	3,632
2036	1,800	5,432
2037	2,366	7,798
2038	4,166	11,964
2039	3,550	15,514
2040	5,000	20,514
2041	1,300	21,814

Source: Revisiting Study Team

Chapter IX: Schedule Plan for Maintenance

A tentative maintenance plan is prepared collecting data from generation utilities which is presented in Table 28**.** There are planning for overhauling, special maintenance as well as regular maintenance etc. It is recommended that a well-coordinated plan of schedule might be formulated for maintenance of the power plants, substations and transmission lines. Therefore, severe power crisis will not take place and regional demand might be fulfilled as much as possible.

Table 28: Utility-wise Maintenance Plan (2017 to 2041)

SI. No.	Name of Power Plant	Capacity (MW)	Type of Fuel	Maintenance timeline
Bangladesh Power Development Board (BPDB)				
1	Tongi Gas Turbine overhauling	105	Gas	January, 2020
2	Haripur GT (1st Unit) overhauling	32	Gas	January to February, 2019
3	Haripur GT (2nd Unit) overhauling	32	Gas	March to May, 2019
4	Chandpur CCPP (GT) overhauling	106	Gas	October to November, 2019
5	Chandpur CCPP (ST) overhauling	57	Gas	October to December, 2019
6	Chattogram Power Station, Raozan 1st Unit overhauling	210	Gas	October, 2019 to February, 2020
7	Shikalbaha Steam Turbine Special Maintenance	60	Gas	1. October, 2018 2. November, 2019
8	Shiddhirganj Steam Turbine Overhauling	210	Gas	April to August, 2019
9	Sylhet Gas Turbine Special Maintenance	20	Gas	December, 2018
10	Bheramara Power Station (3rd Unit) Overhauling	20	Diesel	June to August, 2020
11	Barapukuria Steam Turbine (2nd Unit) overhauling	125	Coal	January to March, 2019
Electricity Generation Company Limited (EGCB)				
1	Shiddhirganj GT 1st Unit Overhauling	105	Gas	November to December, 2020
2	Shiddhirganj GT 2nd Unit Overhauling	105	Gas	1. December, 2019 to January, 2020 2. June, 2020
3	Haripur 412 MW CCPP (GT) Special Maintenance	412	Gas	December, 2019
4	Haripur 412 MW CCPP (ST) Special Overhauling		Gas	December, 2019 to January, 2020
Ashuganj Power Station Company Limited (APSCL)				
1	Ashuganj Unit-4 (Steam Turbine)	150	Gas	October, 2020 to February, 2021
2	Ashuganj Unit-5 (Steam Turbine)	150	Gas	October, 2018 to February, 2019
3	Ashuganj 225 MW CCPP	221.9	Gas	October, 2023 to February, 2024
4	Ashuganj 450 MW CCPP (South)	360.2	Gas	October, 2024 to February, 2025
5	Ashuganj 450 MW CCPP (North)	360	Gas	October, 2025 to February, 2026
North West Power Generation Company Limited (NWPGCL)				
1	Sirajganj 225 MW CCPP (1st Unit)	214	Dual Fuel	July to August, 2020
2	Khulna 225 MW CCPP	230	Dual Fuel	January to February, 2020
Private Generation (IPP)				
1	Haripur Power CCPP	360	Gas	February to March, 2019
2	Meghnaghat Summit CCPP (GT-1) Special Maintenance	102	Diesel	February/May/August/December, 2021
3	Meghnaghat Summit CCPP (GT-2) Special Maintenance	101	Diesel	February/May/August/December, 2021
4	Meghnaghat Summit CCPP (ST) Special Maintenance	102	Diesel	April to May, 2020

Source: Revisiting Study Team.

Chapter X: Renewable Energy

10.1 Renewable Energy Around in World

Sustainable Development Goal (SDG):7th goal of the SDG is 'Ensure access to affordable, reliable, sustainable and modern energy for all.' The global community has committed to achieve the SDG goals by 2030. In addition, population and economic growth will lead to the 30% more energy consumption in the world. India will take one fourth of total energy (Source IEA). Almost all energy consumption growth in coming decades is projected to be in developing countries. This energy consumption estimate already includes negative population growth in high-income countries and energy consumption decrease by energy efficiency and conservation measures.

Under these situations, renewable energy plays a significant role in achieving the projected energy consumption in world. International Energy Agency (IEA) estimates that the share of "modern renewable energy" (excluding traditional solid biomass) will increase from 14% to 19% in total energy demand in the world by 2040.

It also plays significant role in dropping global carbon emissions and the pace of investment has greatly enlarged as the cost of technologies goes down and efficiency continues to go up. Fossil fuels pose a threat to power generations and end users due to volatility of price and supply chain. The prices of renewable energy have been consistently decreasing[5], with the most significant price go down being observed in solar – 80% over the last seven years. The prices for onshore wind are dropped by 25%, while offshore wind power starts to show the sign of decreased price in addition around the world. Renewable energy also provides security of supply, helping a nation to reduce its dependence on imported fuels. It plays a significant role in addressing our energy needs by replacing foreign energy imports with clean and reliable home-grown electricity with the added bonus of incredible local economic opportunities.

10.2 Government Policy

According to Bangladesh Renewable Energy Policy, 2008, it was fixed goal to achieve renewable energy share 5% of the total generation capacity (MW) by 2015, and 10% by 2020. Beyond 2020, Government intends to expand the 10% renewable energy target by 2041, although not predetermined in the existing policy.

[5] *The cost of renewable energy is now falling so fast that it should be a consistently cheaper source of electricity generation than traditional fossil fuels within just a few years, according to a new report from the International Renewable Energy Agency (IRENA)." Forbes,* https://www.forbes.com/sites/dominicdudley/2018/01/13/renewable-energy-cost-effective-fossil-fuels-2020/#315d15e34ff2

10.2.1 Renewable Targeted Generation Capacity

Total generation capacity requirement will be about 94,000 MW to meet the demand 82,292 MW in 2041 for high case studies which is shown in Table 20. To meet the renewable energy policy target 10%, as per plan the renewable based capacity will be 9,400 MW by 2041 and 2,800 MW by 2021.

Total generation capacity requirement will be about 79,500 MW to meet the demand 72,000 MW in 2041 for low case studies which is shown in Table 21. To meet the renewable energy policy target 10%, as per plan the renewable based capacity will be 7,950 MW by 2041 and 2,600 MW by 2021.

In line with the targeted capacity, power sector utilities have taken initiatives to implement grid based renewable power generation projects. Under the initiatives some projects are in pipeline stage. Government is also giving incentives to private sector for implementing renewable based projects. NGOs could play a vital role to implement solar home systems (SHS) in rural areas. Achievements of renewable energy projects are shown below in Table 29.

Table 29: Achievements of Renewable Energy Projects

Technology	Off-grid (MW)	On-grid (MW)	Total (MW)
Solar	286.72	39.1	**325.82**
Wind	2	0.90	**2.90**
Biogas to Electricity	0.68	0	**0.68**
Biomass to Electricity	0.40	0	**0.40**
Total	**289.80**	**40**	**329.80**

Source: SREDA, November 2018.

A year wise plan for power generation from renewable sources is prepared using the data collected from the generation utilities. Utility wise renewable energy-based generation plan is presented in Table 30 and fuel wise renewable energy-based generation plan is presented in Table 31.

Table 30: Utility-wise Renewable Energy based New Addition Generation Plan (2018 to 2041)

Utility / Year	BPDB	APSCL	EGCB	NWPGCL + BCPCL	RPCL	BR Powergen	Private	Total
2017	0	0	0	0	0	0	0	**0**
2018	0	0	0	0	30	0	457	**487**
2019	8	0	300	79.6	200	100	493	**1,181**
2020	215	0	0	100	0	0	0	**315**
2021	0	0	0	50	200	0	0	**250**
2022	0	200	0	100	0	0	0	**300**
2031	0	0	0	0	0	100	0	**100**
2032	0	0	0	0	0	0	0	**0**
2035	0	0	0	0	100	50	0	**150**
2041	0	0	0	0	0	0	0	**0**
Total	**223**	**200**	**300**	**329.6**	**530**	**300**	**950**	**2,833**

Source: Revisiting Study Team

Table 31: Fuel-wise Renewable Energy based New Addition Generation Plan (2017 to 2041)

Year	Solar (MW)	Wind (MW)	Biomass (MW)	Total (MW)
2017				**0**
2018	427	60		**487**
2019	1,080	100	1	**1,181**
2020	315			**315**
2021	100	150		**250**
2022	300			**300**
2023				**0**
2024				**0**
2025				**0**
2026				**0**
2027		50		**50**
2028				**0**
2029				**0**
2030				**0**
2031	100			**100**
2032				**0**
2033				**0**
2034				**0**
2035		150		**150**
Total	**2,322**	**510**	**1**	**2,833**

Source: Revisiting Study Team

Attachment 5 **Year-wise renewable energy generation plan (2017 to 2041) (detailed) has been shown in Attachment 5.**

10.3 Integration of Renewable Energy into Power Development Plan

The peak power demand time in Bangladesh is at night, so the solar power does not work at peak time. Therefore, solar power is not considered in the integrated power development plan. If load pattern is changed from night peak today peak in future, solar power will be considered in the future power development plan.

10.3.1 Substantial Renewable Energy into Grid Connections

10.3.1.1 Variable Renewable Energy Grid Connections

The wind and sun are variable resources, meaning that their availability as an energy source fluctuates due to weather patterns. Power generation from wind and solar is fluctuating during whole day and night and if this power is fed to the grid, if affects the grid stability. IEA states that if the

fluctuating power from wind and solar is within 5-10% of the annual total grid connected power generation, then fluctuations are controllable by conventional power grid network[6].

The forecasted potential of grid-connected power from solar and wind is to be 4,200 GWh/year (SREDA-World Bank, 2015). However, according to this study, the total forecasted energy generation from conventional resources will be around 1,00,000 GWh[7] in 2020 and around 4,73,000 GWh[6] in 2041.

Nevertheless, Bangladesh is still trying to develop its power generation, transmission and distribution network. Therefore, grid-connected utility-scale renewable power should be properly integrated into the power system development plan to ensure appropriate reserve margin and network capacity. Also, technical regulation or standard is required for grid-connected utility-scale renewable power. After these regulations and standards are promulgated, should be implemented, for ensuring grid stability.

10.4 Large Hydro via Cross-Border Power Trade

Bangladesh has a huge potential to exploit renewable energy beyond its boundary, i.e., regional hydropower potential in the South Asian countries. It is projected that Bangladesh can import about 5,000 MW hydro power mainly from Bhutan, Nepal and North-Eastern part of India around 2041[8].

There are challenges to meet this target its domestic renewable resources. Nevertheless, if cross-border power import from hydro power generation is counted as hydropower, (around 4,000 MW from domestic renewable and 5,000 MW from cross-border hydropower) and easily may meet the policy target.

[6] *IEA, "The Power of Transformation - Wind, Sun and the Economics of Flexible Power Systems", 2014; PSMP 2016.*
[7] *Estimated Energy for High Case*
[8] *IEA, "The Power of Transformation - Wind, Sun and the Economics of Flexible Power Systems", 2014; PSMP 2016.*

Chapter XI: Demand Side Management

11.1 Introduction

Demand Side Management (DSM) is applied to energy efficiency measures to reduce end-user's energy demand pattern. It has been applied to reduce the power demand as well as changes for all types of energy demand. The benefits of the end users are reduced their costs by adjusting the timing and amount of electricity use. The energy supplier can benefit from the shifting of energy consumption from peak to off-peak hours.

11.2 Why Encourage DSM?

Electricity is a flexible form of energy and critical resource for modern life and a vital infrastructural input for economic development. In all economies, households and industries have extensive demand for electricity. This demand is premeditated by such important factors as industrialization, extensive urbanization, population growth, rising standard of living and even the modernization of the agricultural sector.

Globally, electricity consumption is increasing speedily as new major economies develop in places such as India, Sri Lanka etc. This need for electricity drives a growing demand for electricity generation, with thousands of new power plants needed across the world over the coming decades. Every form of electricity generation has its strengths and limitation and future electricity generation will require a range of options, even though there must be low carbon emission if greenhouse gas emissions are to be reduced.

In line with this characteristic, the vision of Bangladesh Government is to turn Bangladesh into middle-income country by 2021 and developed country by 2041. Government is working to speed up power demand growth by setting up economic zones and industrial parks, increasing textile export etc. Consequently, a sustainable expansion plan has been prepared to provide the uninterruptable power supply for boosting up targeted economic growth in the country. Power generation capacity will be required to meet up the growing demand. Primary fuel and huge investment are required to generate the power. Climate change and global emission are one of the major threats in power generation. The demand of power has to increase to catch up required economic growth at a time one watt saved is one watt generated without burning of fossil fuel by DSM.

The advantages of DSM are shown in below:

- Cost reduction in customer energy bills;
- Environmental and socio-economic improvement: to reduced greenhouse gas emissions
- Reliability and network issues—increase system reliability
- Improved markets—short-term responses to electricity market conditions particularly by reducing load during periods of high market prices caused by reduced generation or network capacity.
- Reductions in the need for new power plant, transmission and distribution networks;
- Creation of long-term jobs due to new innovations and technologies;

- Increases in the competitiveness of local enterprises;
- Reduced dependency on foreign energy sources;

11.3 Methodology to Reduce the Demand

The main types of DSM activities may be classified in three categories:

- Energy reduction programmers: reducing demand through more efficient processes, buildings or equipment;
- Load management programmers: changing the load pattern and encouraging less demand at peak times and peak rates;
- Load growth and conservation programmers

The following measures should be taken to reduce the Power Demand:

The production of steam and hot water from boilers is a major activity for most enterprises and uses well known Technology. However, poor boiler operation represents a significant source of energy losses. Consequently, performance improvement of boiler is a realistic and low-cost option.

The measures that should be taken to improve the boiler performance include:

- Monitoring combustion conditions regularly and keeping efficiency as high as possible at all times;
- Ensuring adequate controls to adjust the quantity of combustion air;
- Ensuring insulation (on the outside of the boiler) and refractory (inside) are in good condition and that thicknesses are appropriate for good modern practice;
- The water treatment system should be in good working order at all times, and boiler feed water quality should be monitored regularly;
- Equipment should be checked frequently for steam and water leaks;
- Consider using flash steam in the plant;
- Fit automatic temperature controls to equipment wherever possible, to minimize waste of steam to overheat equipment or processes.
- Capacity utilization should be checked—one boiler operating at high load is much more efficient that two boilers each at low load.

The measures that should be taken to reduce power demand in lighting loads:

- Lighting system consumes more electricity as well as lighting normally offers good opportunities for savings. Use energy efficient fluorescent tubes, CFLs, LED and other low energy efficient light sources;
- Consider using energy efficient electronic ballasts;
- Clean luminaries regularly;
- Use appropriate lighting levels for different parts of the work area;
- Install lights at working level where possible, not necessarily on a high ceiling; Use natural light where possible, e.g. fit transparent roof panels or skylights;
- Paint walls and ceilings white or bright colors to improve light reflection.

The measures that should be taken to reduce power demand in motor loads:

- Motors and drive systems in all sectors: motors are significant energy consumers. Poor motor performance is typically a major source of energy losses. Use appropriately sized motors and only run when required;
- Use high efficiency motors;
- Use electronic variable speed controls where motor loads are variable in normal operation; Install improved bearings and lubricate frequently;
- Check power factor frequently and improve with capacitor banks, if possible installed close to the running equipment;

The measures that should be taken to reduce power demand in compressed air system:

Maintain all equipment regularly. Compressed air systems normally a significant user of electricity in an industrial plant, compressed air systems frequently lack meters and suffer poor maintenance. Operating practices may be poor too.

- Eliminate inappropriate use of compressed air (e.g. do not use for clearing away dust or metal shreds from lathes and similar machines);
- Listen for leaks during shift changes or lunch breaks, when workshops are typically quiet and not supposed to be using air;
- Regular maintenance of all parts of the system, including valves and joints, which are often subject to leaks. Check air filters as these may be blocked by dust or grease;
- Reduce air intake temperature e.g. consider relocating the intake;
- Improve overall system efficiency by checking compressor running times e.g. running when there is little or no demand;
- Optimize system pressure: do not generate at high pressure for tools etc. that do not need this; Install heat recovery systems.

The measures that should be taken to reduce power demand in electric appliances:

- Washing machines, dryers and dish washers—only run with a full load;
- Measures needing investment: Replace old inefficient appliances (washing machines, refrigerators, air-conditioners, etc.) with efficient ones;
- Replace electric water heater by solar water heater;
- Monitoring energy purchases and equipment procurement;
- Identifying energy saving opportunities;
- Developing projects to save energy, including technical and financial evaluations;
- Implementing projects and checking post-implementation performance.

The measures that should be taken to reduce power demand through public awareness:

- Maintaining employee communications and public relations. Measurement and verification of energy conservation measures;
- Appliance labeling, selected equipment and even buildings to indicate their expected energy consumption is a well-known and tested tool for raising customer awareness;
- Appliance labeling allows the consumer to compare appliances from various manufacturers and make an informed judgment when buying a new appliance.
- Educating energy consumers can contribute to reduce energy consumption by making them aware of the consumption levels.
- An "energy audit" is done to gather together all the relevant data and to analyze performance throughout the organization, from which deficiencies can be identified and recommendations for improvement made. Audits could be applied to industrial operations, commercial buildings, transport companies, and domestic premises.
- Develop a logical action plan to address the constraints, including specific recommendations and priorities for the different measures.

11.4 Tariff Incentives and Penalties

- Utilities encourage a certain pattern of use by tariff incentives where customers use energy at certain times to reap benefit of a better-priced rate. These include: Time-of-use (ToU) rates—where utilities have different charges for power use during different periods. Higher peak time charges would encourage a user to run high load activities in an off-peak period when rates are lower.
- Power factor charges, where users have to pay more for having power factors below a fixed threshold, usually 0.90 or 0.95. Real-time pricing, where the rate varies based on the utilities load (continuously or by the hour).

11.5 Information Dissemination

- Energy savings and energy efficiency activities depend on the combined efforts of SREDA and other distribution entities and individuals. Well-motivated and skilled personnel of relevant organizations are necessary to develop and implement energy efficiency policies which are essential for continued energy efficiency improvement activities.
- It is necessary to develop awareness through campaigns in order to inform the staff of energy-consuming organizations about energy efficiency options and specific DSM techniques. These campaigns may be marketed by personal contact and visual media, as well as carrying out energy audits, which also have benefits with respect to energy awareness.

11.6 Way Forward for Implementing DSM Programs

- There is generally a low awareness about energy efficiency and DSM programs; therefore, marketing is necessary to promote DSM.
- Load shifting could not be achieved by motivation only, so it is necessary to encourage customers to consume less electricity by revised tariff structure.
- Formulate regulation in order for facilitating the distribution utilities for investing in DSM programs.
- Many industrial and commercial companies still have not carried out energy audits to collect reliable information on their current equipment, machineries and operations. While this may be due to a failure by management to provide potential benefits of energy efficiency, some companies do not have skilled personnel to perform audits. Contemplation should be given to using outside experts, as the cost will normally be well accepted.
- Disseminate knowledge and understanding about DSM systems and opportunities.
- Demonstrate the competence and comprehensiveness of their assessment.
- Efficiency based incentives to be given.

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https://whatis.ciowhitepapersreview.com/definition/demand-side-management/
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Chapter XII: Present & Future Plan of Power Transmission System[9]

12.1 Status of Present Transmission System

Electricity generated in various power plants is being evacuated through 400 kV, 230 kV and 132 kV lines across the country. The existing transmission infrastructure includes 2 nos. of HVDC back-to-back station with 1000 MW capacity; 2 nos. of 400/230 kV substations with 2,210 MVA capacity; 1 no. of 400/132 kV substation with 650 MVA capacity; 24 (with two switching stations) nos. of 230/132 kV substation with 11,485 MVA capacity; 117 nos. of the 132/33 kV substations with 17886 MVA capacity, in total there are 144 substations with a total of 31,581 MVA capacity in whole transmission system. In addition, the total transmission line is approximately 10,623 Circuit kilometers; 400 kV transmission line 559.76 circuit kilometers, 230 kV transmission line 3,325 circuit kilometers and 132 kV transmission line 6,738 circuit kilometers. It is possible to dispatch about 16,097 megawatts of electricity through the transmission infrastructure.

12.2 Plan for future power transmission up to 2041

For comprehensive and sustainable solutions to limitation in power transmission capability, extensive development plans are being implemented for developing an efficient transmission system, which will be able to fulfill the requirement of transmitting generated power according to planning. Field work for developing necessary infrastructure is required for smooth transmission of electricity for the purpose of implementing "Electricity for all by 2021" programme. Transmission infrastructure development plan up to 2041 has been prepared considering draft PSMP 2016 and Revisiting PSMP 2016. Some salient features of the transmission infrastructure development plan are as follows:

12.3 Construction of 765 kV transmission line

Considering the current and future gas crisis, the emphasis has been given on construction of coal-based power plants. So, Matarbari, Moheskhali and Payra are being developed as Power Hub, based mainly of coal fired power plants. Construction of 765 kV transmission line from Power Hubs to Load Center is guided in Draft PSMP-2016. According to guideline one double circuit 765 kV transmission line required to be constructed from Moheskhali to Dhaka by 2024 and another double circuit 765 kV transmission line be constructed from Patuakhali to Dhaka by 2027.

[9] *Power Grid Company of Bangladesh (PGCB)*

12.4 Construction of 765/400 kV transmission grid sub-station

To evacuate power from power plants from Matarbari, Moheskhali and Payra to major load centers in Dhaka, Chattogram area multiple 765/400 kV grid substations have been planned. The land acquisition process is already underway to build two 765/400 kV grid sub-stations named Bhulta and Dhaka (South) considering future demand of Dhaka city and its periphery. Besides, one 765/400 kV grid sub-station will be constructed near Mirsarai to provide electricity to Chattogram, Greater Cumilla and Greater Noakhali areas.

12.5 Construction of Cross-Border Transmission Links

To meet up the increasing demand of electricity resulting from socio-economic development and progress of the country, Government has taken steps to import power from neighboring countries through cross-border interconnections. Up to September 2018, 1,160 MW of electricity is being imported from India. There are also plan to import electricity from India, Nepal, Bhutan, Maldives and China in the future.

12.6 Construction of HVDC Back to Back Station

There are plans to build multiple HVDC Back to Back Stations for importing electricity through cross-border interconnection from neighboring countries. Alongside of existing Bheramara HVDC Back to Back Station there are plan to construct HVDC Back to Back station at Barapukuria, Cumilla, Jamalpur and Sylhet as well.

12.7 Construction of 400 kV high capacity Transmission ring around Dhaka city

At Present, about 40% of total generated electricity is consumed in Dhaka city. Electricity demand of Dhaka city is increasing more rapidly than other parts of the country. According to demand forecast of DPDC and DESCO, the electricity demand of Dhaka zone under these two utilities will be approximately 19,000 MW by 2041. There is a plan to construct 400 kV high capacity transmission ring around the Dhaka City area in order to ensure reliable quality power supply in DPDC & DESCO area.

12.8 Power Evacuation of Rooppur Nuclear Power Plant

According to the Government plan, two units of 2,400 (2×1,200) MW Rooppur nuclear power plant will come into operation by 2025-2026. For the safe and reliable evacuation of power from the nuclear power plant, construction of a transmission line is planned for construction having an N-2 contingency.

12.9 Providing uninterrupted power for the Economic zone:

Plan has been taken to supply uninterrupted powers to all economic zones are being implemented by Bangladesh Economic Zone (BEZA). With the increase of demand in Economic Zones, a plan has been taken to enhance power supply capacity to the economic zones according to requirement.

Meanwhile, high capacity transmission line and grid substation construction work is in progress in Mirsarai Economic Zone, which is the largest in Bangladesh.

12.10 Construction of 400 kV transmission lines for all regions

To make robust power transmission system, plan has been taken to build 400 kV transmission lines for all regions of the country. Each area of the country and Dhaka City will be connected with 400 kV transmission systems.

12.11 Comparison of Power Transmission Infrastructure

Integrated power transmission network plan has been prepared by PGCB in accordance with draft PSMP 2016 and Revisiting PSMP 2016. According to plan, ratio between transmission system dispatch capacity would be twice of projected peak demand which is shown in Table 32, Table 33 and Figure 25.

Table 32: Generation, Transmission and Distribution System up to 2041

Year	Peak Demand Projection (GW)		Integrated Power Generation Plan (GW)	Transmission Dispatch Capacity Plan (GW)
	Draft PSMP-2016	Revisiting Study Team	Revisiting Study Team	PGCB Capacity Plan
2020	14.0	17.0	25.8	37.3
2025	21.9	28.2	43.1	67.2
2030	32.1	41.8	61.8	87.8
2035	44.4	59.2	73.5	107.8
2041	61.6	82.2	94.2	138.3

Figure 25: Comparison between Transmission Capacity and Utility Demand

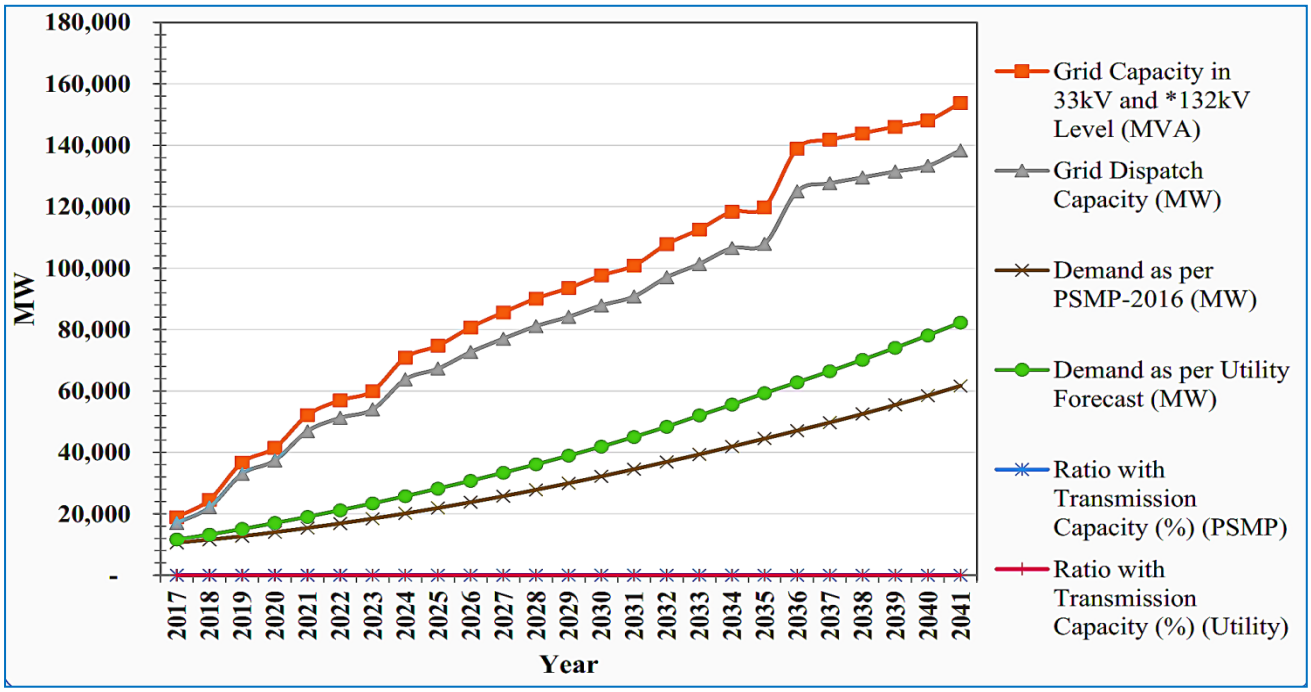


Table 33: Comparison between Transmission Capacity and High Case Demand

Year	33 kV &*132 kV Dispatch Capacity (MVA)	Dispatch Capacity (MW)	**PSMP 2016 Demand (MW)	Transmission Capacity Ratio with Demand (%)	**Distribution Utility High Case Demand (MW)	**Transmission Capacity Ratio with Demand (%)
2017	18,927	17,034	10,601	161	11,637	146
2018	24,559	22,103	11,597	191	13,260	167
2019	36,678	33,010	12,717	260	15,041	219
2020	41,503	37,353	14,009	267	17,015	220
2021	52,124	46,912	15,394	305	19,034	246
2022	56,944	51,250	16,875	304	21,193	242
2023	60,024	54,022	18,453	293	23,417	231
2024	70,879	63,791	20,129	317	25,762	248
2025	74,738	67,264	21,903	307	28,231	238
2026	80,733	72,660	23,776	306	30,765	236
2027	85,591	77,032	25,744	299	33,398	231
2028	90,112	81,101	27,806	292	36,106	225
2029	93,518	84,166	29,959	281	38,946	216
2030	97,627	87,864	32,198	273	41,890	210
2031	100,849	90,764	34,520	263	45,045	201
2032	107,773	96,996	36,916	263	48,367	201
2033	112,613	101,352	39,361	257	52,018	195
2034	118,380	106,542	41,906	254	55,542	192
2035	119,865	107,878	44,483	243	59,275	182
2036	138,939	125,045	47,101	265	62,818	199
2037	141,789	127,610	49,750	257	66,436	192
2038	143,929	129,536	52,526	247	70,185	185
2039	146,069	131,462	55,436	237	74,037	178
2040	148,089	133,280	58,486	228	78,118	171
2041	153,735	138,362	61,681	224	82,292	168

** DPDC & DESCO DistributionÁrea*
*** Without EE&C*

12.12 Year-wise Transmission Infrastructure up to 2041

According to the plan of 2041; the number of grid sub-stations will be 272 and the capacity will be 90,382 MVA by the year 2021 and 18,126 circuit kilometer transmission line at the same time. The number of grid sub-stations will be 344 and the capacity will be 1,36,986 MVA by 2025 and at the same time the transmission line will be 23,472 circuit kilometers; the total number of grid sub-stations will be 428 and the capacity will be 1,78,635 MVA. By the year 2030 and at the same time the transmission line will be 28,320 circuit kilometers; the number of grid sub-stations will be 506 and the capacity will be 2,14,236 MVA. By 2035 and the transmission line will be 32,436 circuits kilometer; the number of grid sub-stations will be 562 and the capacity will be 2,44,406 MVA By 2041, and at the same time the amount of transmission line is 36,870 circuits kilometers which are shown in Table 34, Figure 26, Figure 27 and Figure 28.

Table 34: Year-wise Total Transmission Infrastructure up to 2041

Year	Substation			Transmission Line	
	Voltage Level	Number	Capacity (MVA)	Voltage Level	Length (Ckt. km)
2021	132/33 kV	210	45,107	132 kV	9,846
	230/132 kV	52	35,085	230 kV	5,086
	400/230 kV	7	8,890	400 kV	3,194
	400/132 kV	3	1,300	-	-
	Total	**272**	**90,382**	**Total**	**18,126**
2025	132/33 kV	254	63,871	132 kV	11,281
	230/132 kV	73	54,335	230 kV	6,774
	400/230 kV	13	16,830	400 kV	4,537
	400/132 kV	4	1,950	765 kV	880
	Total	**344**	**1,36,986**	**Total**	**23,472**
2030	132/33 kV	312	84,800	132 kV	13,627
	230/132 kV	87	64,135	230 kV	7,783
	400/230 kV	21	25,150	400 kV	5,530
	400/132 kV	8	4,550	765 kV	1,380
	Total	**428**	**1,78,635**	**Total**	**28,320**
2035	132/33 kV	363	101,731	132 kV	15,365
	230/132 kV	99	72,535	230 kV	8,481
	400/230 kV	29	33,470	400 kV	6,814
	400/132 kV	11	6,500	765 kV	1,380
	765/400 kV	4	8,000	800 kV (DC)	396
	Total	**506**	**2,14,236**	**Total**	**32,436**
2041	132/33 kV	388	108,451	132 kV	16,655
	230/132 kV	113	82,335	230 kV	9,717
	400/230 kV	39	43,870	400 kV	7,962
	400/132 kV	16	9,750	765 kV	1,740
	765/400 kV	6	12,000	800 kV (DC)	796
	Total	**562**	**2,44,406**	**Total**	**36,870**

Attachment 6 **Year-wise Total Transmission Infrastructure 2017-2041 (detailed) has been shown in Attachment 6**

Figure 26: Transmission Line Length up to 2041

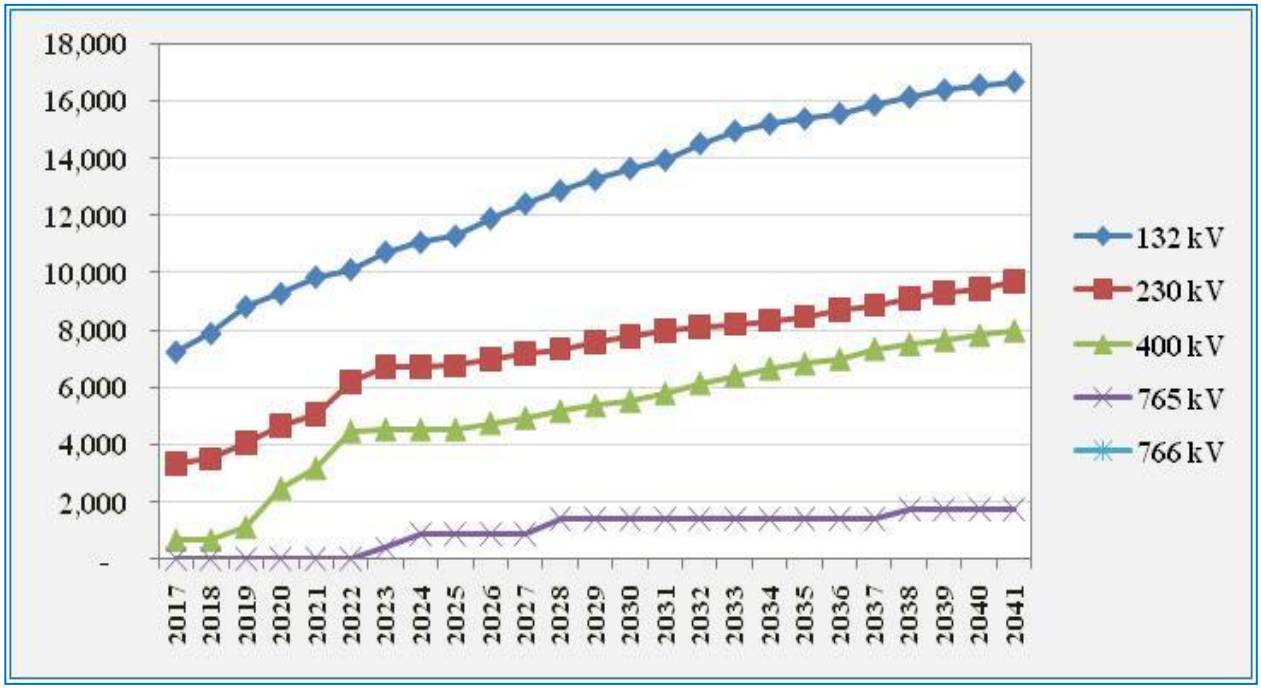


Figure 27: Grid Substation Capacity up to 2041

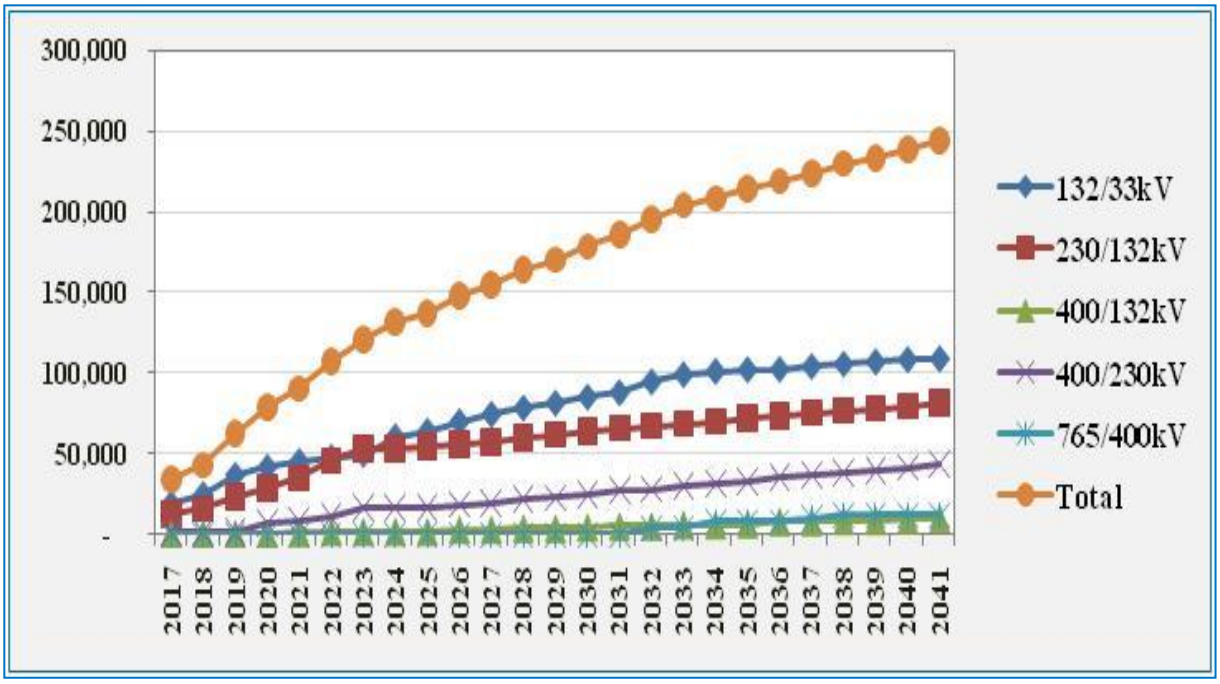
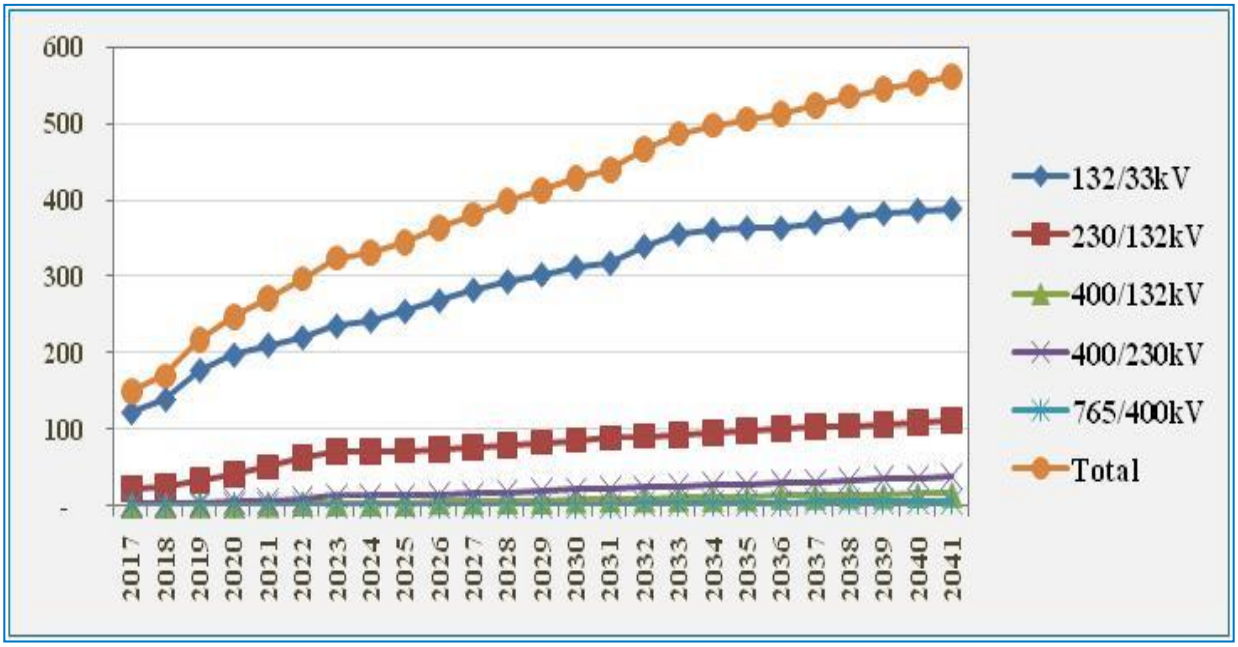


Figure 28: Number of Grid Substations up to 2041



Chapter XIII: Regional Balance through Grid Network

13.1 Zone-wise Generation and Demand Balancing via Transmission Network

Transmission network plan is supposed to be developed considering future demand and generation plan. Bangladesh national grid is divided into two regions: Eastern Part and Western Part separated by the Ganges (Padma) –Brahmaputra (Jamuna) delta. Western and Eastern parts are also divided into two parts each: Southeast, Southwest, Northeast and Northwest. At present eastern and western parts are electrically connected via 230kV double circuit transmission lines.

Considering demand and generation gap among the zones, plan has been taken by PGCB to construct multiple 400 kV transmission lines. Some features of the future plans of PGCB are as follows:

- Each area will be connected with Dhaka with 400 kV (765 kV for some zones also) transmission system as centre point.
- Dhaka Centre point will be connected with Matarbari, Moheskhali, Mirsarai Power Hub through 765kV transmission line.
- Rajshahi & Rangpur zones will be connected to Dhaka and Khulna through three 400kV transmission lines.
- Mymensingh and Sylhet will be connected with Dhaka through two 400 kV transmission lines.
- Khulna and Barishal will be connected to Dhaka through two 400kV and one 765kV transmission lines.
- Chattogram and Cumilla Zones will be connected to Dhaka through 400kV and 765kV transmission lines. This 400kV and 765kV will be connected with each zone and 230kV and 132kV network which will be the delivery of power to distribution utilities. In that case 765/400 kV,400/230kV, 400/132kV, 230/132kV and 132/33kV substation will be constructed in each zone as per requirement of the network.

Due to limitation of transmission capability among the zones/regions, liquid fuel-based power plants are being constructed in deficit areas, which is costly and detrimental to the environment. It is of utmost necessity to enhance grid connectivity among the zones/regions to get rid of such situation. It is recommended to build at least 150% higher transmission capacity than actual generation capacity in order to maintain smooth supply of power to the distribution entities. Grid lines and grid substations are required to be developed simultaneously and plan to be undertaken when it is being used over 60% load.

Redundancy in grid system is the existence of more than one means for performing transmission function. Redundancy plays an important role for reliability in power supply. In present transmission system, there are no enough redundancy. So, in case of cyclone and other natural calamities, power supply will be disrupted for even several days. So, adequate redundancy in power transmission system is recommended in order to avoid such situation.

There is one major incident of grid failure in Bangladesh on 01-11-2014 so enough protection system is required to be introduced as early as possible. Protection Systems are critical to establishing and maintaining an adequate level of grid reliability. The reliability standards required to be defined the level

of reliability to which PGCB must design, can be used to determine the performance requirements of electric system elements such as breakers, and Protection Systems. If required and recommended by the experts, islanding or isolation in addition to protection systems might be taken into consideration in order to avoid a countrywide blackout.

PGCB may open at least some of its grids and substations for private investment, to get rid of fund crisis, as well as create competitive environment between public and private grids. Private investment may bring momentum in constructing new grids and create instance in better grid management. So, it is recommended to formulate a 'Private Investment Policy in Grid Lines and Substations' as soon as possible.

NLDC is responsible for load dispatch and bring balance between generation and demand. In many countries, load dispatch centers are being operated as 'Independent System Operator'. In a meeting held in Power Division, Hon'ble Prime Minister passed order to convert the NLDC into ISO, but no substantive initiative has been taken by the PGCB in this regard. So, it is recommended to convert the NLDC as ISO in order to ensure transparency and improve accountability.

Chapter XIV: Future Planning in Distribution Sector

14.1 Distribution Lines

Geographical Information Systems (GIS) have become a standard and essential in planning and visualizing the structural information in distributed power networks. GIS is a valuable tool for not only mapping facilities but also to improve decision making and better management of infrastructure. The proper integration of GIS into a SCADA system allows for an easy, interactive exploration of spatial and process information of the entire utility's network and inter-network information sharing at the same time. It is not enough to construct distribution lines only for ensuring quality power supply to the customers, which is the most important intention of the Power Division. Distribution utilities are implementing computer-based technologies to modernize their design, planning, maintenance and analysis applications in an un-integrated way. DMS (Distribution Management System), GIS (Geographical Information System) and SCADA (supervisory control and data acquisition) are appearing at an increasing rate in the language of the power distribution community. GIS integration with SCADA/DMS system requires a considerable investment in software development for system modernization and overcoming challenges.

Accessing GIS is necessary for improvement in reliability of supply through much quicker fault identification, isolation and restoration, which ultimately helps in better customers' relation. Additional business improvements are possible with the real-time SCADA data available along with critical data maintained by GIS. At present, all generation, transmission and distribution entities work separately to have GIS and SCADA, it is important to integrate all systems together so that all entities could seek and get specific information from each other, then time and money will be saved. Overall operation, maintenance and support cost would be considerably reduced. Moreover, GIS and SCADA could play pivotal role in formulating future development plans and their implementation.

So, it is recommended to integrate all GIS and SCADA into a single system and exchange information in a coordinated way. Moreover, it is further recommended to establish Smart Grid, for which, GIS and SCADA are the foundation or building blocks in order to ensure uninterrupted and quality power supply to the customers, as well as reduce system loss, pilferage and wastage, which is very important for becoming a developed country. It is also recommended to convert whole power system to Smart Grid.

Requirement of distribution lines, substations and distribution transformers are forecasted based on the high case study. It has been seen that the distribution utilities formulate their future plans based on their own master plan, in-house need analysis and feasibility study. As per high case , future requirement of distribution lines, 33/11 kV substations and 11/0.4 kV distribution transformers are shown in the following tables Table 35, Table 36, Table 37, Table 38**,** Table 39 and Table 40.

Generally it is observed that in some areas power interruption take place frequently due to limitation of substation and distribution lines. When generation capacity is higher than actual demand, but in almost each case, generation side is blamed for deficit. Sometimes, due to sub-standard lines and overloaded substations, power supply disrupted during storms, cyclones, thunderstorms and even high wind. So, distribution entities are required to upgrade all lines and substations having adequate MVA. Actually they have to consider distribution sub-stations and lines overloaded when 60% of its capacity occupied and take project for up-gradation.

Table 35: Total Distribution Lines (Including New Addition and Excluding Maintenance/Renovation) up to 2041

Year	2017	2020	2021	2025	2030	2035	2041
33 kV line (in Thousand km)	23.2	29.6	31.0	36.1	40.6	43.9	47.7
11 kV line (in Thousand km)	238.0	297.8	310.2	359.1	395.1	418.8	454.2
0.4 kV line (in Thousand km)	123.8	148.8	155.9	185.9	224.5	248.4	281.3
Total	**384.9**	**476.2**	**497.0**	**581.1**	**660.2**	**711.1**	**783.2**

Source: Revisiting Study Team

Table 36: New Addition of Distribution Lines (2017 to 2041)

Year	2017	2020	2021	2025	2030	2035	2041
33 kV line (in Thousand km)	1.17	1.97	1.45	1.25	0.88	0.67	0.57
11 kV line (in Thousand km)	12.09	19.08	12.32	12.31	7.31	5.07	4.75
0.4 kV line (in Thousand km)	6.13	10.52	7.52	7.97	8.08	5.22	4.43
Total	**19.38**	**31.57**	**21.29**	**21.53**	**16.27**	**10.95**	**9.74**

Source: Revisiting Study Team

Table 37: Maintenance/Renovation Planning of Distribution Lines (2017 to 2041)

Year	2017	2020	2021	2025	2030	2035	2041
33 kV line (in Thousand km)	10.05	12.47	12.81	14.39	15.51	16.45	17.42
11 kV line (in Thousand km)	126.19	154.74	160.65	183.36	198.10	208.64	224.93
0.4 kV line (in Thousand km)	51.80	60.22	63.10	73.14	85.83	95.10	108.26
Total	**188.03**	**227.43**	**236.56**	**270.89**	**299.44**	**320.19**	**350.61**

Source: Revisiting Study Team

Attachment 7 **New Construction of distribution lines with respect to Demand has been shown in Attachment 7**

Attachment 8 **Maintenance/Renovation of distribution lines with respect to Demand has been shown in Attachment 8**

14.2 Substations

Table 38: Total 33/11 kV substation planning (2017 to 2041)

Year	2017	2020	2021	2025	2030	2035	2041
Number of Transformers (in Thousands)	2.96	3.74	3.92	4.68	5.98	7.29	8.63
Number of Substations (in Thousands)	1.12	1.58	1.71	2.19	2.86	3.52	4.27
Capacity (in Thousand MVA)	19.44	34.06	37.48	54.15	80.04	105.14	133.14

Source: Revisiting Study Team

Table 39: Planning of Up-gradation 33/11 kV substation (2017 to 2041)

Year	2017	2020	2021	2025	2030	2035	2041
Number of Transformers (in Thousands)	111	175	168	168	221	278	240
Capacity (in Thousand MVA)	2.17	3.64	3.44	3.44	4.41	5.71	5.08

Source: Revisiting Study Team

Note: **Total for a year = Data of previous year + New Transformer addition+ Up-gradation in that Year**
Up-gradation = New Capacity -Previous Capacity

Attachment 9 **Total 33/11 kV distribution substations with respect to demand (detailed description) have been shown in Attachment 9**

Attachment 10 **Up-gradation of 33/11 kV distribution substations with respect to demand (detailed description) has been shown in Attachment 10**

14.3 Total Transformers

Table 40: Future planning of total Distribution Transformers of 11/0.4 kV level (2017 to 2041)

Year	2017	2020	2021	2025	2030	2035	2041
Number of Transformers (in Thousands)	170.87	230.35	250.91	327.59	441.85	539.92	644.70
Capacity (in Thousand MVA)	22.24	32.51	36.01	49.15	68.78	89.21	109.65

Note: 11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA transformer)

Attachment 11 **Total Transformers with respect to demand (Detailed Description) of future transformer planning has been shown in Attachment 11**

Chapter XV: Investment Requirement for Generation, Transmission & Distribution Facilities

15.1 Investment Requirement for High Case Studies

15.1.1 Investment Cost for New Generation Capacity Addition Plan

About US$ 9.0 billion has already been invested during 2009 to 2016. Around 99,000 MW new capacity required to be added to meet the future power demand (2017-2041). Around US$ 150 billion will be required to implement generation projects. Around US$ 27 billion has already been ensured out of US$ 150 billion. Year-wise investment requirements including nuclear power are shown in Table 41.

Table 41: Year-wise Investment Requirement for New Generation (2017-2041)

Year	New Capacity Addition (MW)	Investment (US$ in Billion)	Cumulative Investment Cost (US$ in Billion)
2017	1,827	1.5	
2018	4,691	4.2	5.7
2019	4,924	5.9	11.6
2020	3,721	4.5	16.1
2021	3,093	5.4	21.5
2022	5,881	5.0	26.5
2023	4,103	8.3	34.8
2024	5,132	9.9	44.7
2025	3,750	10.5	55.2
2026	5,134	13.9	69.1
2027	4,018	6.1	75.2
2028	4,438	6.7	81.9
2029	3,164	4.9	86.8
2030	4,343	6.4	93.2
2031	3,408	6.2	99.4
2032	2,120	3.4	102.8
2033	2,816	7.5	110.3
2034	2,646	7.4	117.7
2035	5,052	2.7	120.4
2036	5,220	5.3	125.7
2037	2,866	6.4	132.1
2038	5,086	10.1	142.2
2039	3,550	2.3	144.5
2040	5,400	3.4	147.9
2041	2,050	1.6	149.5
Total	**98,433**	**149.5**	

Source: Revisiting Study Team

15.1.2 Investment Cost for New Transmission Infrastructure

The aggregated investment requirement for development of transmission and related facilities is about US$ 31 billion. The annual average investment requirement is about US$ 1.28 billion. The highest investment requirement will be reached at US$ 2.2-2.4 billion in 2021-2022. The year-wise investment requirements are shown in Table 42.

Table 42: Year-wise Investment Requirement for New Transmission Infrastructure up-to 2041

Year	Investment Cost (US$ in Billion)	Cumulative Investment Cost (US$ in Billion)
2018	1.4	
2019	1.7	3.1
2020	2.0	5.1
2021	2.2	7.3
2022	2.4	9.7
2023	1.2	10.9
2024	1.5	12.4
2025	0.8	13.2
2026	0.98	14.18
2027	0.69	14.87
2028	1.73	16.6
2029	0.87	17.47
2030	0.80	18.27
2031	1.9	20.17
2032	1.5	21.67
2033	0.91	22.58
2034	1.2	23.78
2035	0.67	24.45
2036	0.72	25.17
2037	2.1	27.27
2038	1.6	28.87
2039	0.54	29.41
2040	0.67	30.08
2041	0.70	30.78
Grand Total	**30.78**	

Source: Revisiting Study Team

15.1.3 Investment Cost for New Distribution Infrastructure

The aggregated investment requirement for development of distribution lines, substations and related facilities are found to be at US$ 35 billion. The annual average of the investment requirement is about US$ 1.46 billion. The highest investment will be required in 2018-2021 periods, which is about US$ 1.8 - 1.9 billion. The year-wise requirement of investment is shown in the Table 43.

Table 43: Year-wise Investment Requirement for New Distribution Infrastructure (2017-2041)

Year	Investment Cost (US$ in Billion)	Cumulative Investment Cost (US$ in Billion)
2018	1.9	
2019	1.8	3.8
2020	1.6	5.4
2021	1.4	6.8
2022	1.3	8.1
2023	1.4	9.5
2024	1.3	10.8
2025	1.6	12.4
2026	1.3	13.7
2027	1.4	15.1
2028	1.3	16.4
2029	1.5	17.9
2030	1.7	19.5
2031	1.4	20.9
2032	1.3	22.2
2033	1.4	23.6
2034	1.3	24.9
2035	1.6	26.5
2036	1.4	27.8
2037	1.5	29.3
2038	1.4	30.7
2039	1.4	32.1
2040	1.5	33.6
2041	1.4	35.0
Grand Total	**35**	

Source: Revisiting Study Team

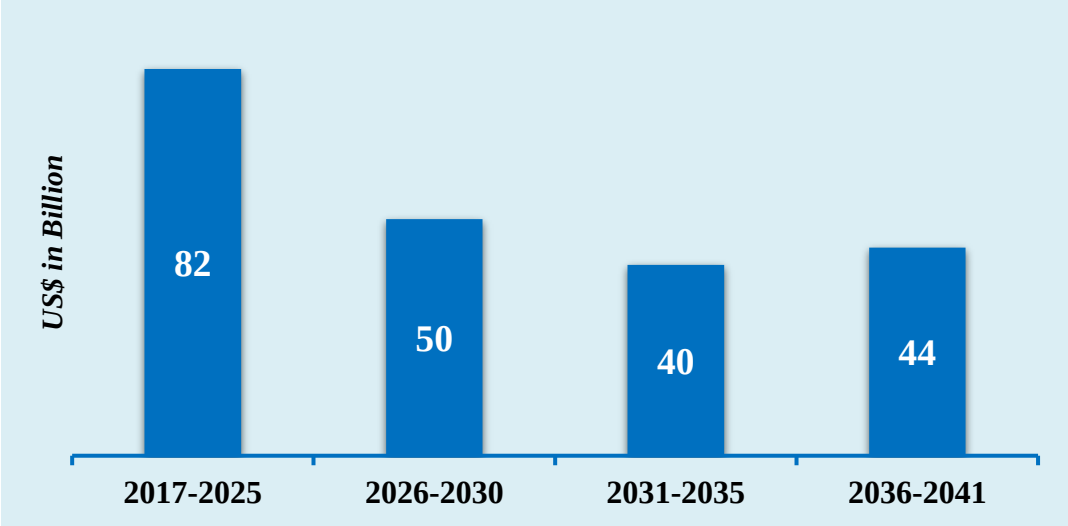
As per high case study, it is observed from Table 44 and Figure 29, investment requirement will be US$ 82 billion, in 2017-2025, US$ 50 billion in 2026-2030 and US$ 40 billion in 2031-2035 and US$ 44 billion in 2036-2041.

Table 44: Investment Requirement for New Generation, Transmission & Distribution (High Case)

in billion US$

Year	Generation	Transmission	Distribution	Total
2017-2025	56	13	12	**82**
2026-2030	38	5	7	**50**
2031-2035	27	6	7	**40**
2036-2041	29	6	9	**44**
Total (2017-41)	**150**	**31**	**35**	**216**

Figure 29: Year-wise Investment for New Generation, Transmission and Distribution Infrastructure



15.1.4 Year-wise Total Investment Cost for Generation, Transmission and Distribution

Total investment requirement for generation, transmission and distribution facilities is estimated to be US$ 216 billion by 2041. Out of this amount, investment requirement for the new generation will be US$ 150 billion by 2041. The average investment required for each year will be about US$ 9.0 billion. Total yearly investment requirements are shown in Table 45.

Table 45: Total Investment Requirement for New Generation, Transmission and Distribution

Year	Generation (US$ in Billion)	Transmission US$ in Billion)	Distribution (US$ in Billion)	Total (US$ in Billion)
2018	5.7			
2019	11.6	3.1	3.8	19
2020	16.1	5.1	5.4	27
2021	21.5	7.3	6.8	36
2022	26.5	9.7	8.1	44
2023	34.8	10.9	9.5	55
2024	44.7	12.4	10.8	68
2025	55.2	13.2	12.4	81
2026	69.1	14.18	13.7	97
2027	75.2	14.87	15.1	105
2028	81.9	16.6	16.4	115
2029	86.8	17.47	17.9	122

Year	Generation (US$ in Billion)	Transmission US$ in Billion)	Distribution (US$ in Billion)	Total (US$ in Billion)
2030	93.2	18.27	19.5	131
2031	99.4	20.17	20.9	140
2032	102.8	21.67	22.2	147
2033	110.3	22.58	23.6	156
2034	117.7	23.78	24.9	166
2035	120.4	24.45	26.5	171
2036	125.7	25.17	27.8	179
2037	132.1	27.27	29.3	189
2038	142.2	28.87	30.7	202
2039	144.5	29.41	32.1	206
2040	147.9	30.08	33.6	212
2041	**149.5**	**30.78**	**35.0**	**216**

15.2 Investment Requirement for Low Case Studies

15.2.1 Investment cost for New Generation Capacity Addition Plan

About US$ 9.0 billion has already been invested during 2009 to 2016. Around 84,000 MW new capacity required to be added to meet the future power demand (2017-2041). Around US$ 127 billion will be required to implement generation projects. Around US$ 30 billion has already been ensured out of US$ 127 billion. Year-wise investment requirements including nuclear power are shown in Table 46.

Table 46: Year-wise Investment Requirement for New Generation of low case study (2017-2041)

Year	New Capacity Addition (MW)	Investment (US$ in Billion)	Cumulative Investment Cost (US$ in Billion)
2017	1419	1.2	
2018	4252	3.8	5.0
2019	4250	3.5	8.4
2020	2783	4.1	12.5
2021	3875	5.0	17.5
2022	4908	2.3	19.9
2023	4948	8.4	28.3
2024	4802	9.4	37.7
2025	2930	9.0	46.7
2026	6602	16.2	63.0
2027	3753	5.4	68.3
2028	2668	3.9	72.2
2029	1504	3.6	75.9
2030	922	1.5	77.4
2031	1739	4.2	81.6
2032	3814	5.3	86.9
2033	4850	10.7	97.6
2034	3244	4.2	101.8
2035	2875	1.1	102.9
2036	2370	2.9	105.8
2037	2866	6.4	112.2

2038	3586	8.9	121.1
2039	2800	1.6	122.7
2040	3300	2.2	124.9
2041	2850	1.8	126.6
Total	**83,910**	**126.6**	

15.2.2 Year-wise Total Investment Cost for Generation, Transmission and Distribution

Total investment requirement for generation, transmission and distribution facilities is estimated to be US$ 193 billion by 2041. Out of this amount, investment requirement for the new generation will be US$ 127 billion by 2041. The average investment required for each year will be about US$ 8.0 billion. Total yearly investment requirements are shown in Table 47.

Table 47: Investment Requirement for New Generation, Transmission & Distribution (Low Case)

in billion US$

Year	Generation	Transmission	Distribution	Total
2017-2025	47	13	12	**72**
2026-2030	31	5	7	**43**
2031-2035	26	6	7	**39**
2036-2041	24	6	9	**39**
Total (2017-41)	**126.6**	**31**	**35**	**193**

15.3 Projection Cost of Generation

15.3.1 Projection Cost of Fuel

The price of domestic gas in Bangladesh is much cheaper than the international price. However, this price is supposed to go up as LNG is being added into grid, which is much costly than domestic gas. In this study, the fuel cost is projected based on PSMP 2016: International cost of Crude Oil. It is to be mentioned that PSMP 2016 has also considered the same methodology to forecast the cost of fuel. The projection cost of fuel is shown in
Figure 30 and Table 48.

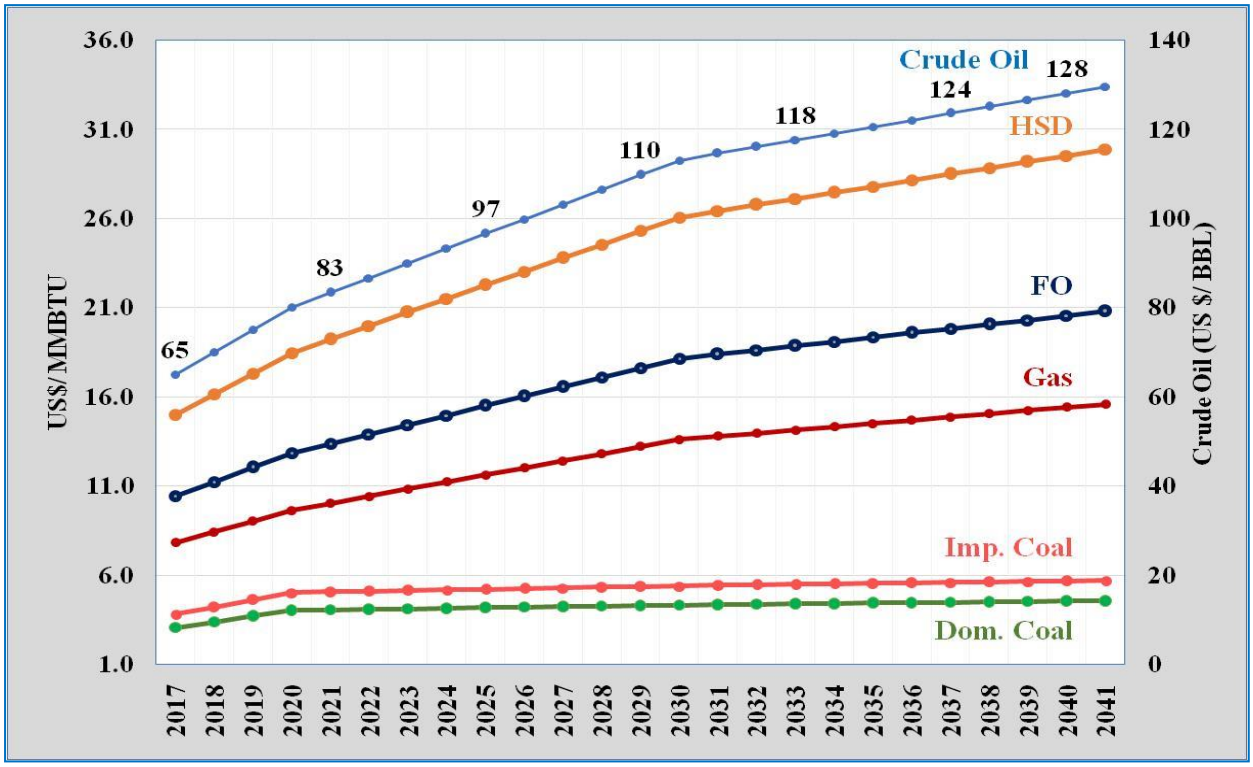
Table 48: Year-wise Projection Cost of Fuel (2018-2041)

Fuel Type	Unit	2018	2019	2020	2021	2025	2030	2035	2041
Crude Oil Price (Brent basis+ IEA)	$/BBL	70	75	80	83	97	113	121	130
Domestic Gas	$/GJ	8.0	8.6	9.1	9.5	11.0	12.9	13.8	14.8
	$/MMBTU	**8.4**	**9.0**	**9.6**	**10.0**	**11.6**	**13.6**	**14.5**	**15.6**
Furnace Oil	$/GJ	10.7	11.4	12.2	12.7	14.7	17.2	18.3	19.7
	$/MMBTU	**11.2**	**12.0**	**12.8**	**13.4**	**15.5**	**18.1**	**19.3**	**20.8**
	Tk./Liter	34	37	39	41	47	55	59	63
High Sulfur Diesel	$/GJ	15.3	16.4	17.5	18.2	21.1	24.7	26.4	28.3
	$/MMBTU	**16.1**	**17.3**	**18.4**	**19.2**	**22.2**	**26.1**	**27.8**	**29.9**
	Tk./Liter	45.9	49.2	52.5	54.6	63.3	74.1	79.0	84.9

Fuel Type	Unit	2018	2019	2020	2021	2025	2030	2035	2041
Imported Coal	$/GJ	4.0	4.4	4.8	4.8	4.9	5.1	5.2	5.4
	$/MMBTU	**4.2**	**4.6**	**5.0**	**5.1**	**5.2**	**5.4**	**5.5**	**5.7**
	US$/Ton	91	100	109	110	113	117	120	124
Domestic coal	$/GJ	3.2	3.5	3.8	3.8	4.0	4.1	4.2	4.3
	$/MMBTU	**3.4**	**3.7**	**4.0**	**4.0**	**4.2**	**4.3**	**4.4**	**4.6**
	US$/Ton	73	80	87	88	90	94	96	99

Source: Revisiting Study Team

Figure 30: Year-wise Projection Cost of Fuel



15.3.2 Projection Cost of Fixed & Variable

The fuel-wise projected cost of Fixed and Variable O&M are shown in Table 49.

Table 49: Year-wise Projection Cost of Fixed and Variable O&M (2018-2041)

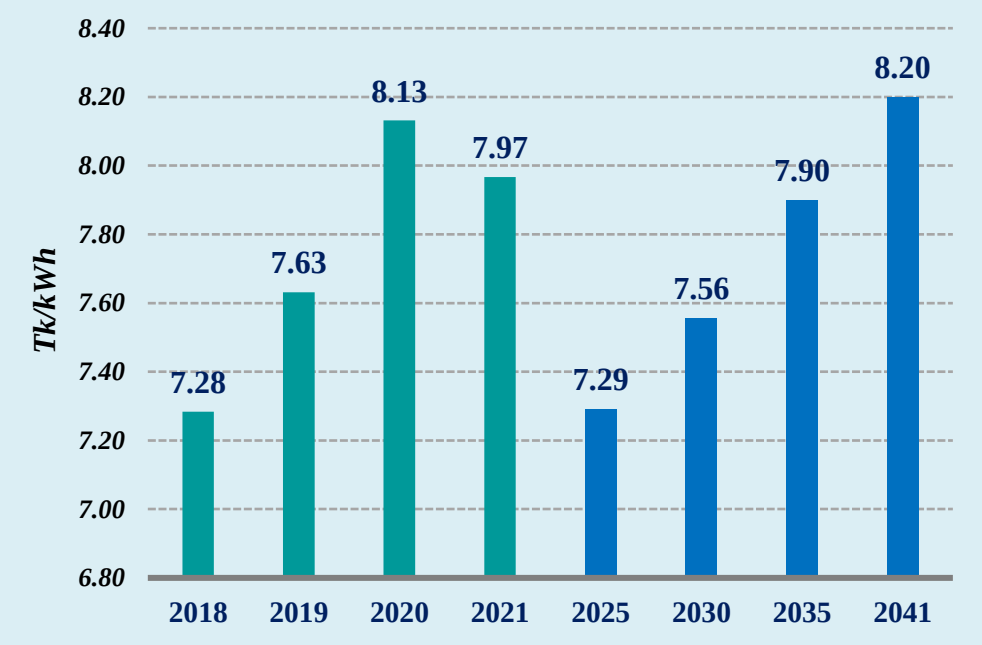
Fuel Type	Unit	2018	2019	2020	2021	2025	2030	2035	2041
Coal	Tk./kWh	1.78	2.36	2.39	2.5	2.7	2.8	2.9	3.05
Gas	Tk./kWh	1.7	1.8	1.9	2.05	2.17	2.2	2.27	2.5
Liquid Fuel	Tk./kWh	4.21	4.25	4.26	4.29	4.39	4.69	4.95	5.25
Import	Tk./kWh	5.68	5.75	5.82	5.89	6.16	6.47	6.74	7.01
Nuclear	Tk./kWh					6.08	6.4	6.67	7.06
Hydro	Tk./kWh	1.01	1.02	1.03	1.05	1.1	1.15	1.2	1.25

15.3.3 Average Cost of Generation

The fuel cost, Fixed and Variable O&M cost are added into calculation of the average cost of generation which is shown in Figure 31. In this study, the average cost of generation per unit will increase from 7.28 Taka/kWh in 2018 to 8.20 Taka/kWh in 2041, which is nearly 13% above than 2018. It can be observed from Figure 31, the average generation cost will increase in 2019 due to increase the share of liquid fuel-based power generation, and it will be decreased after 2020 due to increase in the share of coal-based power generation.

In this analysis, projection of the cost of generation is made based on international economic prices of fuel, not on the domestic prices in Bangladesh. According to this analysis, the average cost of gas-based generation will be higher than that of coal, imported power and hydro-based generation, though it is still considerably lower than that of liquid fuel. The increased share of coal and imported power is supposed to contribute in reducing the average cost of generation.

Figure 31: Average Cost of Generation



Chapter XVI: Conclusion

- In this study, it is found that, in 2017, the maximum demand was around 9,000-9,500 MW (according to NLDC), but according to the data provided by power distribution utilities for high case without EE&C measures, the maximum demand of power is 11,637 MW in 2017, 41,890 MW in 2030 and 82,292 MW in 2041.

- It is also found that for low case without EE & C measures, the maximum demand of power is 10,500 MW in 2017, 37,024 MW in 2030 and 72,379 MW in 2041.

- According to PSMP 2016, without EE&C measures for high case, the electricity demand in 2017 would be 10,600 MW which is expected to be increased to 32,945 MW in 2030 and 67,710 MW in 2041. However, without EE&C measures for low case, the electricity demand in 2017 would be 10,600 MW which is expected to be increased to 31,709 MW in 2030 and 57,946 MW in 2041.

- It is to be mentioned that demand diversity factor and energy efficiency conservation measures are not taken into consideration for this analysis of forecasting demand and preparing the Integrated Power Development Plan.

- The daily load curves are estimated for the 2017-2041 period. It has been seen from the daily load curve 2017; the maximum demand is occurred in the evening time. However, in 2017-2041, maximum demand will be shifted gradually and the load curve would be like the developed countries. It has also been observed that, the maximum demand in the developed countries is found in the daytime. Similarly, more than one peak hour in a single day might be seen in future, which happened in different countries as a consequence of massive industrialization.

- According to the PGCB data, power demand reaches the highest level in April. Therefore, April is the highest power consumption month and December is the lowest consumption month.

- Total generation capacity requirement will be about 94,000 against maximum demand about 82,300 in 2041 for the high case study. Generation capacity share of Gas/LNG based will be higher in comparison to coal-based capacity.

- Total generation capacity requirement will be about 79,507 against maximum demand about 72,379 in 2041 for the low case study. Generation capacity share of Gas/LNG based will be higher in comparison to coal-based capacity.

- Actual reserve margin is considered 28% in 2017. From 2026, reserve margin will decrease gradually and will become 10% in 2041 for the low case study.

- The target of power generation from renewable sources will be 2,800 MW by 2021 and 9,400 MW by 2041 for the high case study. As per the power generation plan from renewable sources according to the generation utilities 2,833 MW capacity will be added by 2041.

- The target of power generation from renewable sources will be 2,600 MW by 2021 and 7,900 MW by 2041 for the low case study. As per the power generation plan from renewable sources according to the generation utilities, 2,833 MW capacity will be added by 2041.

- Target has been set for developing transmission infrastructure to meet forecasted demand. According to the transmission planning target, dispatch capacity will be around double of demand at distribution end.

- According to the transmission plan, the dispatch capacity of 33 kV and 132 kV level would be 18,927 MVA (17,034 MW) in 2017. This capacity will be increased to 97,627 MVA (87,864 MW) in 2030 and 153,735 MVA (138,362 MW) in 2041.

- As per distribution plan, total distribution lines (33 KV and below) would be 476 thousand kilometer in 2020. This distribution lines will be increased to 660 thousand kilometer in 2030 and 783 thousand kilometer in 2041.

- As per the low case study, an investment will be required of US$ 127 billion in generation, US$ 31 billion in transmission and US$ 35 billion in distribution sector by 2041.

- In this analysis, projection of the cost of generation is made based on international economic prices of fuel, not on the domestic prices in Bangladesh. So, the average per unit generation cost will be 7.63 Tk. /kWh in 2019 and 8.20 Tk/kWh in 2041.

- Now the actual generation cost is higher than bulk tariff. So, the proper price of generation cost is required. In this case, the adjustment of bulk tariff is important in each year.

Chapter XVII: Recommendation

- Considering GDP growth & demand diversity factor, low case scenario's forecasted power demand 72,000 MW and net generation capacity 79,500 MW should be logical for 2041.
- Power generation capacity enhancement should be in accordance with the increasing demand forecast.
- Reserve margin of generation capacity should be in between 20-25% higher than actual demand.
- Transmission and distribution infrastructure should be aligned with the increased generation.
- An investment requirement of US$ 193 billion should be ensured for generation, transmission, and distribution by 2041.
- Distribution entities should build a required standard power distribution network.
- The merit order list of power plants/units is to be maintained and followed strictly unless an emergency occurs. One dedicated team to be formed with Single Buyer and PGCB personnel to supervise merit order dispatch periodically.
- Demand side management must be strengthened to control peak demand.
- The total share of imported power through CBET should not exceed 15% of total generation capacity. Import of power should commensurate with seasonal demand. Bangladesh may enter into regional electricity market to trade electricity.
- In order to maintain grid stability, import of power through a single point shall not exceed 10% of the instantaneous generation against demand.
- Public sector generation capacity shall be more than 50% of the total generation capacity.
- The surplus power in lean seasons may be exported to the neighboring countries maintaining the reserve margin.
- Generation capacity is needed to be balanced among the Eastern and Western region of the country followed by the requisite power demand of the concerned Zones/Regions/Areas until sufficient interconnectors and grids are constructed with adequate redundancy.
- Energy Efficiency and Conservation (EE&C) measures shall have to be taken into account for preparing the Integrated Power Development Plan.
- Power generation from renewable resources has to be increased to reduce the dependence on fossil fuel in order to conserve environment alining with the SDG's. Proportion of solar power

may be increased to the grid through different technologies and practices such as net metering system, inverter etc.

- Power transmission networks need to be interconnected into regional, national networks with multiple redundancies to reduce the risk of failure.
- PGCB shall have to develop and maintain the required reliable evacuation and transmission capacity to ensure the required power supply to the distribution entities.
- PGCB may open at least some grid lines and substations for private investment, to get rid of fund crisis, as well as create a competitive environment between public and private. Private investment may bring momentum in constructing transmission network & grid management.
- NLDC should be converted into ISO in order to ensure grid reliability, improve transparency and accountability.
- Co-ordination among generation, transmission and distribution utilities should be strengthened. Utilities should update themselves regularly in connection with the planning & implementation of expansion, up-gradation, and renovation of substations and lines.
- To ensure grid security and to avoid national blackout, the transmission network should have the capability to be separated into independent zone. Each zone should create load generation balance in order to maintain proper voltage, VAR and frequency.
- Integrate all GIS and SCADA into a single system and exchange information in a coordinated way as well as to convert the whole power system into Smart Grid.
- PSMP and PDP should be updated at least every alternate year or as and when required due to change in planning perspective.

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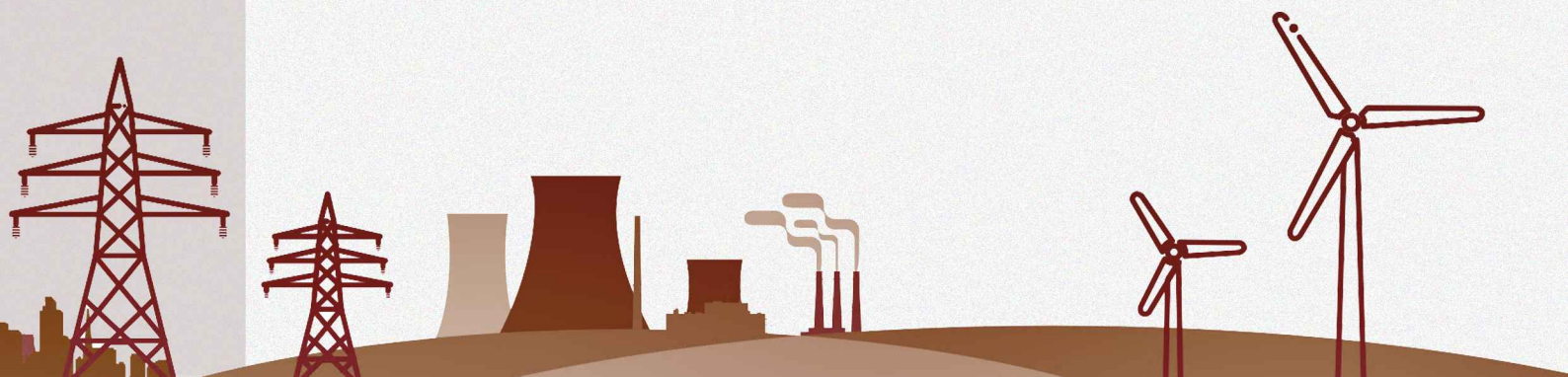
Revisiting
PSMP 2016

Attachments



Zone-wise Forecasted Demand and Growth Rate of Distribution Utilities (2017 to 2041) Attachment-01

Year	BPDB (MW)					NESCO (MW)			WZPDCL (MW)				DESCO (MW)	DPDC (MW)	REB (MW)									Total Demand in 33 kV level (Zonewise collected)	
	Chattogram	Cumilla	Mymensingh	Sylhet	Total	Rajshahi	Rangpur	Total	Khulna	Barishal	Dhaka	Total	Dhaka	Dhaka	Dhaka	Mymensingh	Chattogram	Sylhet	Rajshahi	Rangpur	Khulna	Cumilla	Barishal	Total	Demand (MW)	Growth Rate (%)
2017	973	330	439	234	**1,976**	480	284	**764**	365	107	118	**589**	**938**	**1,531**	1,562	449	399	398	721	419	821	523	208	**5,500**	**11,298**	
2018	1,070	355	472	252	**2,149**	528	312	**840**	408	119	132	**660**	**1,032**	**1,714**	1,835	549	484	478	846	494	921	613	258	**6,478**	**12,874**	**14**
2019	1,182	383	515	271	**2,351**	581	344	**924**	465	136	151	**752**	**1,177**	**1,920**	2,135	644	574	558	956	569	1,021	713	308	**7,478**	**14,603**	**13**
2020	1,342	420	560	296	**2,618**	639	378	**1,017**	535	157	173	**865**	**1,342**	**2,150**	2,456	729	649	628	1,100	654	1,146	808	308	**8,478**	**16,470**	**13**
2021	1,516	460	620	326	**2,922**	703	416	**1,119**	615	180	199	**995**	**1,516**	**2,408**	2,713	804	719	708	1,200	729	1,246	988	308	**9,415**	**18,375**	**12**
2022	1,706	500	680	357	**3,242**	773	457	**1,230**	702	205	227	**1,134**	**1,698**	**2,649**	3,065	884	789	798	1,305	819	1,406	1,083	308	**10,457**	**20,411**	**11**
2023	1,911	547	745	389	**3,591**	850	503	**1,353**	800	234	259	**1,293**	**1,902**	**2,914**	3,365	974	869	888	1,440	899	1,526	1,183	308	**11,452**	**22,505**	**10**
2024	2,134	590	815	422	**3,962**	935	553	**1,489**	904	264	293	**1,461**	**2,111**	**3,205**	3,667	1,074	949	983	1,540	989	1,681	1,283	308	**12,474**	**24,702**	**10**
2025	2,375	640	880	458	**4,353**	1,029	609	**1,638**	1,021	299	331	**1,651**	**2,343**	**3,526**	3,967	1,174	1,044	1,097	1,640	1,074	1,801	1,393	308	**13,498**	**27,009**	**9**
2026	2,637	690	950	495	**4,772**	1,132	670	**1,801**	1,144	335	371	**1,849**	**2,566**	**3,879**	4,227	1,284	1,114	1,241	1,740	1,174	1,941	1,473	308	**14,502**	**29,369**	**9**
2027	2,900	745	1,030	529	**5,204**	1,245	737	**1,982**	1,281	375	415	**2,071**	**2,809**	**4,266**	4,427	1,420	1,209	1,371	1,870	1,274	2,041	1,563	308	**15,483**	**31,815**	**8**
2028	3,176	802	1,103	566	**5,647**	1,369	810	**2,180**	1,435	420	465	**2,320**	**3,076**	**4,693**	4,607	1,552	1,299	1,465	1,970	1,374	2,151	1,683	308	**16,409**	**34,325**	**8**
2029	3,461	870	1,180	600	**6,111**	1,506	891	**2,398**	1,607	470	521	**2,598**	**3,369**	**5,162**	4,787	1,684	1,394	1,568	2,070	1,474	2,256	1,793	308	**17,334**	**36,972**	**8**
2030	3,738	930	1,251	636	**6,555**	1,657	980	**2,638**	1,800	526	583	**2,910**	**3,672**	**5,679**	4,952	1,804	1,494	1,671	2,170	1,564	2,361	1,893	308	**18,217**	**39,670**	**7**
2031	4,027	998	1,320	675	**7,020**	1,790	1,059	**2,849**	1,944	569	630	**3,142**	**4,002**	**6,133**	5,132	1,974	1,644	1,761	2,340	1,694	2,531	2,043	308	**19,427**	**42,573**	**7**
2032	4,330	1,070	1,400	715	**7,515**	1,933	1,144	**3,076**	2,100	614	680	**3,394**	**4,362**	**6,623**	5,342	2,164	1,764	1,881	2,490	1,854	2,671	2,193	308	**20,667**	**45,638**	**7**
2033	4,670	1,150	1,490	760	**8,070**	2,087	1,235	**3,323**	2,267	663	735	**3,665**	**4,755**	**7,153**	5,602	2,424	1,964	2,001	2,615	2,019	2,801	2,333	308	**22,067**	**49,033**	**7**
2034	4,980	1,220	1,580	809	**8,589**	2,254	1,334	**3,588**	2,449	716	793	**3,959**	**5,135**	**7,726**	5,852	2,594	2,114	2,106	2,745	2,189	2,951	2,458	308	**23,317**	**52,314**	**7**
2035	5,300	1,290	1,680	860	**9,130**	2,435	1,441	**3,875**	2,596	759	841	**4,196**	**5,546**	**8,344**	6,112	2,774	2,304	2,236	2,925	2,339	3,106	2,613	308	**24,717**	**55,808**	**7**
2036	5,598	1,370	1,780	910	**9,658**	2,630	1,556	**4,185**	2,752	805	892	**4,448**	**5,935**	**8,761**	6,382	2,944	2,484	2,361	3,115	2,499	3,266	2,753	308	**26,112**	**59,099**	**6**
2037	5,920	1,450	1,870	965	**10,205**	2,840	1,680	**4,520**	2,917	853	945	**4,715**	**6,350**	**9,199**	6,632	3,134	2,654	2,491	3,295	2,649	3,416	2,913	308	**27,492**	**62,481**	**6**
2038	6,290	1,520	1,970	1,020	**10,800**	3,067	1,815	**4,882**	3,092	904	1,002	**4,998**	**6,731**	**9,659**	6,892	3,334	2,834	2,671	3,455	2,839	3,556	3,038	308	**28,927**	**65,996**	**6**
2039	6,670	1,601	2,060	1,086	**11,417**	3,313	1,960	**5,272**	3,246	949	1,052	**5,247**	**7,135**	**10,142**	7,172	3,554	3,044	2,796	3,635	2,999	3,706	3,168	308	**30,382**	**69,595**	**5**
2040	7,060	1,680	2,160	1,150	**12,050**	3,578	2,117	**5,694**	3,409	997	1,104	**5,510**	**7,563**	**10,649**	7,452	3,804	3,264	2,926	3,825	3,179	3,861	3,323	308	**31,942**	**73,408**	**5**
2041	7,390	1,770	2,260	1,210	**12,630**	3,864	2,286	**6,150**	3,579	1,047	1,160	**5,785**	**8,017**	**11,181**	7,712	4,024	3,454	3,076	4,015	3,369	4,061	3,503	308	**33,522**	**77,285**	**5**

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2017							
Public Sector							
1	Shikalbaha 225 MW CCPP	225	218	BPDB	Gas/ HSD	Dec.,2017	•Achieved: 86 % • GT under Test Run
2	Bheramara 360 MW CCPP	410	410	NWPGCL	Gas	SC:May, 2017 ST: Dec.,2017	•Achieved: 94 % •Under Test Run
3	Ashugonj (North) CCPP	360	360	APSCL	Gas	June, 2017	•Under Commercial Operation.
4	Chapai Nababganj 104 MW PP	104	100	BPDB	HFO	August, 2017	•Under Commercial Operation.
5	Ghorasal 365 MW CCPP	365	354	BPDB	Gas	SC:August, 2017; ST: Dec, 2017	•Achieved: 71 % •Under Test Run
	Sub-Total (Public)	**1,464**	**1,442**				
Private Sector							
1	Bosila, Keranigonj 108 MW PP (CLC Power)	108	108	IPP	HFO	22.02.2017	•Under Commercial Operation.
2	Power import from Tripura	60	60	IPP	Import	August, 2017	•Under Commercial Operation.
3	Kamalaghat 50 MW PP	54	54	IPP	HFO	October, 2017	•Achieved: 75 %
4	Kusiara 163 MW CCPP	163	163	IPP	Gas	October, 2017	•Achieved:96 % •Under Test Run
	Sub-Total (Private)	**385**	**385**				
	Total (2017)	**1,849**	**1,827**				
Projects Completion by Year 2018							
Public Sector							
1	Sirajgonj 225 MW CCPP (2nd Unit)	220	220	NWPGCL	Gas/ HSD	SC:Sept., 2017 ST: June,2018	•Achieved: 77 %
2	Siddirganj 335 MW CCPP	335	335	EGCB	Gas	SC:Janu, 2018 ST: June.,2018	•Achieved: 92 %
3	Sirajgonj 225 MW CCPP (3rd Unit)	220	220	NWPGCL	Gas/ HSD	SC: March, 2018 ST: December, 2018	•Achieved: 35 %
4	Bibiana #3 CCPP	400	388	BPDB	Gas	SC: March, 2018 ST: December, 2018	•Achieved: 41 %
5	Barapukuria 275 MW (3rd Unit)	274	252	BPDB	Coal	June, 2018	•Achieved: 70 %
6	Ashugonj 100 MW PP	100	100	APSCL	HFO	December, 2018	
7	Gazipur 100 MW PP	100	100	RPCL	HFO	December, 2018	• Contract Signed
8	Kodda 100 MW PP	100	100	BR Powergen	HFO	December, 2018	
9	Horipur 100 MW PP	100	100	EGCB	HFO	December, 2018	
10	Bagerhat 100 MW PP	100	100	NWPGCL	HFO	December, 2018	
	Sub-Total (Public)	**1,949**	**1,915**				
Private Sector							
1	Power import (2nd HVDC)	500	500	IPP	Import	July, 2018	
2	Daodkandi 200 MW PP(Bangla Track)	200	200	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
3	Noapara 100 MW PP (Bangla Track)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
4	Aorahati, Keranigonj 100 MW (Aggreko)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
5	Brahmangaon, Keranigonj 100 MW (Aggreko)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
6	Keranigonj 300 MW (APR)	300	300	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
7	Bogura 113 MW PP (Confidence)	113	113	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
8	Ashugonj 150 MW PP (Midland)	150	150	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
9	Labonchora,Khulna 110 MW PP (Orion)	110	110	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
10	Kodda, Gazipur 300 MW PP (Summit)	300	300	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
11	Julda, Chattogram 100 MW PP (Accorn)	100	100	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
12	Chandpur 200 MW PP (Desh Energy)	200	200	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
13	Mymenshing 200 MW PP (United)	200	200	IPP	HFO	July, 2018	
14	Potia, Chattogram 54 MW PP (Re-located from Satkhira)	54	54	IPP	HFO	December, 2018	• LOI issued on 07.03.2017
15	Gazipur 150 MW PP (Summit)	149	149	IPP	HFO	December, 2018	•Contract Signed on 12.04.2017
16	Julda, Chattogram 100 MW PP (Accorn Inf) (Unit-2)	100	100	IPP	HFO	December, 2018	• Contract Signed
	Sub-Total (Private)	**2,776**	**2,776**				
	Total (2018)	**4,725**	**4,691**				
Projects Completion by Year 2019							
Public Sector							
1	Khulna 330 MW CCPP (D/F)	336	326	BPDB	Gas/HSD	SC: March, 2019 ST: December, 2019	•Contract Signed
2	Shajibazar 100 MW PP	100	98	BPDB	Gas	June, 2019	• Tender Under Evaluation
3	Ghorasal 4th Unit Repowering	200	398	BPDB	Gas	May, 2019	•Achieved: 31 %
4	Sylhet 150 MW PP Conversion	75	218	BPDB	Gas	June, 2019	•NOA Issued
5	Mirsorai, Chattogram 150 MW PP	150	150	BR Powergen	Gas/HSD	December, 2019	•Tender under evaluation

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
6	Ghorasal 3rd Unit Repowering	206	404	BPDB	Gas	September, 2019	•Achieved: 25%
7	Payra, Potuakhali 1320 Coal Fired Power Plant (1st Phase)	1,320	1,214	BCPCL (NWPGCL)	Imp. Coal	December, 2019	•Achieved: 20%
	Sub-Total (Public)	**2,387**	**2,808**				
Private Sector							
1	Sirajganj 414 MW CCPP	414	414	IPP	Gas/ HSD	SC:January, 2019 ST: May, 2019	•Achieved: 34 %
2	Chandpur 100 MW Power Plant	115	115	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
3	Choumohoni, Noakhali 100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
4	Feni 100 MW Power Plant	114	114	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
5	Meghnaghat 100 MW Power Plant	104	104	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
6	Thakurgaon 100 MW Power Plant	115	115	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
7	Rangpur 100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
8	Bogura 100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
9	Jamalpur 100 MW Power Plant	115	115	IPP	HFO	June, 2019	• Tender Under Evaluation
10	Anowara, Chattogram 300 MW PP (United Enterprise)	300	300	IPP	HFO	May, 2019	• Contract Signed
11	Shikalbaha 110 MW PP (Kornofuly Power)	110	110	IPP	HFO	July, 2019	• LOI issued on 20.08.2017
12	Potiya, Chattogram 100 MW PP (Precision Energy)	116	116	IPP	HFO	October, 2019	• LOI Issued on 18.04.2016
13	Bhairab 50 MW PP	54	54	IPP	HFO	December, 2019	• LOI issued on 20.03.2012
14	Bhola 220 MW CCPP (D/F) (Shapoorji Pallonji)	220	220	IPP	Gas/ HSD	December, 2019	• LOI Issued on 18.04.2016
	Sub-Total (Private)	**2,116**	**2,116**				
	Total (2019)	**4,503**	**4,924**				
Projects Completion by Year 2020							
Public Sector							
1	Sayedpur 150 MW PP	150	146	BPDB	HSD	January, 2020	• Tender Document under preparation.
2	Bibiana South 383 MW CCPP	383	372	BPDB	Gas	SC: January, 2020 ST: December, 2020	• Achieved: 17 %
3	Satkhira 25 MW PP	25	25	BPDB	HFO	June, 2020	
4	Sreepur 150 MW HFO Based Power Plant	150	150	BR Powergen	HFO	December, 2020	
	Sub-Total (Public)	**708**	**693**				
Private Sector							
1	LNG based 750 MW CCPP (Reliance)	718	718	IPP	LNG	June, 2020	• LOI Issued
2	Meghnaghat 500 MW CCPP (Summit)	583	583	IPP	LNG	December, 2020	• Preliminary works
3	Import from Tripura (2nd Phase)	340	340	IPP	Import	December, 2020	• Preliminary works
4	Chattogram 612 MW Coal Fired Power Project (S.Alam Group)-1	612	612	IPP	Imp. Coal	December, 2020	• Preliminary works
5	Chattogram 612 MW Coal Fired Power Project (S.Alam Group)-2	612	612	IPP	Imp. Coal	December, 2020	• Preliminary works
6	Fenchugonj 50 MW Power Plant	55	55	IPP/NRB	Gas	June, 2020	• Approved by purchase committee.
7	Gabtoli 108 MW PP	108	108	IPP	HFO	December, 2020	• Contract Signed
	Sub-Total (Private)	**3,028**	**3,028**				
	Total (2020)	**3,736**	**3,721**				
Projects Completion by Year 2021							
Public Sector							
1	Ashugonj 400 MW CCPP (East)	400	400	APSCL	Gas	January,2021	• Tender Under Evaluation
2	BIFPCL, Rampal, Coal Fired Power Plant	1,320	1,214	BIFPCL	Imp. Coal	March,2021	• Contract Signed
3	Baghabari 100 MW PP Conversion	50	146	BPDB	Gas	June, 2021	• Tender under evaluation.
4	Shajibazar 70 MW PP Conversion	35	102	BPDB	Gas	June, 2021	• Tender under evaluation.
5	Mymenshingh 360 MW CCPP	360	360	RPCL	Gas/HSD	June, 2021	• Land acquisition & Development Completed
6	Barishal 225 MW CCPP (D/F)	225	214	BPDB	Gas/HSD	December, 2021	• Preliminary works
7	Gazaria 350 MW Coal Fired Thermal Power Plant	350	350	RPCL	Imp. Coal	December, 2021	• Land acquisition under process.
	Sub-Total (Public)	**2,740**	**2,786**				
Private Sector							
1	Barishal 307 MW Coal Fired Power Plant	307	307	IPP	Imp. Coal	December, 2021	· LOI Issued
	Sub-Total (Private)	**307**	**307**				
	Total (2021)	**3,047**	**3,093**				

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2022							
Public Sector							
1	Rupsa 800 MW CCPP	800	800	NWPGCL	LNG	January, 2022	• Land acquisition under process.
2	Ghorasal 6th Unit Repowering (Capacity Addition)	206	388	BPDB	Gas	June, 2022	
3	Raozan 550 MW CCPP (1st Unit)	550	530	BPDB	LNG	June, 2022	• PDPP under Preparation
4	Shiddirgonj 550 MW CCPP	550	530	BPDB	LNG	June, 2022	• PDPP under Preparation
5	Bheramara 550 MW CCPP (D/F)	550	530	BPDB	Gas	December, 2022	• PDPP under Preparation
6	Gazipur 450 MW CCPP	450	450	RPCL	LNG	December, 2022	• Land acquisition Complete.
	Sub-Total (Public)	**3,106**	**3,228**				
Private Sector							
1	Adani Power, Jharkhand, India	1,496	1,496	IPP	Import	June, 2022	• LOI Issued on 31.05.2017
2	Maowa, Munshiganj 522 MW Coal Fired Power Project (Orion)	522	522	IPP	Imp. Coal	June, 2022	•Achieved:3 %
3	Dhaka 635 MW Coal Fired Power Project (Orion Group)	635	635	IPP	Imp. Coal	December, 2022	• Contract Signed
	Sub-Total (Private)	**2,653**	**2,653**				
	Total (2022)	**5,759**	**5,881**				
Projects Completion by Year 2023							
Public Sector							
1	Matarbari 1200 MW USCPP	1,200	1,104	CPGCBL	Imp. Coal	December, 2023	• Contract Signed
2	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL)(Phase-1)	700	650	JV CPGCBL	Imp. Coal	December, 2023	• Preliminary works
3	Gazipur 225 MW CCPP	225	225	RPCL	LNG	December, 2023	• Land acquisition Complete.
4	Payra, Potuakhali 1320 Coal Fired Power Plant (2nd Phase)	1,320	1,214	BCPCL (NWPGCL)	Imp. Coal	December, 2023	• Preliminary works
5	Gazaria 500 MW Power Plant	500	500	RPCL	LNG	December, 2023	• Land acquisition Under Process
6	Haripur 410 MW Dual Fuel CCPP	410	410	EGCB	LNG	December, 2023	• Land acquisition is under process
	Sub-Total (Public)	**4,355**	**4,103**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2023)	**4,355**	**4,103**				
Projects Completion by Year 2024							
Public Sector							
1	Moheskhali 1200 MW USCPP (ECA)	1,200	1,104	BPDB	Imp. Coal	December, 2024	• Preliminary works
2	Patuakhali 1320 MW Super Thermal Power Plant (1st Phase)	1,320	1,214	APSCL	Imp. Coal	December, 2024	
3	Patuakhali 1320 (2x660) MW USCPP(Phase-1)	1,320	1,214	RPCL	Imp. Coal	December, 2024	• Land Development work is in progress
4	Payra 1600 (4x400) MW LNG based Combined Cycle Power Plant	1,600	1,600	NWPGCL	LNG	December, 2024	
	Sub-Total (Public)	**5,440**	**5,132**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2024)	**5,440**	**5,132**				
Projects Completion by Year 2025							
Public Sector							
1	Rooppur Nuclear Power Plant (1st Unit)	1,200	1,116	NPCBL	Nuclear	December, 2025	• Loan Agreement Signed.
2	LNG based 750 MW CCPP at Moheskhali-Phase-1	750	730	BPDB	LNG	December, 2025	• Preliminary works
3	Pekua 2×600 MW Ultra Super Critical Coal Based Power Plant (Phase-1)	1,200	1,104	EGCB	Imp. Coal	December, 2025	• Land acquisition is under progress
4	Chattogram 300 MW PP	300	300	RPCL	HFO	December, 2025	• Pre-feasibilty study completed
5	Mirshorai 500 MW CCPP	500	500	RPCL	LNG	December, 2025	• Land allocation got from BEZA
	Sub-Total (Public)	**3,950**	**3,750**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2025)	**3,950**	**3,750**				

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2026							
Public Sector							
1	Rooppur Nuclear Power Plant (2nd Unit)	1,200	1,116	NPCBL	Nuclear	December, 2026	• Loan Agreement Signed.
2	Munsiganj 300-400 MW Super Critical Coal Based Power Plant Project (Phase-1)	400	400	EGCB	Imp. Coal	December, 2026	• Land acquisition is under process
3	Moheshkhali 2x660 MW Coal Fired Thermal Power Plant	1,320	1,214	BR Powergen	Imp. Coal	December, 2026	
4	CPGCBL-Sumitomo 2x600 MW USC Coal fired Power Plant	1,200	1,104	JV CPGCBL	Imp. Coal	December, 2026	
5	Boalkhali, Chattogram 400 MW CCPP (Phase-1)	400	400	RPCL	LNG/HSD	December, 2026	• Land acquisition is under progress
6	Ashugonj 400 MW CCPP	400	400	APSCL	Gas/HSD	December, 2026	
	Sub-Total (Public)	**4,920**	**4,634**				
Private Sector							
1	Import from India-Khulna (Pha-1)	500	500			December, 2026	
	Sub-Total (Private)	**500**	**500**				
	Total (2026)	**5,420**	**5,134**				
Projects Completion by Year 2027							
Public Sector							
1	Mirsorai 400 MW CCPP	400	400	BR Powergen	LNG	December, 2027	
2	Sonagazi, Feni 410 MW Dual Fuel CCPP	410	410	EGCB	LNG	December, 2027	• Land acquisition is under process
3	Moheshkhali 1200 MW USCPP JV of BPDB & CHDHK, China	1,200	1,104	JV BPDB	Imp. Coal	December, 2027	• Preliminary works
4	Moheshkhali 1200 MW USCPP JV of BPDB & TNB, Malaysia	1,200	1,104	JV BPDB	Imp. Coal	December, 2027	• Preliminary works
	Sub-Total (Public)	**3,210**	**3,018**				
Private Sector							
1	Bibiana - Meghalaya (Phase-1)	500	500	IPP	Import	December, 2027	
2	GMR	500	500	IPP	Import	December, 2027	
	Sub-Total (Private)	**1,000**	**1,000**				
	Total (2027)	**4,210**	**4,018**				
Projects Completion by Year 2028							
Public Sector							
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-1)	600	600	JV CPGCBL	LNG	June, 2028	
2	Matarbari 1200 MW USCPP (Phase 2)	1,200	1,104	CPGCBL	Imp. Coal	December, 2028	
3	Moheshkhali 1200 MW USCPP JV of BPDB & SEPCO, China	1,200	1,104	JV BPDB	Imp. Coal	December, 2028	• Preliminary works
4	LNG based 750 MW CCPP at Moheskhali (Phase-2)	750	730	BPDB	LNG	December, 2028	• Preliminary works
5	Bheramara 550 MW CCPP (2nd Phase)	400	400	NWPGCL	LNG	December, 2028	
	Sub-Total (Public)	**4,150**	**3,938**				
Private Sector							
1	Import from India-Khulna (Pha-2)	500	500				
	Sub-Total (Private)	**500**	**500**				
	Total (2028)	**4,650**	**4,438**				
Projects Completion by Year 2029							
Public Sector							
1	LNG based 750 MW CCPP at Moheskhali (Phase-3)	750	730	BPDB	LNG	December, 2029	• Preliminary works
2	Ashugonj 450 MW CCPP-1	400	400	APSCL	LNG	December, 2029	
3	Horipur 550 MW CCPP	550	530	BPDB	LNG	December, 2029	
4	Munsiganj 300-400 MW Super Critical Coal Based Power Plant Project (Phase-1)	400	400	EGCB	Imp. Coal	December, 2029	• Land acquisition is under process
5	Moheshkhali 1200 MW USCPP JV of BPDB & KEPCO, South Korea	1,200	1,104	JV BPDB	Imp. Coal	December, 2029	• Preliminary works
	Sub-Total (Public)	**3,300**	**3,164**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2029)	**3,300**	**3,164**				
Projects Completion by Year 2030							
Public Sector							
1	Boalkhali, Chattogram 400 MW CCPP (Phase-2)	400	400	RPCL	LNG/HSD	December, 2030	• Land acquisition is under progress
2	Ashugonj 450 MW CCPP-2	400	400	APSCL	LNG	December, 2030	
3	Pekua 2×600 MW Ultra Super Critical Coal Based Power Plant (Phase-2)	1,200	1,104	EGCB	Imp. Coal	December, 2030	• Land acquisition is under progress
4	Import from Bhutan (Kuri Project)	1,125	1,125	BPDB	Import	December, 2030	• Preliminary works

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
5	Patuakhali 1320 MW Super Thermal Power Plant (2nd Phase)	1,320	1,214	APSCL	Imp. Coal	December, 2030	
	Sub-Total (Public)	**4,445**	**4,243**				
Candidate							
1	Kaptai Extension	100	100	BPDB	Hydro	December, 2030	Candidate
	Sub-Total	**100**	**100**				
	Total (2030)	**4,545**	**4,343**				
Projects Completion by Year 2031							
Public Sector							
1	Pakua 450 MW Dual Fuel CCPP	450	450	EGCB	LNG	December, 2031	• Land acquisition is under process
2	Patuakhali 1320 (2x660) MW USCPP(Phase-2)	1,320	1,214	RPCL	Imp. Coal	December, 2031	• Land Development work is in progress
4	North-Bengal (Gaibandha) 1320 MW Super Thermal Power Plant	1,320	1,214	APSCL	D.Coal	December, 2031	
5	Raozan 550 MW CCPP (2nd Unit)	550	530	BPDB	LNG	December, 2031	
	Sub-Total (Public)	**3,640**	**3,408**				
Candidate							
	Sub-Total (Private)	**0**	**0**				
	Total (2031)	**3,640**	**3,408**				
Projects Completion by Year 2032							
Public Sector							
1	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL)(Phase-2)	700	700	JV CPGCBL	Imp. Coal	December, 2032	• Preliminary works
2	Dighipara 1000 MW Ultra Super Critical Thermal Power Plant Project	1,000	920	NWPGCL	D.Coal	December, 2032	
	Sub-Total (Public)	**1,700**	**1,620**				
Candidate							
1	Bibiana - Meghalaya (Phase-2)	500	500	IPP	Import	June, 2032	
	Sub-Total	**500**	**500**				
	Total (2032)	**2,200**	**2,120**				
Projects Completion by Year 2033							
Public Sector							
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-2)	600	600	JV CPGCBL	LNG	June, 2033	
2	Rooppur Nuclear Power Plant (3rd Unit)	1,200	1,116	NPCBL	Nuclear	December, 2033	
3	Shaghata, Gaibandha 400 MW CCPP	400	400	APSCL	LNG	December, 2033	
	Sub-Total (Public)	**2,200**	**2,116**				
Candidate							
1	100 MW GT	100	100		HSD	December, 2033	Candidate
2	100 MW GT	100	100		HSD	December, 2033	Candidate
3	Case 2 HVDC (Barapkuria S/S) Phase II	500	500			December, 2033	
	Sub-Total (Private)	**700**	**700**				
	Total (2033)	**2,900**	**2,816**				
Projects Completion by Year 2034							
Public Sector							
1	Fulchari 400 MW CCPP-1	400	400	APSCL	LNG	December, 2034	
2	Meghnagat 550 MW CCPP	550	530	BPDB	LNG	December, 2034	
3	Rooppur Nuclear Power Plant (4th Unit)	1,200	1,116	NPCBL	Nuclear	December, 2034	
	Sub-Total (Public)	**2,150**	**2,046**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase III From Nepal (Purnea - Barapukuria) (Nepal)	500	500	IPP	Import	June, 2034	
3	100 MW GT	100	100		HSD		Candidate
	Sub-Total (Private)	**600**	**600**				
	Total (2034)	**2,750**	**2,646**				
Projects Completion by Year 2035							
Public Sector							
1	Fulchari 400 MW CCPP-2	400	400	APSCL	LNG	December, 2035	
2	LNG based 750 MW CCPP at Moheskhali (Phase-4)	750	730	BPDB	LNG	December, 2035	• Preliminary works
3	Sylhet 250 MW CCPP	250	242	BPDB	LNG	December, 2035	
4	Shiddirgonj 800 MW CCPP	800	775	BPDB	LNG	December, 2035	
5	Fenchugonj 550 MW CCPP	550	530	BPDB	LNG	December, 2035	
6	Baghabari 800 MW CCPP	800	775	BPDB	LNG	December, 2035	
	Sub-Total (Public)	**3,550**	**3,452**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase IV From Nepal (Purnea - Barapukuria) (Nepal)	500	500	IPP	Import	June, 2035	
2	Import from India	500	500		Import	June, 2035	

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
3	Import from China/Myanmar (Ph-1)	500	500		Import	June, 2035	
4	100 MW GT	100	100		HSD	December, 2035	
	Sub-Total (Private)	**1,600**	**1,600**				
	Total (2035)	**5,150**	**5,052**				
Projects Completion by Year 2036							
Public Sector							
1	Moheshkhali 1000 MW USCPP	1,000	920	BPDB	Imp. Coal	December, 2036	
2	Sundarganj 400 MW CCPP	400	400	APSCL	LNG	December, 2036	
	Sub-Total (Public)	**1,400**	**1,320**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase V From Nepal (Purnea - Barapukuria) (Nepal)	500	500		Import	June, 2036	
2	Payra 800 MW CCPP	800	800		LNG	December, 2036	Candidate
3	Payra 800 MW CCPP	800	800		LNG	December, 2036	Candidate
4	Gas 500 after 2035	500	500		LNG	December, 2036	Candidate
5	Gas 500 after 2035	500	500		LNG	December, 2036	Candidate
6	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
8	100 MW GT	100	100		HSD	December, 2036	Candidate
9	100 MW GT	100	100		HSD	December, 2036	Candidate
10	100 MW GT	100	100		HSD	December, 2036	Candidate
	Sub-Total (Private)	**3,900**	**3,900**				
	Total (2036)	**5,300**	**5,220**				
Projects Completion by Year 2037							
Public Sector							
1	South West Nuclear Power Plant (5th Unit)	1,116	1,116				
	Sub-Total (Public)	**1,116**	**1,116**				
Candidate							
1	Case 2 HVDC (Barapkuria S/S) Phase III	500	500		Import	June, 2037	Candidate
2	Import from India	500	500		Import	June, 2037	Candidate
3	Import from China/Myanmar (Ph-2)	500	500		Import	June, 2037	Candidate
4	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
	Sub-Total (Private)	**1,750**	**1,750**				
	Total (2037)	**2,866**	**2,866**				
Projects Completion by Year 2038							
Public Sector							
1	Moheshkhali 1000 MW USCPP	1,000	920	BPDB	Imp. Coal	December, 2038	
2	South West Nuclear Power Plant (6th Unit)	1,116	1,116				
	Sub-Total (Public)	**2,116**	**2,036**				
Candidate							
1	Import from India	500	500	IPP	Import	June, 2038	
2	Import from India	500	500	IPP	Import	June, 2038	
3	800 MW CCPP	800	800		LNG	December, 2038	Candidate
4	Gas 500 after 2035	500	500		LNG	December, 2038	Candidate
5	Gas 250 after 2035	250	250		LNG	December, 2038	Candidate
6	Gas 250 after 2035	250	250		LNG	December, 2038	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2038	Candidate
	Sub-Total (Private)	**3,050**	**3,050**				
	Total (2038)	**5,166**	**5,086**				
Projects Completion by Year 2039							
Candidate							
1	Import from India	500	500		Import	June, 2039	
2	Import from India	500	500		Import	June, 2039	
3	800 MW CCPP	800	800		LNG	December, 2039	Candidate
4	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
5	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
6	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
8	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
9	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
10	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
	Sub-Total (Private)	**3,550**	**3,550**				
	Total (2039)	**3,550**	**3,550**				
Projects Completion by Year 2040							
Public Sector							
1	Bogura 400 MW CCPP	400	400	APSCL	LNG	December, 2040	
	Sub-Total (Public)	**400**	**400**				
Candidate							
1	Import from India	500	500		Import	June, 2040	
2	Import from India	500	500		Import	June, 2040	
3	800 MW CCPP	800	800		LNG	December, 2040	Candidate
4	800 MW CCPP	800	800		LNG	December, 2040	Candidate

List of Committed and Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
5	800 MW CCPP	800	800		LNG	December, 2040	Candidate
6	800 MW CCPP	800	800		LNG	December, 2040	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2040	Candidate
8	Gas 250 after 2035	250	250		LNG	December, 2040	Candidate
9	100 MW GT	100	100		HSD	December, 2040	Candidate
10	100 MW GT	100	100		HSD	December, 2040	Candidate
11	100 MW GT	100	100		HSD	December, 2040	Candidate
	Sub-Total	**5,000**	**5,000**				
	Total (2040)	**5,400**	**5,400**				
Projects Completion by Year 2041							
Public Sector							
1	LNG based 750 MW CCPP at Chattogram	750	750	RPCL	LNG	December, 2041	• Preliminary works
	Sub-Total (Public)	**750**	**750**				
Candidate							
1	800 MW CCPP	800	800		LNG	December, 2041	Candidate
2	100 MW GT	100	100		HSD	December, 2041	Candidate
3	100 MW GT	100	100		HSD	December, 2041	Candidate
4	100 MW GT	100	100		HSD	December, 2041	Candidate
5	100 MW GT	100	100		HSD	December, 2041	Candidate
6	100 MW GT	100	100		HSD	December, 2041	Candidate
	Sub-Total (Private)	**1,300**	**1,300**				
	Total (2041)	**2,050**	**2,050**				

Total	**100,461**	**98,433**	**MW**

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2017							
Public Sector							
1	Shikalbaha 225 MW CCPP	225	218	BPDB	Gas/ HSD	Dec.,2017	•Achieved: 86 % • GT Under Test Run
2	Bheramara 360 MW CCPP	410	410	NWPGCL	Gas	SC:May, 2017 ST: Dec.,2017	•Achieved: 94 % •Under Test Run
3	Ashugonj (North) CCPP	360	360	APSCL	Gas	June, 2017	•Under Commercial Operation.
4	Chapai Nawabganj 104 MW PP	104	100	BPDB	HFO	August, 2017	•Under Commercial Operation.
5	Ghorasal 365 MW CCPP	365	354	BPDB	Gas	SC:August, 2017 ST: Dec, 2017	•Achieved: 71 % •Under Test Run
	Sub-Total (Public)	**1,464**	**1,442**				
Private Sector							
1	Bosila, Keranigonj 108 MW PP (CLC Power)	108	108	IPP	HFO	22.02.2017	•Under Commercial Operation.
2	Power import from Tripura	60	60	IPP	Import	August, 2017	•Under Commercial Operation.
3	Kamalaghat 50 MW PP	54	54	IPP	HFO	October, 2017	•Achieved: 75 %
4	Kusiara 163 MW CCPP	163	163	IPP	Gas	October, 2017	•Achieved:96 % •Under Test Run
	Sub-Total (Private)	**385**	**385**				
	Total (2017)	**1,849**	**1,827**				
Projects Completion by Year 2018							
Public Sector							
1	Sirajgonj 225 MW CCPP (2nd Unit)	220	220	NWPGCL	Gas/ HSD	SC:Sept., 2017 ST: June,2018	•Achieved: 77 %
2	Siddirganj 335 MW CCPP	335	335	EGCB	Gas	SC:Janu, 2018 ST: June.,2018	•Achieved: 92 %
3	Sirajgonj 225 MW CCPP (3rd Unit)	220	220	NWPGCL	Gas/ HSD	SC: March, 2018 ST: December, 2018	•Achieved: 35 %
4	Bibiana #3 CCPP	400	388	BPDB	Gas	SC: March, 2018 ST: December, 2018	•Achieved: 41 %
5	Barapukuria 275 MW (3rd Unit)	274	252	BPDB	Coal	June, 2018	•Achieved: 70 %
6	Gazipur 100 MW PP	100	100	RPCL	HFO	December, 2018	• Contract Signed
7	Ashugonj 100 MW PP	100	100	APSCL	HFO	December, 2018	
8	Kodda 100 MW PP	100	100	BR Powergen	HFO	December, 2018	
9	Horipur 100 MW PP	100	100	EGCB	HFO	December, 2018	
10	Bagerhat 100 MW PP	100	100	NWPGCL	HFO	December, 2018	
	Sub-Total (Public)	**1,949**	**1,915**				
Private Sector							
1	Power import (2nd HVDC)	500	500	IPP	Import	July, 2018	
2	Daodkandi 200 MW PP (Bangla Track)	200	200	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
3	Noapara 100 MW PP (Bangla Track)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
4	Aorahati, Keranigonj 100 MW (Aggreko)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
5	Brahmangaon, Keranigonj 100 MW (Aggreko)	100	100	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
6	Keranigonj 300 MW (APR)	300	300	IPP	HSD	March,2018	• LOI Issued on 10.08.2017
7	Bogura 113 MW PP (Confidence)	113	113	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
8	Ashugonj 150 MW PP (Midland)	150	150	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
9	Labonchora,Khulna 110 MW PP (Orion)	110	110	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
10	Kodda, Gazipur 300 MW PP (Summit)	300	300	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
11	Julda ,CTG 100 MW PP (Accorn)	100	100	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
12	Chandpur 200 MW PP (Desh Energy)	200	200	IPP	HFO	July, 2018	• LOI Issued on 10.08.2017
13	Mymenshing 200 MW PP (United)	200	200	IPP	HFO	July, 2018	
14	Potia, Chattogram 54 MW PP (Re-located from Satkhira)	54	54	IPP	HFO	December, 2018	• LOI issued on 07.03.2017
15	Gazipur 150 MW PP (Summit)	149	149	IPP	HFO	December, 2018	•Contract Signed on 12.04.2017
16	Julda, Chattogram 100 MW PP (Accorn Inf) (Unit-2)	100	100	IPP	HFO	December, 2018	• Contract Signed
	Sub-Total (Private)	**2,776**	**2,776**				
	Total (2018)	**4,725**	**4,691**				
Projects Completion by Year 2019							
Public Sector							
1	Khulna 330 MW CCPP (D/F)	336	326	BPDB	Gas/HSD	SC: March, 2019 ST: December, 2019	•Contract Signed
2	Shajibazar 100 MW PP	100	98	BPDB	Gas	June, 2019	• Tender Under Evaluation
3	Ghorasal 4th Unit Repowering	200	398	BPDB	Gas	May, 2019	•Achieved: 31 %
4	Sylhet 150 MW PP Conversion	75	218	BPDB	Gas	June, 2019	•NOA Issued
5	Mirsorai, Chattogram 150 MW PP	150	150	BR Powergen	Gas/HSD	December, 2019	•Tender under evaluation
6	Ghorasal 3rd Unit Repowering	206	404	BPDB	Gas	September, 2019	•Achieved: 25%
7	Payra, Potuakhali 1320 Coal Fired Power Plant (1st Phase)	1,320	1,214	BCPCL (NWPGCL)	Imp. Coal	December, 2019	•Achieved: 20%
	Sub-Total (Public)	**2,387**	**2,808**				
Private Sector							
1	Sirajganj 414 MW CCPP	414	414	IPP	Gas/ HSD	SC:January, 2019 ST: May, 2019	•Achieved: 34 %
2	Chandpur 100 MW Power Plant	115	115	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
3	Choumohoni, Noakhali 100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
4	Feni 100 MW Power Plant	114	114	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
5	Meghnaghat 100 MW Power Plant	104	104	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
6	Thakurgaon 100 MW Power Plant	115	115	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
7	Rangpur100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
8	Bogura 100 MW Power Plant	113	113	IPP	HFO	March, 2019	• LOI issued on 15.05.2017
9	Jamalpur 100 MW Power Plant	115	115	IPP	HFO	June, 2019	• Tender Under Evaluation
10	Anowara, Chattogram 300 MW PP (United Enterprise)	300	300	IPP	HFO	May, 2019	• Contract Signed
11	Shikalbaha 110 MW PP (Kornofuly Power)	110	110	IPP	HFO	July, 2019	• LOI issued on 20.08.2017
12	Potiya, Chattogram 100 MW PP (Precision Energy)	116	116	IPP	HFO	October, 2019	• LOI Issued on 18.04.2016
13	Bhairab 50 MW PP	54	54	IPP	HFO	December, 2019	• LOI issued on 20.03.2012
14	Bhola 220 MW CCPP (D/F) (Shapoorji Pallonji)	220	220	IPP	Gas/ HSD	December, 2019	• LOI Issued on 18.04.2016
	Sub-Total (Private)	**2,116**	**2,116**				
	Total (2019)	**4,503**	**4,924**				

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2020							
Public Sector							
1	Bibiana South 383 MW CCPP	383	372	BPDB	Gas	SC: January, 2020 ST: December, 2020	•Achieved: 17 %
	Sub-Total (Public)	**383**	**372**				
Private Sector							
1	LNG based 750 MW CCPP (Reliance)	718	718	IPP	LNG	June, 2020	• LOI Issued
2	Import from Tripura (2nd Phase)	340	340	IPP	Import	December, 2020	• Preliminary works
3	Chattogram 612 MW Coal Fired Power Project (S.Alam Group)-1	612	612	IPP	Imp. Coal	December, 2020	
4	Chattogram 612 MW Coal Fired Power Project (S.Alam Group)-2	612	612	IPP	Imp. Coal	December, 2020	
5	Fenchugonj 50 MW Power Plant	55	55	IPP/NRB	Gas	June, 2020	• Approved by purchase committee.
6	Gabtoli 108 MW PP	108	108	IPP	HFO	December, 2020	• Contract Signed
	Sub-Total (Private)	**2,445**	**2,445**				
	Total (2020)	**2,828**	**2,817**				
Projects Completion by Year 2021							
Public Sector							
1	Ashugonj 400 MW CCPP (East)	400	400	APSCL	Gas	January,2021	• Tender Under Evaluation
2	BIFPCL, Rampal, Coal Fired Power Plant	1,320	1,214	BIFPCL	Imp. Coal	March,2021	• Contract Signed
3	Baghabari 100 MW PP Conversion	50	146	BPDB	Gas	June, 2021	• Tender under evaluation.
4	Shajibazar 70 MW PP Conversion	35	102	BPDB	Gas	June, 2021	• Tender under evaluation.
	Sub-Total (Public)	**1,805**	**1,862**				
Private Sector							
1	Barishal 307 MW Coal Fired Power Plant	307	307	IPP	Imp. Coal	December, 2021	· LOI Issued
	Sub-Total (Private)	**307**	**307**				
	Total (2021)	**2,112**	**2,169**				
Projects Completion by Year 2022							
Public Sector							
1	Ghorasal 6th Unit Repowering (Capacity Addition)	206	388	BPDB	Gas	June, 2022	
	Sub-Total (Public)	**206**	**388**				
Private Sector							
1	Adani Power, Jharkhand, India	1,496	1,496	IPP	Import	June, 2022	• LOI Issued on 31.05.2017
2	Maowa, Munshiganj 522 MW Coal Fired Power Project (Orion)	522	522	IPP	Imp. Coal	June, 2022	•Achieved:3 %
3	Dhaka 635 MW Coal Fired Power Project (Orion Group)	635	635	IPP	Imp. Coal	December, 2022	• Contract Signed
	Sub-Total (Private)	**2,653**	**2,653**				
	Total (2022)	**2,859**	**3,041**				
Projects Completion by Year 2023							
Public Sector							
1	Matarbari 1200 MW USCPP	1,200	1,104	CPGCBL	Imp. Coal	December, 2023	• Contract Signed
	Sub-Total (Public)	**1,200**	**1,104**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2023)	**1,200**	**1,104**				
Projects Completion by Year 2024							
Public Sector							
1	Moheskhali 1200 MW USCPP (ECA)	1,200	1,104	BPDB	Imp. Coal	December, 2024	• Preliminary works
	Sub-Total (Public)	**1,200**	**1,104**				

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2024)	**1,200**	**1,104**				
Projects Completion by Year 2025							
Public Sector							
1	Rooppur Nuclear Power Plant (1st Unit)	1,200	1,116	NPCBL	Nuclear	December, 2025	• Loan Agreement Signed.
	Sub-Total (Public)	**1,200**	**1,116**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2025)	**1,200**	**1,116**				
Projects Completion by Year 2026							
Public Sector							
1	Rooppur Nuclear Power Plant (2nd Unit)	1,200	1,116	NPCBL	Nuclear	December, 2026	• Loan Agreement Signed.
	Sub-Total (Public)	**1,200**	**1,116**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2026)	**1,200**	**1,116**				
Projects Completion by Year 2027							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2027)	**0**	**0**				
Projects Completion by Year 2028							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2028)	**0**	**0**				
Projects Completion by Year 2029							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2029)	**0**	**0**				
Projects Completion by Year 2030							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2030)	**0**	**0**				
Projects Completion by Year 2031							
Public Sector							
	Sub-Total (Public)	**0**	**0**				

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2031)	**0**	**0**				
Projects Completion by Year 2032							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2032)	**0**	**0**				
Projects Completion by Year 2033							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2033)	**0**	**0**				
Projects Completion by Year 2034							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2034)	**0**	**0**				
Projects Completion by Year 2035							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2035)	**0**	**0**				
Projects Completion by Year 2036							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2036)	**0**	**0**				
Projects Completion by Year 2037							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2037)	**0**	**0**				
Projects Completion by Year 2038							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2038)	**0**	**0**				

List of Committed Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2039							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2039)	**0**	**0**				
Projects Completion by Year 2040							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2040)	**0**	**0**				
Projects Completion by Year 2041							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2041)	**0**	**0**				

Total (Committed)	**23,676**	**23,909**	**MW**

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2017							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2017)	**0**	**0**				
Projects Completion by Year 2018							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2018)	**0**	**0**				
Projects Completion by Year 2019							
Public Sector							
	Sub-Total (Public)	**0**	**0**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2019)	**0**	**0**				
Projects Completion by Year 2020							
Public Sector							
1	Sayedpur 150 MW PP	150	146	BPDB	HSD	January, 2020	• Tender Document under preparation.
2	Satkhira 25 MW PP	25	25	BPDB	HFO	June, 2020	
3	Sreepur 150 MW HFO Based Power Plant	150	150	BR Powergen	HFO	December, 2020	
	Sub-Total (Public)	**325**	**321**				
Private Sector							
1	Meghnaghat 500 MW CCPP (Summit)	583	583	IPP	LNG	December, 2020	• Preliminary works
	Sub-Total (Private)	**583**	**583**				
	Total (2020)	**908**	**904**				
Projects Completion by Year 2021							
Public Sector							
1	Mymenshingh 360 MW CCPP	360	360	RPCL	Gas/HSD	June, 2021	
2	Barishal 225 MW CCPP (D/F)	225	214	BPDB	Gas/HSD	December, 2021	• Preliminary works
3	Gazaria 350 MW Coal Fired Thermal Power Plant	350	350	RPCL	Imp. Coal	December, 2021	• Land acquisition under process.
	Sub-Total (Public)	**935**	**924**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2021)	**935**	**924**				
Projects Completion by Year 2022							
Public Sector							
1	Rupsa 800 MW CCPP	800	800	NWPGCL	LNG	January, 2022	• Land acquisition under process.
2	Raozan 550 MW CCPP (1st Unit)	550	530	BPDB	LNG	June, 2022	• PDPP under Preparation
3	Shiddirgonj 550 MW CCPP	550	530	BPDB	LNG	June, 2022	• PDPP under Preparation
4	Bheramara 550 MW CCPP (D/F)	550	530	BPDB	Gas	December, 2022	• PDPP under Preparation
5	Gazipur 450 MW CCPP	450	450	RPCL	LNG	December, 2022	• Land acquisition Complete.
	Sub-Total (Public)	**2,900**	**2,840**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2022)	**2,900**	**2,840**				

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2023							
Public Sector							
1	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL) (Phase-1)	700	650	JV CPGCBL	Imp. Coal	December, 2023	• Preliminary works
2	Gazipur 225 MW CCPP	450	225	RPCL	LNG	December, 2023	• Land acquisition Complete.
3	Payra, Potuakhali 1320 Coal Fired Power Plant (2nd Phase)	1,320	1,214	BCPCL (NWPGCL)	Imp. Coal	December, 2023	• Preliminary works
4	Gazaria 500 MW Power Plant	350	500	RPCL	LNG	December, 2023	• Land acquisition Under Process
5	Haripur 410 MW Dual Fuel CCPP	410	410	EGCB	LNG	December, 2023	• Land acquisition is under process
	Sub-Total (Public)	**3,230**	**2,999**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2023)	**3,230**	**2,999**				
Projects Completion by Year 2024							
Public Sector							
1	Patuakhali 1320 MW Super Thermal Power Plant (1st Phase)	1,320	1,214	APSCL	Imp. Coal	December, 2024	
2	Patuakhali 1320 (2x660) MW USCPP (Phase-1)	1,320	1,214	RPCL	Imp. Coal	December, 2024	
3	Payra 1600 (4x400) MW LNG based Combined Cycle Power Plant	1,600	1,600	NWPGCL	LNG	December, 2024	
	Sub-Total (Public)	**4,240**	**4,028**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2024)	**4,240**	**4,028**				
Projects Completion by Year 2025							
Public Sector							
1	LNG based 750 MW CCPP at Moheskhali-Phase-1	750	730	BPDB	LNG	December, 2025	• Preliminary works
2	Pekua 2×600 MW Ultra Super Critical Coal Based Power Plant (Phase-1)	1,200	1,104	EGCB	Imp. Coal	December, 2025	• Land acquisition is under progress
3	Chattogram 300 MW PP	300	300	RPCL	HFO	December, 2025	
4	Mirshorai 500 MW CCPP	400	500	RPCL	LNG	December, 2025	
	Sub-Total (Public)	**2,650**	**2,634**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2025)	**2,650**	**2,634**				
Projects Completion by Year 2026							
Public Sector							
1	Munsiganj 300-400 MW Super Critical Coal Based Power Plant Project (Phase-1)	400	400	EGCB	Imp. Coal	December, 2026	• Land acquisition is under process
2	Moheshkhali 2x660 MW Coal Fired Thermal Power Plant	1,320	1,214	BR Powergen	Imp. Coal	December, 2026	
3	CPGCBL-Sumitomo 2x600 MW USC Coal fired Power Plant	1,200	1,104	JV CPGCBL	Imp. Coal	December, 2026	
4	Boalkhali,Chattogram 400 MW CCPP (Phase-1)	225	400	RPCL	LNG/HSD	December, 2026	
5	Ashugonj 400 MW CCPP	400	400	APSCL	Gas/HSD	December, 2026	
	Sub-Total (Public)	**3,545**	**3,518**				
Candidate							
1	Import from India-Khulna (Pha-1)	500	500			December, 2026	
	Sub-Total	**500**	**500**				
	Total (2026)	**4,045**	**4,018**				

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2027							
Public Sector							
1	Mirsorai 400 MW CCPP	400	400	BR Powergen	LNG	December, 2027	
2	Sonagazi, Feni 410 MW Dual Fuel CCPP	410	410	EGCB	LNG	December, 2027	• Land acquisition is under process
3	Moheshkhali 1200 MW USCPP JV of BPDB & CHDHK, China	1,200	1,104	JV BPDB	Imp. Coal	December, 2027	• Preliminary works
4	Moheshkhali 1200 MW USCPP JV of BPDB & TNB, Malaysia	1,200	1,104	JV BPDB	Imp. Coal	December, 2027	• Preliminary works
	Sub-Total (Public)	**3,210**	**3,018**				
Private Sector							
1	Bibiana - Meghalaya (Phase-1)	500	500	IPP	Import	December, 2027	
2	Import from India (GMR)	500	500	IPP	Import	December, 2027	
	Sub-Total (Private)	**1,000**	**1,000**				
	Total (2027)	**4,210**	**4,018**				
Projects Completion by Year 2028							
Public Sector							
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-1)	600	600	JV CPGCBL	LNG	June, 2028	
2	Matarbari 1200 MW USCPP (Phase 2)	1,200	1,104	CPGCBL	Imp. Coal	December, 2028	
3	Moheshkhali 1200 MW USCPP JV of BPDB & SEPCO, China	1,200	1,104	JV BPDB	Imp. Coal	December, 2028	• Preliminary works
4	LNG based 750 MW CCPP at Moheskhali (Phase-2)	750	730	BPDB	LNG	December, 2028	• Preliminary works
5	Bheramara 550 MW CCPP (2nd Phase)	550	400	NWPGCL	LNG	December, 2028	
	Sub-Total (Public)	**4,300**	**3,938**				
Candidate							
1	Import from India-Khulna (Pha-2)	500	500				
	Sub-Total	**500**	**500**				
	Total (2028)	**4,800**	**4,438**				
Projects Completion by Year 2029							
Public Sector							
1	LNG based 750 MW CCPP at Moheskhali (Phase-3)	750	730	BPDB	LNG	December, 2029	• Preliminary works
2	Ashugonj 450 MW CCPP-1	450	400	APSCL	LNG	December, 2029	
3	Horipur 550 MW CCPP	550	530	BPDB	LNG	December, 2029	
4	Munsiganj 300-400 MW Super Critical Coal Based Power Plant Project (Phase-1)	400	400	EGCB	Imp. Coal	December, 2029	• Land acquisition is under process
5	Moheshkhali 1200 MW USCPP JV of BPDB & KEPCO, South Korea	1,200	1,104	JV BPDB	Imp. Coal	December, 2029	• Preliminary works
	Sub-Total (Public)	**3,350**	**3,164**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2029)	**3,350**	**3,164**				
Projects Completion by Year 2030							
Public Sector							
1	Boalkhali, Chattogram 400 MW CCPP (Phase-2)	225	400	RPCL	LNG/HSD	December, 2030	
2	Ashugonj 450 MW CCPP-2	450	400	APSCL	LNG	December, 2030	
3	Pekua 2×600 MW Ultra Super Critical Coal Based Power Plant (Phase-2)	1,200	1,104	EGCB	Imp. Coal	December, 2030	• Land acquisition is under progress
4	Import from Bhutan (Kuri Project)	1,125	1,125	BPDB	Import	December, 2030	
5	Patuakhali 1320 MW Super Thermal Power Plant (2nd Phase)	1,320	1,214	APSCL	Imp. Coal	December, 2030	
	Sub-Total (Public)	**4,320**	**4,243**				

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Candidate							
1	Kaptai Extension	100	100	BPDB	Hydro	December, 2030	
	Sub-Total	**100**	**100**				
	Total (2030)	**4,420**	**4,343**				
Projects Completion by Year 2031							
Public Sector							
1	Pakua 450 MW Dual Fuel CCPP	450	450	EGCB	LNG	December, 2031	• Land acquisition is under process
2	Patuakhali 1320 (2x660) MW USCPP(Phase-2)	1,320	1,214	RPCL	Imp. Coal	December, 2031	
3	North-Bengal (Gaibanda) 1320 MW Super Thermal Power Plant	1,320	1,214	APSCL	D.Coal	December, 2031	
4	Raozan 550 MW CCPP (2nd Unit)	550	530	BPDB	LNG	December, 2031	
	Sub-Total (Public)	**3,640**	**3,408**				
Private Sector							
	Sub-Total (Private)	**0**	**0**				
	Total (2031)	**3,640**	**3,408**				
Projects Completion by Year 2032							
Public Sector							
1	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL) (Phase-2)	700	700	JV CPGCBL	Imp. Coal	December, 2032	• Preliminary works
2	Dighipara 1000 MW Ultra Super Critical Thermal Power Plant Project	1,000	920	NWPGCL	D.Coal	December, 2032	
	Sub-Total (Public)	**1,700**	**1,620**				
Private Sector							
1	Bibiana - Meghalaya (Phase-2)	500	500	IPP	Import	June, 2032	
	Sub-Total (Private)	**500**	**500**				
	Total (2032)	**2,200**	**2,120**				
Projects Completion by Year 2033							
Public Sector							
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-2)	600	600	JV CPGCBL	LNG	June, 2033	
2	Rooppur Nuclear Power Plant (3rd Unit)	1,200	1,116	NPCBL	Nuclear	December, 2033	
3	Shaghata, Gaibandha 400 MW CCPP	400	400	APSCL	LNG	December, 2033	
	Sub-Total (Public)	**2,200**	**2,116**				
Candidate							
1	100 MW GT	100	100		HSD	December, 2033	Candidate
2	100 MW GT	100	100		HSD	December, 2033	Candidate
3	Case 2 HVDC (Barapkuria S/S) Phase II	500	500		Import	December, 2033	
	Sub-Total	**700**	**700**				
	Total (2033)	**2,900**	**2,816**				
Projects Completion by Year 2034							
Public Sector							
1	Fulchari 400 MW CCPP-1	400	400	APSCL	LNG	December, 2034	
2	Meghnagat 550 MW CCPP	550	530	BPDB	LNG	December, 2034	
3	Rooppur Nuclear Power Plant (4th Unit)	1,200	1,116	NPCBL	Nuclear	December, 2034	
	Sub-Total (Public)	**2,150**	**2,046**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase III From Nepal (Purnea - Barapukuria) (Nepal)	500	500	IPP	Import	June, 2034	
2	100 MW GT	100	100		HSD		Candidate
	Sub-Total	**600**	**600**				
	Total (2034)	**2,750**	**2,646**				

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Projects Completion by Year 2035							
Public Sector							
1	Fulchari 400 MW CCPP-2	400	400	APSCL	LNG	December, 2035	
2	LNG based 750 MW CCPP at Moheskhali (Phase-4)	750	730	BPDB	LNG	December, 2035	• Preliminary works
3	Sylhet 250 MW CCPP	250	242	BPDB	LNG	December, 2035	
4	Shiddirgonj 800 MW CCPP	800	775	BPDB	LNG	December, 2035	
5	Fenchugonj 550 MW CCPP	550	530	BPDB	LNG	December, 2035	
6	Baghabari 800 MW CCPP	800	775	BPDB	LNG	December, 2035	
	Sub-Total (Public)	**3,550**	**3,452**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase IV From Nepal (Purnea - Barapukuria) (Nepal)	500	500	IPP	Import	June, 2035	
2	Import from India	500	500		Import	June, 2035	
3	Import from China/Myanmar (Ph-1)	500	500		Import	June, 2035	
4	100 MW GT	100	100		HSD		
	Sub-Total	**1,600**	**1,600**				
	Total (2035)	**5,150**	**5,052**				
Projects Completion by Year 2036							
Public Sector							
1	Moheshkhali 1000 MW USCPP	1,000	920	BPDB	Imp. Coal	December, 2036	
2	Sundarganj 400 MW CCPP	400	400	APSCL	LNG	December, 2036	
	Sub-Total (Public)	**1,400**	**1,320**				
Candidate							
1	Case 3 HVDC (Barapkuria S/S) Phase V From Nepal(Purnea - Barapukuria) (Nepal)	500	500		Import	June, 2036	
2	Payra 800 MW CCPP	800	800		LNG	December, 2036	Candidate
3	Payra 800 MW CCPP	800	800		LNG	December, 2036	Candidate
4	Gas 500 after 2035	500	500		LNG	December, 2036	Candidate
5	Gas 500 after 2035	500	500		LNG	December, 2036	Candidate
6	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
8	100 MW GT	100	100		HSD	December, 2036	Candidate
9	100 MW GT	100	100		HSD	December, 2036	Candidate
10	100 MW GT	100	100		HSD	December, 2036	Candidate
	Sub-Total	**3,900**	**3,900**				
	Total (2036)	**5,300**	**5,220**				
Projects Completion by Year 2037							
Public Sector							
1	South West Nuclear Power Plant (5th Unit)	1,116	1,116				
	Sub-Total (Public)	**1,116**	**1,116**				
Candidate							
1	Case 2 HVDC (Barapkuria S/S) Phase III	500	500		Import	June, 2037	Candidate
2	Import from India	500	500		Import	June, 2037	Candidate
3	Import from China/Myanmar (Ph-2)	500	500		Import	June, 2037	Candidate
4	Gas 250 after 2035	250	250		LNG	December, 2036	Candidate
	Sub-Total	**1,750**	**1,750**				
	Total (2037)	**2,866**	**2,866**				
Projects Completion by Year 2038							
Public Sector							
1	Moheshkhali 1000 MW USCPP	1,000	920	BPDB	Imp. Coal	December, 2038	
2	Gas 250 after 2035	250	250		LNG	December, 2038	
3	South West Nuclear Power Plant (6th Unit)	1,116	1,116				
	Sub-Total (Public)	**2,366**	**2,286**				

List of Candidate Power Plants for High Case Studies (2017 to 2041) Attachment-02

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Ownership	Type of Fuel	Expected Commissioning Date	Remarks
Candidate							
1	Import from India	500	500	IPP	Import	June, 2038	
2	Import from India	500	500	IPP	Import	June, 2038	
3	800 MW CCPP	800	800		LNG	December, 2038	Candidate
4	Gas500 after 2035	500	500		LNG	December, 2038	Candidate
5	Gas250 after 2035	250	250		LNG	December, 2038	Candidate
6	Gas250 after 2035	250	250		LNG	December, 2038	Candidate
	Sub-Total	**2,800**	**2,800**				
	Total (2038)	**5,166**	**5,086**				
Projects Completion by Year 2039							
Candidate							
1	Import from India	500	500		Import	June, 2039	
2	Import from India	500	500		Import	June, 2039	
3	800 MW CCPP	800	800		LNG	December, 2039	Candidate
4	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
5	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
6	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
8	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
9	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
10	Gas 250 after 2035	250	250		LNG	December, 2039	Candidate
	Sub-Total	**3,550**	**3,550**				
	Total (2039)	**3,550**	**3,550**				
Projects Completion by Year 2040							
Public Sector							
1	Bogura 400 MW CCPP	400	400	APSCL	LNG	December, 2040	
	Sub-Total (Public)	**400**	**400**				
Candidate							
1	Import from India	500	500		Import	June, 2040	
2	Import from India	500	500		Import	June, 2040	
3	800 MW CCPP	800	800		LNG	December, 2040	Candidate
4	800 MW CCPP	800	800		LNG	December, 2040	Candidate
5	800 MW CCPP	800	800		LNG	December, 2040	Candidate
6	800 MW CCPP	800	800		LNG	December, 2040	Candidate
7	Gas 250 after 2035	250	250		LNG	December, 2040	Candidate
8	Gas 250 after 2035	250	250		LNG	December, 2040	Candidate
9	100 MW GT	100	100		HSD	December, 2040	Candidate
10	100 MW GT	100	100		HSD	December, 2040	Candidate
11	100 MW GT	100	100		HSD	December, 2040	Candidate
	Sub-Total	**5,000**	**5,000**				
	Total (2040)	**5,400**	**5,400**				
Projects Completion by Year 2041							
Public Sector							
1	LNG based 750 MW CCPP at Chattogram	750	750	RPCL	LNG	December, 2041	• Preliminary works
	Sub-Total (Public)	**750**	**750**				
Candidate							
1	800 MW CCPP	800	800		LNG	December, 2040	Candidate
2	100 MW GT	100	100		HSD	December, 2041	Candidate
3	100 MW GT	100	100		HSD	December, 2041	Candidate
4	100 MW GT	100	100		HSD	December, 2041	Candidate
5	100 MW GT	100	100		HSD	December, 2041	Candidate
6	100 MW GT	100	100		HSD	December, 2041	Candidate
	Sub-Total	**1,300**	**1,300**				
	Total (2041)	**2,050**	**2,050**				

Total (Candidate)	**76,660**	**74,524**	**MW**

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2017								
Public Sector								
1	Shikalbaha 225 MW CCPP	225	218	Gas/HSD	BPDB	Dec.,2017	•Under Commercial Operation.	
2	Bheramara 360 MW CCPP	410	410	Gas	NWPGCL	SC:May, 2017 ST: Dec.,2017	•Under Commercial Operation.	
3	Ashugonj (North) CCPP	360	360	Gas	APSCL	June, 2017	•Under Commercial Operation.	
4	Chapai Nawabganj 104 MW PP	104	100	HFO	BPDB	August, 2017	•Under Commercial Operation.	
	Sub-Total (Public)	**1099**	**1088**					
Private Sector								
1	Bosila, Keranigonj 108 MW PP (CLC Power)	108	108	HFO	IPP	22.02.2017	•Under Commercial Operation.	
2	Power import from Tripura	60	60	Import	IPP	August, 2017	•Under Commercial Operation.	
3	Kusiara 163 MW CCPP	163	163	Gas	IPP	October, 2017	•Under Commercial Operation.	
	Sub-Total (Private)	**331**	**331**					
	Total (2017)	**1430**	**1419**					
Projects Completion by Year 2018								
Public Sector								
1	Ghorasal 365 MW CCPP	365	354	Gas	BPDB	2/5/2018	•Under Commercial Operation	Running
2	Sirajgonj 225 MW CCPP (2nd Unit)	220	220	Gas/HSD	NWPGCL	2/5/2018	•Under Commercial Operation	Running
3	Siddirganj 335 MW CCPP	335	335	Gas	EGCB	SCApril, 2018 ST: Dec.,2018	•Achieved: 92 % •GT COD: 30.04.2018	Ongoing
4	Sirajgonj 225 MW CCPP (3rd Unit)	220	220	Gas/HSD	NWPGCL	SC: August, 2018 ST: December, 2018	•Achieved: 87 %	Ongoing
5	Barapukuria 275 MW (3rd Unit)	274	252	Coal	BPDB	1/1/2018	•Under Commercial Operation	Running
6	Gazipur 100 MW PP	100	100	HFO	RPCL	December, 2018	•Achieved: 52%	Ongoing
7	Bagerhat 100 MW PP	100	100	HFO	NWPGCL	December, 2018	•Achieved: 66%	Ongoing
	Sub-Total (Public)	**1614**	**1581**					
Private Sector								
1	Kamalaghat 50 MW PP	54	54	HFO	IPP	1/1/2018	•Under Commercial Operation	Running
2	Daodkandi 200 MW PP (Bangla Track)	200	200	HSD	IPP	4/27/2018	•Under Commercial Operation	Running
3	Noapara 100 MW PP (Bangla Track)	100	100	HSD	IPP	4/18/2018	•Under Commercial Operation	Running
4	Aorahati, Keranigonj 100 MW (Aggreko)	100	100	HSD	IPP	6/30/2018	•Under Commercial Operation	Running
5	Brahmangaon, Keranigonj 100 MW (Aggreko)	100	100	HSD	IPP	5/30/2018	•Under Commercial Operation	Running
6	Keranigonj 300 MW (APR)	300	300	HSD	IPP	August,2018	•Under Test Run	Ongoing
7	Bogura 113 MW PP (Confidence) (Unit-2)	113	113	HFO	IPP	September, 2018	•Achieved: 80%	Ongoing
8	Ashugonj 150 MW PP (Midland)	150	150	HFO	IPP	August,2018	•Achieved: 91%	Ongoing
9	Labonchora, Khulna 105 MW PP (Orion)	105	105	HFO	IPP	August,2018	•Achieved: 70 %	Ongoing
10	Kodda, Gazipur 300 MW PP (Summit)	300	300	HFO	IPP	5/10/2018	•Under Commercial Operation	Running
11	Julda, Chattogram 100 MW PP (Unit-3) (Accorn)	100	100	HFO	IPP	September, 2018	•Achieved: 90%	Ongoing
12	Chandpur 200 MW PP (Desh Energy)	200	200	HFO	IPP	August,2018	•Achieved: 92%	Ongoing
13	Mymenshing 200 MW PP (United)	200	200	HFO	IPP	6/16/2018	•Under Commercial Operation	Running
14	Power import (2nd HVDC)	500	500	Import	IPP	August,2018		Ongoing
15	Gazipur 150 MW PP (Summit)	149	149	HFO/Gas	IPP	12/7/2018	•Under Commercial Operation	Running
	Sub-Total (Private)	**2671**	**2671**					
	Total (2018)	**4285**	**4252**					

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2019								
Public Sector								
1	Bibiana #3 CCPP	400	388	Gas	BPDB	SC:Nov, 2018 ST: May, 2019	•Achieved: 83%	Ongoing
2	Shajibazar 100 MW PP	100	98	Gas	BPDB	June, 2019	•Achieved: 20%	Ongoing
3	Ghorasal 4th Unit Repowering	200	398	Gas	BPDB	May, 2019	•Achieved: 66%	Ongoing
4	Sylhet 150 MW PP Conversion	75	218	Gas	BPDB	June, 2019	•Achieved: 31%	Ongoing
5	Mirsorai, Chattogram 150 MW PP	150	150	HFO/Gas	BR Powergen	September, 2019	•Achieved: 16%	Ongoing
6	Ghorasal 3rd Unit Repowering	206	404	Gas	BPDB	September, 2019	•Achieved: 71%	Ongoing
	Sub-Total (Public)	**1131**	**1656**					
Private Sector								
1	Sirajganj 414 MW CCPP	414	414	Gas/HSD	IPP	SC:January, 2019 ST: May, 2019	•Achieved: 90% •GT COD: 04.10.2018	Ongoing
2	Baghabari 200 MW PP (Paramount Btrac)	200	200	HSD	IPP	January,2019	•Achieved: 75%	Ongoing
3	Shikalbaha 105 MW PP (Baraka-Royal Homes)	105	105	HFO	IPP	January,2019	•Achieved: 40%	Ongoing
4	Chandpur 100 MW Power Plant	115	115	HFO	IPP	July, 2019	•Achieved: 15 %	Ongoing
5	Choumohoni, Noakhali 100 MW Power Plant	113	113	HFO	IPP	July, 2019	•Achieved: 12%	Ongoing
6	Feni 100 MW Power Plant	114	114	HFO	IPP	August, 2019	• Contract Signed	Ongoing
7	Meghnaghat 100 MW Power Plant	104	104	HFO	IPP	July, 2019	•Achieved: 3 %	Ongoing
8	Thakurgaon 100 MW Power Plant	115	115	HFO	IPP	August, 2019	•Achieved: 5%	Ongoing
9	Rangpur 100 MW Power Plant	113	113	HFO	IPP	June, 2019	•Achieved: 35%	Ongoing
10	Bogura 100 MW Power Plant (Unit-1)	113	113	HFO	IPP	June, 2019	•Achieved: 40%	Ongoing
11	Julda, Chattogram 100 MW PP (Accorn Inf) (Unit-2)	100	100	HFO	IPP	March, 2019	•Achieved: 7 %	Ongoing
12	Tangail 22 MW PP (Polli Power)	22	22	HFO	IPP	March, 2019	•Achieved: 5 %	Ongoing
13	Jamalpur 100 MW Power Plant (United)	115	115	HFO	IPP	August, 2019	•Achieved: 50%	Ongoing
14	Anowara, Chattogram 300 MW PP (United Enterprise)	300	300	HFO	IPP	May, 2019	•Achieved: 10%	Ongoing
15	Potia, Chattogram 54 MW PP (Re-located from Satkhira)	54	54	HFO	IPP	June, 2019	•Achieved: 45 %	Ongoing
16	Shikalbaha 110 MW PP (Kornofuly Power)	110	110	HFO	IPP	July, 2019	• Contract Signed	Ongoing
17	Potiya, Chattogram 100 MW PP (Precision Energy)	116	116	HFO	IPP	July, 2019	•Achieved: 35 %	Ongoing
18	Bhairab 50 MW PP	54	54	HFO	IPP	July, 2019	•Achieved: 50 %	Ongoing
19	Manikgonj 162 MW PP	162	162	HFO	IPP	July, 2019	• LOI issued on 2.04.2018	Ongoing
20	Kanchan, Narayangonj 55 MW PP	55	55	HFO	IPP	August, 2019	•Achieved: 5%	Ongoing
	Sub-Total (Private)	**2594**	**2594**					
	Total (2019)	**3725**	**4250**					
Projects Completion by Year 2020								
Public Sector								
1	Payra, Potuakhali 1320 Coal Fired Power Plant (1st Phase)	1320	1214	I. Coal	BCPCL (NWPGCL)	January, 2020	•Achieved: 55%	Ongoing
2	Bibiana South 383 MW CCPP	383	372	Gas	BPDB	SC: January, 2020 ST: December, 2020	•Achieved: 41%	Ongoing
3	Khulna 330 MW CCPP (D/F)	336	326	Gas/HSD	BPDB	SC: May, 2020 ST: December, 2020	•Contract Signed	Ongoing
4	Sayedpur 150 MW PP	161	161	HSD	BPDB	December, 2020	• NOA issued	Ongoing
5	Sreepur 150 MW Power Plant	150	150	HFO	BR Powergen	December, 2020	• NOA issued	Ongoing
	Sub-Total (Public)	**2350**	**2223**					

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) **Attachment-03**

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Private Sector								
1	Bhola 220 MW CCPP (D/F) (Shapoorji Pallonji)	220	220	Gas/HSD	IPP	January, 2020	•Achieved: 17%	Ongoing
2	Import from Tripura (2nd Phase)	340	340	Import	IPP	December, 2020	• Preliminary works	Ongoing
	Sub-Total (Private)	**560**	**560**					
	Total (2020)	**2910**	**2783**					
Projects Completion by Year 2021								
Public Sector								
1	Ashugonj 400 MW CCPP (East)	400	400	Gas	APSCL	January,2021	• Contract Signed	Ongoing
2	BIFPCL, Rampal, Coal Fired Power Plant	1320	1214	I. Coal	BIFPCL	June, 2021	• Progress: 16%	Ongoing
3	Mymenshingh 360 MW CCPP	360	360	Gas/HSD	RPCL	June, 2021	• Tender under Evaluation.	Ongoing
	Sub-Total (Public)	**2080**	**1974**					
Private Sector								
1	LNG based 750 MW CCPP (Reliance)	718	718	LNG	IPP	June, 2021	• LOI Issued	Ongoing
2	Meghnaghat 500 MW CCPP (Summit)	583	583	LNG	IPP	June, 2021	• LOI Issued	Ongoing
3	Meghnaghat 600 MW CCPP (Unique)	600	600	LNG	IPP	Dec, 2021	• LOI Issued	Ongoing
	Sub-Total (Private)	**1901**	**1901**					
	Total (2021)	**3981**	**3875**					
Projects Completion by Year 2022								
Public Sector								
1	Rupsa 800 MW CCPP	800	800	LNG	NWPGCL	January, 2022	• Tender under Evaluation.	Planning
2	Ghorasal 6th Unit Repowering (Capacity Addition)	206	388	Gas	BPDB	June, 2022		Planning
3	Raozan 550 MW CCPP (1st Unit)	550	530	LNG	BPDB	June, 2022	• PDPP under Preparation	Planning
4	Bheramara 550 MW CCPP (D/F)	550	530	Gas/LNG	BPDB	December, 2022	• PDPP under Preparation	Planning
5	Payra 1200 MW LNG based CCPP (1st Phase)	1200	1164	LNG	NWPGCL	December, 2022		Planning
	Sub-Total (Public)	**3306**	**3412**					
Private Sector								
1	Adani Power, Jharkhand, India	1496	1496	Import	IPP	June, 2022	• Contract Signed	Ongoing
	Sub-Total (Private)	**1496**	**1496**					
	Total (2022)	**4802**	**4908**					
Projects Completion by Year 2023								
Public Sector								
1	Shiddirgonj 550 MW CCPP	550	530	LNG	BPDB	June, 2023	• PDPP under Preparation	Planning
2	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-1)	600	600	LNG	JV CPGCBL	June, 2023		Planning
3	Gazaria 600 MW LNG Based Power Plant	600	600	LNG	RPCL	December, 2023	• Land acquisition under process.	Planning
4	Barishal 225 MW CCPP (D/F)	225	214	Gas/HSD	BPDB	December, 2023	• Preliminary works	Planning
5	Payra, Potuakhali 1320 Coal Fired Power Plant (2nd Phase)	1320	1214	I. Coal	BCPCL (NWPGCL)	December, 2023	• Preliminary works	Planning
6	Haripur 250 MW CCPP	250	243	LNG	BPDB	December, 2023	• Land acquisition is under process	Planning
	Sub-Total (Public)	**3545**	**3401**					
Private Sector								
1	Barishal 307 MW Coal Fired Power Plant	307	307	I. Coal	IPP	January, 2023	•Achieved: 6%	Ongoing
2	Mirshorai 1320 MW Coal Fired PP (Hangzhou Group)	1320	1240	I. Coal	IPP	June, 2023	· LOI Issued	Ongoing
	Sub-Total (Private)	**1627**	**1547**					
	Total (2023)	**5172**	**4948**					

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2024								
Public Sector								
1	Matarbari 1200 MW USCPP	1200	1200	I. Coal	CPGCBL	June, 2024	•Achieved: 18 %	Ongoing
2	Patuakhali 1320 (2x660) MW USCPP(Phase-1)	1320	1214	I. Coal	RPCL	December, 2024	• Land Development work is in progress	Planning
3	Payra 1200 MW LNG based CCPP (2nd Phase)	1200	1164	LNG	NWPGCL	December, 2024		Planning
	Sub-Total (Public)	**3720**	**3578**					
Private Sector								
1	Chattogram 2x612 MW Coal Fired Power Project (S.Alam Group)	1224	1224	I. Coal	IPP	January, 2024	•Achieved:21%	Ongoing
	Sub-Total (Private)	**1224**	**1224**					
	Total (2024)	**4944**	**4802**					
Projects Completion by Year 2025								
Public Sector								
1	Rooppur Nuclear Power Plant (1st Unit)	1200	1116	Nuclear	NPCBL	December, 2025	• Loan Agreement Signed.	Ongoing
2	LNG based 1200 MW CCPP at Moheskhali-Phase-1	1200	1164	LNG	BPDB	December, 2025	• MoU Signed with GE	Planning
3	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL)(Phase-1)	700	650	I. Coal	JV CPGCBL	December, 2025	• Preliminary works	Planning
	Sub-Total (Public)	**3100**	**2930**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2025)	**3100**	**2930**					
Projects Completion by Year 2026								
Public Sector								
1	Rooppur Nuclear Power Plant (2nd Unit)	1200	1116	Nuclear	NPCBL	December, 2026	• Loan Agreement Signed.	Ongoing
2	CPGCBL-Sumitomo 2x600 MW USC Power Plant	1200	1104	I. Coal	JV CPGCBL	December, 2026		Planning
3	Patuakhali 1320 MW USC Power Plant (1st Phase)	1320	1214	I. Coal	APSCL	December, 2026		
4	Moheskhali 1200 MW USCPP (ECA)	1200	1104	I. Coal	BPDB	December, 2026	• Preliminary works	Planning
5	Boalkhali, Chattogram 400 MW CCPP (Phase-1)	400	400	LNG	RPCL	December, 2026	• Land acquisition is under progress	Planning
6	Payra 1200 MW LNG based CCPP (3rd Phase)	1200	1164	LNG	NWPGCL	December, 2026		
	Sub-Total (Public)	**6520**	**6102**					
Private Sector								
1	Power Import (Pha-1)	500	500	Import	Unknown	December, 2026		Planning
	Sub-Total (Private)	**500**	**500**					
	Total (2026)	**7020**	**6602**					
Projects Completion by Year 2027								
Public Sector								
1	Gazipur 450 MW CCPP	450	450	LNG	RPCL	December, 2027	• Land acquisition Complete.	
2	Sonagazi, Feni 410 MW Dual Fuel CCPP	410	410	LNG	EGCB	December, 2027	• Land acquisition is under process	Planning
3	Munsiganj 300-400 MW USC Power Plant Project (Phase-1)	400	400	I. Coal	EGCB	December, 2027	• Land acquisition is under process	Planning
4	LNG based 1200 MW CCPP at Moheskhali-Phase-2	1200	1164	LNG	BPDB	December, 2027	• MoU Signed with GE	Planning
5	Gazipur 225 MW CCPP	225	225	LNG	RPCL	December, 2027	• Land acquisition Complete.	Planning
6	Moheshkhali 1200 MW USCPP(Phase-2)	1200	1104	I. Coal	JV BPDB	December, 2027	• Preliminary works	Planning
	Sub-Total (Public)	**3885**	**3753**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2027)	**3885**	**3753**					

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2028								
Public Sector								
1	Matarbari 1200 MW USCPP (Phase 2)	1200	1104	I. Coal	CPGCBL	December, 2028		Planning
2	LNG based 1200 MW CCPP at Moheskhali-Phase-3	1200	1164	LNG	BPDB	December, 2028	• MoU Signed with GE	Planning
3	Mirsorai 400 MW CCPP	400	400	LNG	BR Powergen	December, 2027		Planning
	Sub-Total (Public)	**2800**	**2668**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2028)	**2800**	**2668**					
Projects Completion by Year 2029								
Public Sector								
1	Munsiganj 300-400 MW USC Power Plant Project (Phase-2)	400	400	I. Coal	EGCB	December, 2029	• Land acquisition is under process	Planning
2	Moheshkhali 1200 MW USCPP (Phase-3)	1200	1104	I. Coal	JV BPDB	December, 2029	• Preliminary works	Planning
	Sub-Total (Public)	**1600**	**1504**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2029)	**1600**	**1504**					
Projects Completion by Year 2030								
Public Sector								
1	Ashugonj 450 MW CCPP-1	400	400	LNG	APSCL	December, 2030		Planning
	Sub-Total (Public)	**400**	**400**					
Private Sector								
1	Maowa, Munshiganj 522 MW Coal Fired Power Project (Orion)	522	522	I. Coal	IPP	June, 2030	•Achieved:3 %	Ongoing
	Sub-Total (Private)	**522**	**522**					
	Total (2030)	**922**	**922**					
Projects Completion by Year 2031								
Public Sector								
1	Moheshkhali 1200 MW USCPP (Phase-5)	1200	1104	I. Coal	JV BPDB	December, 2031	• Preliminary works	Planning
	Sub-Total (Public)	**1200**	**1104**					
Private Sector								
1	Dhaka 635 MW Coal Fired Power Project (Orion Group)	635	635	I. Coal	IPP	December, 2031	• Contract Signed	Ongoing
	Sub-Total (Private)	**635**	**635**					
	Total (2031)	**1835**	**1739**					
Projects Completion by Year 2032								
Public Sector								
1	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL) (Phase-2)	700	700	I. Coal	JV CPGCBL	December, 2032	• Preliminary works	Planning
2	Boalkhali, Chattogram 400 MW CCPP (Phase-2)	400	400	LNG	RPCL	December, 2032	• Land acquisition is under progress	Planning
3	Mirshorai 500 MW CCPP	500	500	LNG	RPCL	December, 2032	• Land allocation got from BEZA	Planning
4	Patuakhali 1320 MW USC Power Plant (2nd Phase)	1320	1214	I. Coal	APSCL	December, 2032		Planning
	Sub-Total (Public)	**2920**	**2814**					
Private Sector								
1	Bibiana - Meghalaya (Phase-2)	500	500	Import	IPP	June, 2032		Planning
2	Power Import (Pha-2)	500	500	Import	IPP	December, 2032		Planning
	Sub-Total (Private)	**1000**	**1000**					
	Total (2032)	**3920**	**3814**					
Projects Completion by Year 2033								
Public Sector								
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-2)	600	600	LNG	JV CPGCBL	June, 2033		Planning
2	Kaptai Extension	100	100	Hydro	BPDB	December, 2033	Candidate	Planning

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
3	Raozan 550 MW CCPP (2nd Unit)	550	530	LNG	BPDB	December, 2033		Planning
4	Moheshkhali 1200 MW USCPP (Phase-4)	1200	1104	I. Coal	JV BPDB	December, 2033	• Preliminary works	Planning
5	Rooppur Nuclear Power Plant (3rd Unit)	1200	1116	Nuclear	NPCBL	December, 2033		Planning
6	Shaghata, Gaibandha 400 MW CCPP	400	400	LNG	APSCL	December, 2033		Planning
	Sub-Total (Public)	**4050**	**3850**					
Candidate								
1	Case 2 HVDC (Barapkuria S/S) Phase II	500	500	Import	Unknown	December, 2033		Planning
2	Power Import (Pha-3)	500	500	Import	IPP	December, 2033		Planning
	Sub-Total	**1000**	**1000**					
	Total (2033)	**5050**	**4850**					
Projects Completion by Year 2034								
Public Sector								
1	Fulchari 400 MW CCPP-1	400	400	LNG	APSCL	December, 2034		Planning
2	Ashugonj 450 MW CCPP-2	400	400	LNG	APSCL	December, 2034		Planning
3	Patuakhali 1320 (2x660) MW USCPP(Phase-2)	1320	1214	I. Coal	RPCL	December, 2034	• Land Development work is in progress	Planning
4	Meghnagat 550 MW CCPP	550	530	LNG	BPDB	December, 2034		Planning
	Sub-Total (Public)	**2670**	**2544**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase III From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	IPP	June, 2034		
2	100 MW GT	100	100	HSD	Unknown	June, 2034	Candidate	
3	100 MW GT	100	100	HSD	Unknown	June, 2034	Candidate	
	Sub-Total	**700**	**700**					
	Total (2034)	**3370**	**3244**					
Projects Completion by Year 2035								
Public Sector								
1	Fulchari 400 MW CCPP-2	400	400	LNG	APSCL	December, 2035		Planning
2	Baghabari 800 MW CCPP	800	775	LNG	BPDB	December, 2035		Planning
	Sub-Total (Public)	**1200**	**1175**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase IV From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	Unknown	June, 2035		Planning
2	Import from India	500	500	Import	Unknown	June, 2035		Planning
3	Import from China/Myanmar (Ph-1)	500	500	Import	Unknown	June, 2035		Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2035		Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2035		Planning
	Sub-Total	**1700**	**1700**					
	Total (2035)	**2900**	**2875**					
Projects Completion by Year 2036								
Public Sector								
1	Moheshkhali 1000 MW USCPP	1000	920	I. Coal	BPDB	December, 2036		Planning
2	Sundarganj 400 MW CCPP	400	400	LNG	APSCL	December, 2036		Planning
	Sub-Total (Public)	**1400**	**1320**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase V From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	Unknown	June, 2036		Planning
2	Gas 250 after 2035	250	250	LNG	Unknown	December, 2036	Candidate	Planning
3	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
	Sub-Total	**1050**	**1050**					
	Total (2036)	**2450**	**2370**					
Projects Completion by Year 2037								
Public Sector								
1	South West Nuclear Power Plant (4th Unit)	1116	1116	Nuclear	NPCBL	December, 2037		
	Sub-Total (Public)	**1116**	**1116**					

List of Committed and Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Candidate								
1	Case 2 HVDC (Barapkuria S/S) Phase III	500	500	Import	Unknown	June, 2037	Candidate	Planning
2	Import from India	500	500	Import	Unknown	June, 2037	Candidate	Planning
3	Import from China/Myanmar (Ph-2)	500	500	Import	Unknown	June, 2037	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2037	Candidate	Planning
	Sub-Total	**1750**	**1750**					
	Total (2037)	**2866**	**2866**					
Projects Completion by Year 2038								
Public Sector								
1	Moheshkhali 1000 MW USCPP	1000	920	I. Coal	BPDB	December, 2038		Planning
2	South West Nuclear Power Plant (5th Unit)	1116	1116	Nuclear	NPCBL	December, 2038		Planning
	Sub-Total (Public)	**2116**	**2036**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2038		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2038	Candidate	Planning
3	Gas 250 after 2035	250	250	LNG	Unknown	December, 2038	Candidate	Planning
	Sub-Total	**1550**	**1550**					
	Total (2038)	**3666**	**3586**					
Projects Completion by Year 2039								
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2039		Planning
2	Import from India	500	500	Import	Unknown	December, 2039		Planning
3	800 MW CCPP	800	800	LNG	Unknown	December, 2039	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
5	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
6	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
7	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
	Sub-Total	**2800**	**2800**					
	Total (2039)	**2800**	**2800**					
Projects Completion by Year 2040								
Public Sector								
1	Bogura 400 MW CCPP	400	400	LNG	APSCL	December, 2040		Planning
	Sub-Total (Public)	**400**	**400**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2040		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2040	Candidate	Planning
3	800 MW CCPP	800	800	LNG	Unknown	December, 2040	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2040	Candidate	Planning
5	Gas 250 after 2035	250	250	LNG	Unknown	December, 2040	Candidate	Planning
6	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
7	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
8	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
	Sub-Total	**2900**	**2900**					
	Total (2040)	**3300**	**3300**					
Projects Completion by Year 2041								
Public Sector								
1	LNG based 750 MW CCPP at Chattogram	750	750	LNG	RPCL	December, 2041	• Preliminary works	Planning
	Sub-Total (Public)	**750**	**750**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2041		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2041	Candidate	Planning
3	500 MW CCPP	500	500	LNG	Unknown	December, 2041	Candidate	Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
6	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
	Sub-Total	**2100**	**2100**					
	Total (2041)	**2850**	**2850**					

Total	**85,583**	**83,910**	**MW**

List of Committed Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2017								
Public Sector								
1	Shikalbaha 225 MW CCPP	225	218	Gas/HSD	BPDB	Dec.,2017	•Under Commercial Operation.	
2	Bheramara 360 MW CCPP	410	410	Gas	NWPGCL	SC:May, 2017 ST: Dec.,2017	•Under Commercial Operation.	
3	Ashugonj (North) CCPP	360	360	Gas	APSCL	June, 2017	•Under Commercial Operation.	
4	Chapai Nawabganj 104 MW PP	104	100	HFO	BPDB	August, 2017	•Under Commercial Operation.	
	Sub-Total (Public)	**1099**	**1088**					
Private Sector								
1	Bosila, Keranigonj 108 MW PP (CLC Power)	108	108	HFO	IPP	22.02.2017	•Under Commercial Operation.	
2	Power import from Tripura	60	60	Import	IPP	August, 2017	•Under Commercial Operation.	
3	Kusiara 163 MW CCPP	163	163	Gas	IPP	October, 2017	•Under Commercial Operation.	
	Sub-Total (Private)	**331**	**331**					
	Total (2017)	**1430**	**1419**					
Projects Completion by Year 2018								
Public Sector								
1	Ghorasal 365 MW CCPP	365	354	Gas	BPDB	2/5/2018	•Under Commercial Operation	Running
2	Sirajgonj 225 MW CCPP (2nd Unit)	220	220	Gas/HSD	NWPGCL	2/5/2018	•Under Commercial Operation	Running
3	Siddirganj 335 MW CCPP	335	335	Gas	EGCB	SCApril, 2018 ST: Dec.,2018	•Achieved: 92 % •GT COD: 30.04.2018	Ongoing
4	Sirajgonj 225 MW CCPP (3rd Unit)	220	220	Gas/HSD	NWPGCL	SC: August, 2018 ST: December, 2018	•Achieved: 87 %	Ongoing
5	Barapukuria 275 MW (3rd Unit)	274	252	Coal	BPDB	1/1/2018	•Under Commercial Operation	Running
6	Gazipur 100 MW PP	100	100	HFO	RPCL	December, 2018	•Achieved: 52%	Ongoing
7	Bagerhat 100 MW PP	100	100	HFO	NWPGCL	December, 2018	•Achieved: 66%	Ongoing
	Sub-Total (Public)	**1614**	**1581**					
Private Sector								
1	Kamalaghat 50 MW PP	54	54	HFO	IPP	1/1/2018	•Under Commercial Operation	Running
2	Daodkandi 200 MW PP (Bangla Track)	200	200	HSD	IPP	4/27/2018	•Under Commercial Operation	Running
3	Noapara 100 MW PP (Bangla Track)	100	100	HSD	IPP	4/18/2018	•Under Commercial Operation	Running
4	Aorahati, Keranigonj 100 MW (Aggreko)	100	100	HSD	IPP	6/30/2018	•Under Commercial Operation	Running
5	Brahmangaon, Keranigonj 100 MW (Aggreko)	100	100	HSD	IPP	5/30/2018	•Under Commercial Operation	Running
6	Keranigonj 300 MW (APR)	300	300	HSD	IPP	August,2018	•Under Test Run	Ongoing
7	Bogura 113 MW PP (Confidence) (Unit-2)	113	113	HFO	IPP	September, 2018	•Achieved: 80%	Ongoing
8	Ashugonj 150 MW PP (Midland)	150	150	HFO	IPP	August,2018	•Achieved: 91%	Ongoing
9	Labonchora, Khulna 105 MW PP(Orion)	105	105	HFO	IPP	August,2018	•Achieved: 70 %	Ongoing
10	Kodda, Gazipur 300 MW PP (Summit)	300	300	HFO	IPP	5/10/2018	•Under Commercial Operation	Running
11	Julda, Chattogram 100 MW PP (Unit-3) (Accorn)	100	100	HFO	IPP	September, 2018	•Achieved: 90%	Ongoing
12	Chandpur 200 MW PP (Desh Energy)	200	200	HFO	IPP	August,2018	•Achieved: 92%	Ongoing

List of Committed Power Plants for Low Case Studies (2017 to 2041) **Attachment-03**

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
13	Mymenshing 200 MW PP (United)	200	200	HFO	IPP	6/16/2018	•Under Commercial Operation	Running
14	Power import (2nd HVDC)	500	500	Import	IPP	August,2018		Ongoing
15	Gazipur 150 MW PP (Summit)	149	149	HFO/Gas	IPP	12/7/2018	•Under Commercial Operation	Running
	Sub-Total (Private)	**2671**	**2671**					
	Total (2018)	**4285**	**4252**					
Projects Completion by Year 2019								
Public Sector								
1	Bibiana #3 CCPP	400	388	Gas	BPDB	SC:Nov, 2018 ST: May, 2019	•Achieved: 83%	Ongoing
2	Shajibazar 100 MW PP	100	98	Gas	BPDB	June, 2019	•Achieved: 20%	Ongoing
3	Ghorasal 4th Unit Repowering	200	398	Gas	BPDB	May, 2019	•Achieved: 66%	Ongoing
4	Sylhet 150 MW PP Conversion	75	218	Gas	BPDB	June, 2019	•Achieved: 31%	Ongoing
5	Mirsorai, Chattogram 150 MW PP	150	150	HFO/Gas	BR Powergen	September, 2019	•Achieved: 16%	Ongoing
6	Ghorasal 3rd Unit Repowering	206	404	Gas	BPDB	September, 2019	•Achieved: 71%	Ongoing
	Sub-Total (Public)	**1131**	**1656**					
Private Sector								
1	Sirajganj 414 MW CCPP	414	414	Gas/HSD	IPP	SC:January, 2019 ST: May, 2019	•Achieved: 90% •GT COD: 04.10.2018	Ongoing
2	Baghabari 200 MW PP (Paramount Btrac)	200	200	HSD	IPP	January,2019	•Achieved: 75%	Ongoing
3	Shikalbaha 105 MW PP (Baraka-Royal Homes)	105	105	HFO	IPP	January,2019	•Achieved: 40%	Ongoing
4	Chandpur 100 MW Power Plant	115	115	HFO	IPP	July, 2019	•Achieved: 15 %	Ongoing
5	Choumohoni, Noakhali 100 MW Power Plant	113	113	HFO	IPP	July, 2019	•Achieved: 12%	Ongoing
6	Feni 100 MW Power Plant	114	114	HFO	IPP	August, 2019	• Contract Signed	Ongoing
7	Meghnaghat 100 MW Power Plant	104	104	HFO	IPP	July, 2019	•Achieved: 3 %	Ongoing
8	Thakurgaon 100 MW Power Plant	115	115	HFO	IPP	August, 2019	•Achieved: 5%	Ongoing
9	Rangpur 100 MW Power Plant	113	113	HFO	IPP	June, 2019	•Achieved: 35%	Ongoing
10	Bogura 100 MW Power Plant (Unit-1)	113	113	HFO	IPP	June, 2019	•Achieved: 40%	Ongoing
11	Julda, Chattogram 100 MW PP (Accorn Inf) (Unit-2)	100	100	HFO	IPP	March, 2019	•Achieved: 7 %	Ongoing
12	Tangail 22 MW PP (Polli Power)	22	22	HFO	IPP	March, 2019	•Achieved: 5 %	Ongoing
13	Jamalpur 100 MW Power Plant (United)	115	115	HFO	IPP	August, 2019	•Achieved: 50%	Ongoing
14	Anowara, Chattogram 300 MW PP (United Enterprise)	300	300	HFO	IPP	May, 2019	•Achieved: 10%	Ongoing
15	Potia, Chattogram 54 MW PP (Re-located from Satkhira)	54	54	HFO	IPP	June, 2019	•Achieved: 45 %	Ongoing
16	Shikalbaha 110 MW PP (Kornofuly Power)	110	110	HFO	IPP	July, 2019	• Contract Signed	Ongoing
17	Potiya, Chattogram 100 MW PP (Precision Energy)	116	116	HFO	IPP	July, 2019	•Achieved: 35 %	Ongoing
18	Bhairab 50 MW PP	54	54	HFO	IPP	July, 2019	•Achieved: 50 %	Ongoing
19	Manikgonj 162 MW PP	162	162	HFO	IPP	July, 2019	• LOI issued on 2.04.2018	Ongoing
20	Kanchan, Narayangonj 55 MW PP	55	55	HFO	IPP	August,2019	•Achieved: 5%	Ongoing
	Sub-Total (Private)	**2594**	**2594**					
	Total (2019)	**3725**	**4250**					

List of Committed Power Plants for Low Case Studies (2017 to 2041) **Attachment-03**

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2020								
Public Sector								
1	Payra, Potuakhali 1320 Coal Fired Power Plant (1st Phase)	1320	1214	I. Coal	BCPCL (NWPGCL)	January, 2020	•Achieved: 55%	Ongoing
2	Bibiana South 383 MW CCPP	383	372	Gas	BPDB	SC: January, 2020 ST: December, 2020	•Achieved: 41%	Ongoing
3	Khulna 330 MW CCPP (D/F)	336	326	Gas/HSD	BPDB	SC: May, 2020 ST: December, 2020	•Contract Signed	Ongoing
4	Sayedpur 150 MW PP	161	161	HSD	BPDB	December, 2020	• NOA issued	Ongoing
5	Sreepur 150 MW Power Plant	150	150	HFO	BR Powergen	December, 2020	• NOA issued	Ongoing
	Sub-Total (Public)	**2350**	**2223**					
Private Sector								
1	Bhola 220 MW CCPP (D/F) (Shapoorji Pallonji)	220	220	Gas/HSD	IPP	January, 2020	•Achieved: 17%	Ongoing
2	Import from Tripura (2nd Phase)	340	340	Import	IPP	December, 2020	• Preliminary works	Ongoing
	Sub-Total (Private)	**560**	**560**					
	Total (2020)	**2910**	**2783**					
Projects Completion by Year 2021								
Public Sector								
1	Ashugonj 400 MW CCPP (East)	400	400	Gas	APSCL	January,2021	• Contract Signed	Ongoing
2	BIFPCL, Rampal, Coal Fired Power Plant	1320	1214	I. Coal	BIFPCL	June, 2021	• Progress: 16%	Ongoing
3	Mymenshingh 360 MW CCPP	360	360	Gas/HSD	RPCL	June, 2021	• Tender under Evaluation.	Ongoing
	Sub-Total (Public)	**2080**	**1974**					
Private Sector								
1	LNG based 750 MW CCPP (Reliance)	718	718	LNG	IPP	June, 2021	• LOI Issued	Ongoing
2	Meghnaghat 500 MW CCPP (Summit)	583	583	LNG	IPP	June, 2021	• LOI Issued	Ongoing
3	Meghnaghat 600 MW CCPP (Unique)	600	600	LNG	IPP	Dec, 2021	• LOI Issued	Ongoing
	Sub-Total (Private)	**1901**	**1901**					
	Total (2021)	**3981**	**3875**					
Projects Completion by Year 2022								
Public Sector								
1	Rupsa 800 MW CCPP	800	800	LNG	NWPGCL	January, 2022	• Tender under Evaluation.	Planning
2	Ghorasal 6th Unit Repowering (Capacity Addition)	206	388	Gas	BPDB	June, 2022		Planning
	Sub-Total (Public)	**1006**	**1188**					
Private Sector								
1	Adani Power, Jharkhand, India	1496	1496	Import	IPP	June, 2022	• Contract Signed	Ongoing
	Sub-Total (Private)	**1496**	**1496**					
	Total (2022)	**2502**	**2684**					
Projects Completion by Year 2023								
Public Sector								
1	Payra, Potuakhali 1320 Coal Fired Power Plant (2nd Phase)	1320	1214	I. Coal	BCPCL (NWPGCL)	December, 2023	• Preliminary works	Planning
	Sub-Total (Public)	**1320**	**1214**					
Private Sector								
1	Barishal 307 MW Coal Fired Power Plant	307	307	I. Coal	IPP	January, 2023	•Achieved: 6%	Ongoing
2	Mirshorai 1320 MW Coal Fired PP (Hangzhou Group)	1320	1240	I. Coal	IPP	June, 2023	· LOI Issued	Ongoing
	Sub-Total (Private)	**1627**	**1547**					
	Total (2023)	**2947**	**2761**					

List of Committed Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2024								
Public Sector								
1	Matarbari 1200 MW USCPP	1200	1200	I. Coal	CPGCBL	June, 2024	•Achieved: 18 %	Ongoing
2	Patuakhali 1320 (2x660) MW USCPP(Phase-1)	1320	1214	I. Coal	RPCL	December, 2024	• Land Development work is in progress	Planning
	Sub-Total (Public)	**2520**	**2414**					
Private Sector								
1	Chattogram 2x612 MW Coal Fired Power Project (S.Alam Group)	1224	1224	I. Coal	IPP	January, 2024	•Achieved:21%	Ongoing
	Sub-Total (Private)	**1224**	**1224**					
	Total (2024)	**3744**	**3638**					
Projects Completion by Year 2025								
Public Sector								
1	Rooppur Nuclear Power Plant (1st Unit)	1200	1116	Nuclear	NPCBL	December, 2025	• Loan Agreement Signed.	Ongoing
	Sub-Total (Public)	**1200**	**1116**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2025)	**1200**	**1116**					
Projects Completion by Year 2026								
Public Sector								
1	Rooppur Nuclear Power Plant (2nd Unit)	1200	1116	Nuclear	NPCBL	December, 2026	• Loan Agreement Signed.	Ongoing
2	Moheskhali 1200 MW USCPP (ECA)	1200	1104	I. Coal	BPDB	December, 2026	• Preliminary works	Planning
	Sub-Total (Public)	**2400**	**2220**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2026)	**2400**	**2220**					
Projects Completion by Year 2027								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2027)	**0**	**0**					
Projects Completion by Year 2028								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2028)	**0**	**0**					
Projects Completion by Year 2029								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2029)	**0**	**0**					
Projects Completion by Year 2030								
Public Sector								
	Sub-Total (Public)	**0**	**0**					

List of Committed Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Private Sector								
1	Maowa, Munshiganj 522 MW Coal Fired Power Project (Orion)	522	522	I. Coal	IPP	June, 2030	•Achieved:3 %	Ongoing
	Sub-Total (Private)	**522**	**522**					
	Total (2030)	**522**	**522**					
Projects Completion by Year 2031								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
1	Dhaka 635 MW Coal Fired Power Project (Orion Group)	635	635	I. Coal	IPP	December, 2031	• Contract Signed	Ongoing
	Sub-Total (Private)	**635**	**635**					
	Total (2031)	**635**	**635**					
Projects Completion by Year 2032								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2032)	**0**	**0**					
Projects Completion by Year 2033								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2033)	**0**	**0**					
Projects Completion by Year 2034								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2034)	**0**	**0**					
Projects Completion by Year 2035								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2035)	**0**	**0**					
Projects Completion by Year 2036								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2036)	**0**	**0**					
Projects Completion by Year 2037								
Public Sector								
	Sub-Total (Public)	**0**	**0**					

List of Committed Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2037)	**0**	**0**					
Projects Completion by Year 2038								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2038)	**0**	**0**					
Projects Completion by Year 2039								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2039)	**0**	**0**					
Projects Completion by Year 2040								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2040)	**0**	**0**					
Projects Completion by Year 2041								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2041)	**0**	**0**					

Total (Committed)	**30,281**	**30,155**	**MW**

List of Candidate Power Plants for Low Case Studies (2017 to 2041)

Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2017								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2017)	**0**	**0**					
Projects Completion by Year 2018								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2018)	**0**	**0**					
Projects Completion by Year 2019								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2019)	**0**	**0**					
Projects Completion by Year 2020								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2020)	**0**	**0**					
Projects Completion by Year 2021								
Public Sector								
	Sub-Total (Public)	**0**	**0**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2021)	**0**	**0**					
Projects Completion by Year 2022								
Public Sector								
1	Raozan 550 MW CCPP (1st Unit)	550	530	LNG	BPDB	June, 2022	• PDPP under Preparation	Planning
2	Bheramara 550 MW CCPP (D/F)	550	530	Gas/LNG	BPDB	December, 2022	• PDPP under Preparation	Planning
3	Payra 1200 MW LNG based CCPP (1st Phase)	1200	1164	LNG	NWPGCL	December, 2022		Planning
	Sub-Total (Public)	**2300**	**2224**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2022)	**2300**	**2224**					
Projects Completion by Year 2023								
Public Sector								
1	Shiddirgonj 550 MW CCPP	550	530	LNG	BPDB	June, 2023	• PDPP under Preparation	Planning
2	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-1)	600	600	LNG	JV CPGCBL	June, 2023		Planning

List of Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
3	Gazaria 600 MW LNG Based Power Plant	600	600	LNG	RPCL	December, 2023	• Land acquisition under process.	Planning
4	Barishal 225 MW CCPP (D/F)	225	214	Gas/HSD	BPDB	December, 2023	• Preliminary works	Planning
5	Haripur 250 MW CCPP	250	243	LNG	BPDB	December, 2023	• Land acquisition is under process	Planning
	Sub-Total (Public)	**2225**	**2187**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2023)	**2225**	**2187**					
Projects Completion by Year 2024								
Public Sector								
1	Payra 1200 MW LNG based CCPP (2nd Phase)	1200	1164	LNG	NWPGCL	December, 2024		Planning
	Sub-Total (Public)	**1200**	**1164**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2024)	**1200**	**1164**					
Projects Completion by Year 2025								
Public Sector								
1	LNG based 1200 MW CCPP at Moheskhali-Phase-1	1200	1164	LNG	BPDB	December, 2025	• MoU Signed with GE	Planning
2	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL)(Phase-1)	700	650	I. Coal	JV CPGCBL	December, 2025	• Preliminary works	Planning
	Sub-Total (Public)	**1900**	**1814**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2025)	**1900**	**1814**					
Projects Completion by Year 2026								
Public Sector								
1	CPGCBL-Sumitomo 2x600 MW USC Power Plant	1200	1104	I. Coal	JV CPGCBL	December, 2026		Planning
2	Patuakhali 1320 MW USC Power Plant (1st Phase)	1320	1214	I. Coal	APSCL	December, 2026		
3	Boalkhali, Chattogram 400 MW CCPP (Phase-1)	400	400	LNG	RPCL	December, 2026	• Land acquisition is under progress	Planning
4	Payra 1200 MW LNG based CCPP (3rd Phase)	1200	1164	LNG	NWPGCL	December, 2026		
	Sub-Total (Public)	**4120**	**3882**					
Private Sector								
1	Power Import (Pha-1)	500	500	Import	Unknown	December, 2026		Planning
	Sub-Total (Private)	**500**	**500**					
	Total (2026)	**4620**	**4382**					
Projects Completion by Year 2027								
Public Sector								
1	Gazipur 450 MW CCPP	450	450	LNG	RPCL	December, 2027	• Land acquisition Complete.	
2	Sonagazi, Feni 410 MW Dual Fuel CCPP	410	410	LNG	EGCB	December, 2027	• Land acquisition is under process	Planning
3	Munsiganj 300-400 MW USC Power Plant Project (Phase-1)	400	400	I. Coal	EGCB	December, 2027	• Land acquisition is under process	Planning
4	LNG based 1200 MW CCPP at Moheskhali-Phase-2	1200	1164	LNG	BPDB	December, 2027	• MoU Signed with GE	Planning
5	Gazipur 225 MW CCPP	225	225	LNG	RPCL	December, 2027	• Land acquisition Complete.	Planning
6	Moheshkhali 1200 MW USCPP(Phase-2)	1200	1104	I. Coal	JV BPDB	December, 2027	• Preliminary works	Planning
	Sub-Total (Public)	**3885**	**3753**					

List of Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2027)	**3885**	**3753**					
Projects Completion by Year 2028								
Public Sector								
1	Matarbari 1200 MW USCPP (Phase 2)	1200	1104	I. Coal	CPGCBL	December, 2028		Planning
2	LNG based 1200 MW CCPP at Moheskhali-Phase-3	1200	1164	LNG	BPDB	December, 2028	• MoU Signed with GE	Planning
3	Mirsorai 400 MW CCPP	400	400	LNG	BR Powergen	December, 2027		Planning
	Sub-Total (Public)	**2800**	**2668**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2028)	**2800**	**2668**					
Projects Completion by Year 2029								
Public Sector								
1	Munsiganj 300-400 MW USC Power Plant Project (Phase-2)	400	400	I. Coal	EGCB	December, 2029	• Land acquisition is under process	Planning
2	Moheshkhali 1200 MW USCPP (Phase-3)	1200	1104	I. Coal	JV BPDB	December, 2029	• Preliminary works	Planning
	Sub-Total (Public)	**1600**	**1504**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2029)	**1600**	**1504**					
Projects Completion by Year 2030								
Public Sector								
1	Ashugonj 450 MW CCPP-1	400	400	LNG	APSCL	December, 2030		Planning
	Sub-Total (Public)	**400**	**400**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2030)	**400**	**400**					
Projects Completion by Year 2031								
Public Sector								
1	Moheshkhali 1200 MW USCPP (Phase-5)	1200	1104	I. Coal	JV BPDB	December, 2031	• Preliminary works	Planning
	Sub-Total (Public)	**1200**	**1104**					
Private Sector								
	Sub-Total (Private)	**0**	**0**					
	Total (2031)	**1200**	**1104**					
Projects Completion by Year 2032								
Public Sector								
1	Matarbari 700 MW USCPP (JV of Symcorp & CPGCBL) (Phase-2)	700	700	I. Coal	JV CPGCBL	December, 2032	• Preliminary works	Planning
2	Boalkhali, Chattogram 400 MW CCPP (Phase-2)	400	400	LNG	RPCL	December, 2032	• Land acquisition is under progress	Planning
3	Mirshorai 500 MW CCPP	500	500	LNG	RPCL	December, 2032	• Land allocation got from BEZA	Planning
4	Patuakhali 1320 MW USC Power Plant (2nd Phase)	1320	1214	I. Coal	APSCL	December, 2032		Planning
	Sub-Total (Public)	**2920**	**2814**					
Private Sector								
1	Bibiana - Meghalaya (Phase-2)	500	500	Import	IPP	June, 2032		Planning
2	Power Import (Pha-2)	500	500	Import	IPP	December, 2032		Planning
	Sub-Total (Private)	**1000**	**1000**					
	Total (2032)	**3920**	**3814**					

List of Candidate Power Plants for Low Case Studies (2017 to 2041) Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2033								
Public Sector								
1	CPGCBL-Mitsui 500-600 MW LNG based CCPP (Phase-2)	600	600	LNG	JV CPGCBL	June, 2033		Planning
2	Kaptai Extension	100	100	Hydro	BPDB	December, 2033	Candidate	Planning
3	Raozan 550 MW CCPP (2nd Unit)	550	530	LNG	BPDB	December, 2033		Planning
4	Moheshkhali 1200 MW USCPP (Phase-4)	1200	1104	I. Coal	JV BPDB	December, 2033	• Preliminary works	Planning
5	Rooppur Nuclear Power Plant (3rd Unit)	1200	1116	Nuclear	NPCBL	December, 2033		Planning
6	Shaghata, Gaibandha 400 MW CCPP	400	400	LNG	APSCL	December, 2033		Planning
	Sub-Total (Public)	**4050**	**3850**					
Candidate								
1	Case 2 HVDC (Barapkuria S/S) Phase II	500	500	Import	Unknown	December, 2033		Planning
2	Power Import (Pha-3)	500	500	Import	IPP	December, 2033		Planning
	Sub-Total	**1000**	**1000**					
	Total (2033)	**5050**	**4850**					
Projects Completion by Year 2034								
Public Sector								
1	Fulchari 400 MW CCPP-1	400	400	LNG	APSCL	December, 2034		Planning
2	Ashugonj 450 MW CCPP-2	400	400	LNG	APSCL	December, 2034		Planning
3	Patuakhali 1320 (2x660) MW USCPP(Phase-2)	1320	1214	I. Coal	RPCL	December, 2034	• Land Development work is in progress	Planning
4	Meghnagat 550 MW CCPP	550	530	LNG	BPDB	December, 2034		Planning
	Sub-Total (Public)	**2670**	**2544**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase III From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	IPP	June, 2034		
2	100 MW GT	100	100	HSD	Unknown	June, 2034	Candidate	
3	100 MW GT	100	100	HSD	Unknown	June, 2034	Candidate	
	Sub-Total	**700**	**700**					
	Total (2034)	**3370**	**3244**					
Projects Completion by Year 2035								
Public Sector								
1	Fulchari 400 MW CCPP-2	400	400	LNG	APSCL	December, 2035		Planning
2	Baghabari 800 MW CCPP	800	775	LNG	BPDB	December, 2035		Planning
	Sub-Total (Public)	**1200**	**1175**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase IV From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	Unknown	June, 2035		Planning
2	Import from India	500	500	Import	Unknown	June, 2035		Planning
3	Import from China/Myanmar (Ph-1)	500	500	Import	Unknown	June, 2035		Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2035		Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2035		Planning
	Sub-Total	**1700**	**1700**					
	Total (2035)	**2900**	**2875**					
Projects Completion by Year 2036								
Public Sector								
1	Moheshkhali 1000 MW USCPP	1000	920	I. Coal	BPDB	December, 2036		Planning
2	Sundarganj 400 MW CCPP	400	400	LNG	APSCL	December, 2036		Planning
	Sub-Total (Public)	**1400**	**1320**					
Candidate								
1	Case 3 HVDC (Barapkuria S/S) Phase V From Nepal (Purnea - Barapukuria) (Nepal)	500	500	Import	Unknown	June, 2036		Planning
2	Gas 250 after 2035	250	250	LNG	Unknown	December, 2036	Candidate	Planning
3	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2036	Candidate	Planning
	Sub-Total	**1050**	**1050**					
	Total (2036)	**2450**	**2370**					

List of Candidate Power Plants for Low Case Studies (2017 to 2041)

Attachment-03

Sl. No	Name of the Power Plant	Capacity (MW)	Net Capacity (MW)	Fuel Type	Ownership	Expected Commissioning Date	Remarks	Status
Projects Completion by Year 2037								
Public Sector								
1	South West Nuclear Power Plant (4th Unit)	1116	1116	Nuclear	NPCBL	December, 2037		
	Sub-Total (Public)	**1116**	**1116**					
Candidate								
1	Case 2 HVDC (Barapkuria S/S) Phase III	500	500	Import	Unknown	June, 2037	Candidate	Planning
2	Import from India	500	500	Import	Unknown	June, 2037	Candidate	Planning
3	Import from China/Myanmar (Ph-2)	500	500	Import	Unknown	June, 2037	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2037	Candidate	Planning
	Sub-Total	**1750**	**1750**					
	Total (2037)	**2866**	**2866**					
Projects Completion by Year 2038								
Public Sector								
1	Moheshkhali 1000 MW USCPP	1000	920	I. Coal	BPDB	December, 2038		Planning
2	South West Nuclear Power Plant (5th Unit)	1116	1116	Nuclear	NPCBL	December, 2038		Planning
	Sub-Total (Public)	**2116**	**2036**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2038		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2038	Candidate	Planning
3	Gas 250 after 2035	250	250	LNG	Unknown	December, 2038	Candidate	Planning
	Sub-Total	**1550**	**1550**					
	Total (2038)	**3666**	**3586**					
Projects Completion by Year 2039								
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2039		Planning
2	Import from India	500	500	Import	Unknown	December, 2039		Planning
3	800 MW CCPP	800	800	LNG	Unknown	December, 2039	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
5	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
6	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
7	Gas 250 after 2035	250	250	LNG	Unknown	December, 2039	Candidate	Planning
	Sub-Total	**2800**	**2800**					
	Total (2039)	**2800**	**2800**					
Projects Completion by Year 2040								
Public Sector								
1	Bogura 400 MW CCPP	400	400	LNG	APSCL	December, 2040		Planning
	Sub-Total (Public)	**400**	**400**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2040		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2040	Candidate	Planning
3	800 MW CCPP	800	800	LNG	Unknown	December, 2040	Candidate	Planning
4	Gas 250 after 2035	250	250	LNG	Unknown	December, 2040	Candidate	Planning
5	Gas 250 after 2035	250	250	LNG	Unknown	December, 2040	Candidate	Planning
6	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
7	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
8	100 MW GT	100	100	HSD	Unknown	December, 2040	Candidate	Planning
	Sub-Total	**2900**	**2900**					
	Total (2040)	**3300**	**3300**					
Projects Completion by Year 2041								
Public Sector								
1	LNG based 750 MW CCPP at Chattogram	750	750	LNG	RPCL	December, 2041	• Preliminary works	Planning
	Sub-Total (Public)	**750**	**750**					
Candidate								
1	Import from India	500	500	Import	Unknown	December, 2041		Planning
2	800 MW CCPP	800	800	LNG	Unknown	December, 2041	Candidate	Planning
3	500 MW CCPP	500	500	LNG	Unknown	December, 2041	Candidate	Planning
4	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
5	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
6	100 MW GT	100	100	HSD	Unknown	December, 2041	Candidate	Planning
	Sub-Total	**2100**	**2100**					
	Total (2041)	**2850**	**2850**					

Total (Candidate)	**55,302**	**53,755**	**MW**

Zone-wise Total Generation Capacity (Existing, Committed and Candidate) and Power Demand at 33 kV level for High Case Studies (2017 to 2041)

Attachment-04

Year	Zone	Dhaka	Chattogram	Cumilla	Mymensingh	Sylhet	Rajshahi	Rangpur	Khulna	Barishal	Total
2017	Existing Capacity (MW)	4,424	1,289	1,852	319	1,327	796	224	1,355	360	**11,946**
	Committed Capacity (MW)	516	218	420	0	163	100	0	410	0	**1,827**
	Candidate Capacity (MW)	0	0	0	0	0	0	0	0	0	**0**
	Total Capacity (MW)	**4,940**	**1,507**	**2,272**	**319**	**1,490**	**896**	**224**	**1,765**	**360**	**13,773**
	Total Demand (MW) [33 kV]	**4,149**	**1,372**	**853**	**888**	**632**	**1,201**	**703**	**1,186**	**315**	**11,299**
	Total Demand (MW) [132 KV]	**4,273**	**1,413**	**879**	**915**	**651**	**1,237**	**724**	**1,222**	**324**	**11,638**
	Reserve Margin (%) [33 KV]	**19**	**10**	**166**	**-64**	**136**	**-25**	**-68**	**49**	**14**	**22**
	Reserve Margin (%) [132 KV]	**16**	**7**	**159**	**-65**	**129**	**-28**	**-69**	**44**	**11**	**18**
2018	Existing Capacity (MW)	4,279	1,289	1,852	319	1,327	796	224	1,355	360	**11,801**
	Committed Capacity (MW)	2,100	472	1,070	200	551	653	252	1,220	0	**6,518**
	Candidate Capacity (MW)	0	0	0	0	0	0	0	0	0	**0**
	Total Capacity (MW)	**6,379**	**1,761**	**2,922**	**519**	**1,878**	**1,449**	**476**	**2,575**	**360**	**18,319**
	Total Demand (MW) [33 kV]	**4,714**	**1,554**	**968**	**1,021**	**730**	**1,374**	**806**	**1,329**	**377**	**12,873**
	Total Demand (MW) [132 KV]	**4,855**	**1,601**	**997**	**1,052**	**752**	**1,415**	**830**	**1,369**	**388**	**13,259**
	Reserve Margin (%) [33 KV]	**35**	**13**	**202**	**-49**	**157**	**5**	**-41**	**94**	**-4**	**42**
	Reserve Margin (%) [132 KV]	**31**	**10**	**193**	**-51**	**150**	**2**	**-43**	**88**	**-7**	**38**
2019	Existing Capacity (MW)	3,840	1,252	1,659	319	1,168	796	184	1,310	318	**10,846**
	Committed Capacity (MW)	3,060	1,148	1,412	315	867	1,180	480	1,546	1,434	**11,442**
	Candidate Capacity (MW)	0	0	0	0	0	0	0	0	0	**0**
	Total Capacity (MW)	**6,900**	**2,400**	**3,071**	**634**	**2,035**	**1,976**	**664**	**2,856**	**1,752**	**22,288**
	Total Demand (MW) [33 kV]	**5,383**	**1,756**	**1,096**	**1,159**	**829**	**1,537**	**913**	**1,486**	**444**	**14,603**
	Total Demand (MW) [132 KV]	**5,544**	**1,809**	**1,129**	**1,194**	**854**	**1,583**	**940**	**1,531**	**457**	**15,041**
	Reserve Margin (%) [33 KV]	**28**	**37**	**180**	**-45**	**145**	**29**	**-27**	**92**	**295**	**53**
	Reserve Margin (%) [132 KV]	**24**	**33**	**172**	**-47**	**138**	**25**	**-29**	**87**	**283**	**48**
2020	Existing Capacity (MW)	3,762	1,252	1,564	319	1,124	796	184	1,310	318	**10,629**
	Committed Capacity (MW)	3,886	2,372	1,752	315	1,294	1,180	480	1,546	1,434	**14,259**
	Candidate Capacity (MW)	733	0	0	0	0	0	146	25	0	**904**
	Total Capacity (MW)	**8,381**	**3,624**	**3,316**	**634**	**2,418**	**1,976**	**810**	**2,881**	**1,752**	**25,792**
	Total Demand (MW) [33 kV]	**6,121**	**1,991**	**1,228**	**1,289**	**924**	**1,739**	**1,032**	**1,681**	**515**	**16,520**
	Total Demand (MW) [132 KV]	**6,305**	**2,051**	**1,265**	**1,328**	**952**	**1,791**	**1,063**	**1,731**	**530**	**17,016**
	Reserve Margin (%) [33 KV]	**37**	**82**	**170**	**-51**	**162**	**14**	**-22**	**71**	**240**	**56**
	Reserve Margin (%) [132 KV]	**33**	**77**	**162**	**-52**	**154**	**10**	**-24**	**66**	**230**	**52**
2021	Existing Capacity (MW)	3,602	1,252	1,442	319	1,009	698	184	1,310	318	**10,134**
	Committed Capacity (MW)	3,886	2,372	2,152	315	1,396	1,326	480	2,760	1,741	**16,428**
	Candidate Capacity (MW)	1,083	0	0	360	0	0	146	25	214	**1,828**
	Total Capacity (MW)	**8,571**	**3,624**	**3,594**	**994**	**2,405**	**2,024**	**810**	**4,095**	**2,273**	**28,390**
	Total Demand (MW) [33 kV]	**6,837**	**2,235**	**1,448**	**1,424**	**1,034**	**1,903**	**1,145**	**1,861**	**593**	**18,480**
	Total Demand (MW) [132 KV]	**7,042**	**2,302**	**1,491**	**1,467**	**1,065**	**1,960**	**1,179**	**1,917**	**611**	**19,034**
	Reserve Margin (%) [33 KV]	**25**	**62**	**148**	**-30**	**133**	**6**	**-29**	**120**	**283**	**54**
	Reserve Margin (%) [132 KV]	**22**	**57**	**141**	**-32**	**126**	**3**	**-31**	**114**	**272**	**49**
2022	Existing Capacity (MW)	3,047	1,101	1,295	319	927	618	184	1,145	318	**8,954**
	Committed Capacity (MW)	5,431	2,372	2,152	315	1,396	2,822	480	2,760	1,741	**19,469**
	Candidate Capacity (MW)	2,063	530	0	360	0	0	146	1,355	214	**4,668**
	Total Capacity (MW)	**10,541**	**4,003**	**3,447**	**994**	**2,323**	**3,440**	**810**	**5,260**	**2,273**	**33,091**
	Total Demand (MW) [33 kV]	**7,639**	**2,495**	**1,583**	**1,564**	**1,155**	**2,078**	**1,276**	**2,108**	**678**	**20,576**
	Total Demand (MW) [132 KV]	**7,868**	**2,570**	**1,630**	**1,611**	**1,190**	**2,140**	**1,314**	**2,171**	**698**	**21,193**
	Reserve Margin (%) [33 KV]	**38**	**60**	**118**	**-36**	**101**	**66**	**-37**	**150**	**235**	**61**
	Reserve Margin (%) [132 KV]	**34**	**56**	**111**	**-38**	**95**	**61**	**-38**	**142**	**226**	**56**
2023	Existing Capacity (MW)	2,587	1,101	1,173	297	927	546	184	990	318	**8,123**
	Committed Capacity (MW)	4,931	2,372	1,952	315	1,396	2,822	480	3,764	1,741	**19,773**
	Candidate Capacity (MW)	3,198	530	0	360	0	0	146	2,005	1,428	**7,667**
	Total Capacity (MW)	**10,716**	**4,003**	**3,125**	**972**	**2,323**	**3,368**	**810**	**6,759**	**3,487**	**35,563**
	Total Demand (MW) [33 kV]	**8,440**	**2,780**	**1,730**	**1,719**	**1,277**	**2,290**	**1,402**	**2,326**	**772**	**22,736**
	Total Demand (MW) [132 KV]	**8,693**	**2,863**	**1,782**	**1,771**	**1,315**	**2,359**	**1,444**	**2,396**	**795**	**23,418**
	Reserve Margin (%) [33 KV]	**27**	**44**	**81**	**-43**	**82**	**47**	**-42**	**191**	**352**	**56**
	Reserve Margin (%) [132 KV]	**23**	**40**	**75**	**-45**	**77**	**43**	**-44**	**182**	**339**	**52**
2024	Existing Capacity (MW)	2,049	1,079	1,107	297	769	535	184	990	318	**7,328**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	2,822	480	3,764	1,741	**20,877**
	Candidate Capacity (MW)	3,198	530	0	360	0	0	146	2,005	5,456	**11,695**
	Total Capacity (MW)	**10,178**	**5,085**	**3,059**	**972**	**2,165**	**3,357**	**810**	**6,759**	**7,515**	**39,900**
	Total Demand (MW) [33 kV]	**9,276**	**3,083**	**1,873**	**1,889**	**1,405**	**2,475**	**1,542**	**2,585**	**882**	**25,010**
	Total Demand (MW) [132 KV]	**9,554**	**3,175**	**1,929**	**1,946**	**1,447**	**2,549**	**1,588**	**2,663**	**908**	**25,760**
	Reserve Margin (%) [33 KV]	**10**	**65**	**63**	**-49**	**54**	**36**	**-47**	**161**	**752**	**60**
	Reserve Margin (%) [132 KV]	**7**	**60**	**59**	**-50**	**50**	**32**	**-49**	**154**	**727**	**55**
2025	Existing Capacity (MW)	1,949	747	1,107	297	769	485	184	990	298	**6,826**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	3,938	480	3,764	1,741	**21,993**
	Candidate Capacity (MW)	3,198	3,164	0	360	0	0	146	2,005	5,456	**14,329**
	Total Capacity (MW)	**10,078**	**7,387**	**3,059**	**972**	**2,165**	**4,423**	**810**	**6,759**	**7,495**	**43,148**
	Total Demand (MW) [33 kV]	**10,167**	**3,419**	**2,033**	**2,054**	**1,555**	**2,669**	**1,683**	**2,822**	**1,007**	**27,409**
	Total Demand (MW) [132 KV]	**10,472**	**3,522**	**2,094**	**2,116**	**1,602**	**2,749**	**1,733**	**2,907**	**1,037**	**28,231**
	Reserve Margin (%) [33 KV]	**-1**	**116**	**50**	**-53**	**39**	**66**	**-52**	**140**	**644**	**57**
	Reserve Margin (%) [132 KV]	**-4**	**110**	**46**	**-54**	**35**	**61**	**-53**	**133**	**623**	**53**

Zone-wise Total Generation Capacity (Existing, Committed and Candidate) and Power Demand at 33 kV level for High Case Studies (2017 to 2041)

Attachment-04

Year	Zone	Dhaka	Chattogram	Cumilla	Mymensingh	Sylhet	Rajshahi	Rangpur	Khulna	Barishal	Total
2026	Existing Capacity (MW)	1,774	651	1,011	297	769	364	184	830	298	**6,179**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	3,598	5,882	400	360	0	0	146	2,505	5,456	**18,347**
	Total Capacity (MW)	**10,303**	**10,009**	**3,363**	**972**	**2,165**	**5,418**	**810**	**7,099**	**7,495**	**47,635**
	Total Demand (MW) [33 kV]	**11,042**	**3,751**	**2,163**	**2,234**	**1,736**	**2,872**	**1,844**	**3,085**	**1,143**	**29,870**
	Total Demand (MW) [132 KV]	**11,373**	**3,864**	**2,228**	**2,301**	**1,788**	**2,958**	**1,899**	**3,178**	**1,177**	**30,766**
	Reserve Margin (%) [33 KV]	**-7**	**167**	**55**	**-56**	**25**	**89**	**-56**	**130**	**556**	**59**
	Reserve Margin (%) [132 KV]	**-9**	**159**	**51**	**-58**	**21**	**83**	**-57**	**123**	**537**	**55**
2027	Existing Capacity (MW)	1,723	551	1,011	297	769	266	184	830	298	**5,930**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	3,598	8,490	810	360	500	0	646	2,505	5,456	**22,365**
	Total Capacity (MW)	**10,252**	**12,517**	**3,773**	**972**	**2,665**	**5,320**	**1,310**	**7,099**	**7,495**	**51,404**
	Total Demand (MW) [33 kV]	**11,918**	**4,109**	**2,308**	**2,450**	**1,900**	**3,115**	**2,011**	**3,322**	**1,293**	**32,426**
	Total Demand (MW) [132 KV]	**12,276**	**4,232**	**2,377**	**2,524**	**1,957**	**3,208**	**2,071**	**3,422**	**1,332**	**33,399**
	Reserve Margin (%) [33 KV]	**-14**	**205**	**63**	**-60**	**40**	**71**	**-35**	**114**	**480**	**59**
	Reserve Margin (%) [132 KV]	**-16**	**196**	**59**	**-61**	**36**	**66**	**-37**	**107**	**463**	**54**
2028	Existing Capacity (MW)	1,723	526	960	297	744	266	184	830	298	**5,829**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	3,598	10,924	810	360	500	0	646	4,509	5,456	**26,803**
	Total Capacity (MW)	**10,252**	**14,926**	**3,722**	**972**	**2,640**	**5,320**	**1,310**	**9,103**	**7,495**	**55,741**
	Total Demand (MW) [33 kV]	**12,841**	**4,475**	**2,485**	**2,655**	**2,031**	**3,339**	**2,184**	**3,586**	**1,458**	**35,054**
	Total Demand (MW) [132 KV]	**13,226**	**4,609**	**2,560**	**2,735**	**2,092**	**3,439**	**2,250**	**3,694**	**1,502**	**36,106**
	Reserve Margin (%) [33 KV]	**-20**	**234**	**50**	**-63**	**30**	**59**	**-40**	**154**	**414**	**59**
	Reserve Margin (%) [132 KV]	**-22**	**224**	**45**	**-64**	**26**	**55**	**-42**	**146**	**399**	**54**
2029	Existing Capacity (MW)	1,513	476	908	95	744	214	184	830	298	**5,263**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	4,528	12,758	1,210	360	500	0	646	4,509	5,456	**29,967**
	Total Capacity (MW)	**10,972**	**16,710**	**4,070**	**770**	**2,640**	**5,268**	**1,310**	**9,103**	**7,495**	**58,339**
	Total Demand (MW) [33 kV]	**13,839**	**4,855**	**2,663**	**2,864**	**2,168**	**3,576**	**2,365**	**3,863**	**1,618**	**37,811**
	Total Demand (MW) [132 KV]	**14,254**	**5,001**	**2,743**	**2,950**	**2,233**	**3,683**	**2,436**	**3,979**	**1,667**	**38,945**
	Reserve Margin (%) [33 KV]	**-21**	**244**	**53**	**-73**	**22**	**47**	**-45**	**136**	**363**	**54**
	Reserve Margin (%) [132 KV]	**-23**	**234**	**48**	**-74**	**18**	**43**	**-46**	**129**	**350**	**50**
2030	Existing Capacity (MW)	1,110	230	717	95	744	214	184	830	298	**4,423**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	4,528	14,362	1,610	360	500	0	1,771	4,509	6,670	**34,310**
	Total Capacity (MW)	**10,569**	**18,068**	**4,279**	**770**	**2,640**	**5,268**	**2,435**	**9,103**	**8,709**	**61,842**
	Total Demand (MW) [33 kV]	**14,886**	**5,232**	**2,823**	**3,055**	**2,307**	**3,827**	**2,544**	**4,161**	**1,834**	**40,669**
	Total Demand (MW) [132 KV]	**15,333**	**5,389**	**2,908**	**3,147**	**2,376**	**3,942**	**2,620**	**4,286**	**1,889**	**41,889**
	Reserve Margin (%) [33 KV]	**-29**	**245**	**52**	**-75**	**14**	**38**	**-4**	**119**	**375**	**52**
	Reserve Margin (%) [132 KV]	**-31**	**235**	**47**	**-76**	**11**	**34**	**-7**	**112**	**361**	**48**
2031	Existing Capacity (MW)	843	230	717	0	744	214	184	830	188	**3,950**
	Committed Capacity (MW)	4,931	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,109**
	Candidate Capacity (MW)	4,528	15,342	1,610	360	500	0	2,985	4,509	7,884	**37,718**
	Total Capacity (MW)	**10,302**	**19,048**	**4,279**	**675**	**2,640**	**5,268**	**3,649**	**9,103**	**9,813**	**64,777**
	Total Demand (MW) [33 kV]	**15,897**	**5,671**	**3,041**	**3,294**	**2,436**	**4,130**	**2,753**	**4,475**	**2,037**	**43,734**
	Total Demand (MW) [132 KV]	**16,374**	**5,841**	**3,132**	**3,393**	**2,509**	**4,254**	**2,836**	**4,609**	**2,098**	**45,046**
	Reserve Margin (%) [33 KV]	**-35**	**236**	**41**	**-80**	**8**	**28**	**33**	**103**	**382**	**48**
	Reserve Margin (%) [132 KV]	**-37**	**226**	**37**	**-80**	**5**	**24**	**29**	**97**	**368**	**44**
2032	Existing Capacity (MW)	843	230	717	0	744	214	184	830	188	**3,950**
	Committed Capacity (MW)	4,823	3,476	1,952	315	1,396	5,054	480	3,764	1,741	**23,001**
	Candidate Capacity (MW)	4,528	15,342	1,610	360	1,000	0	3,905	5,209	7,884	**39,838**
	Total Capacity (MW)	**10,194**	**19,048**	**4,279**	**675**	**3,140**	**5,268**	**4,569**	**9,803**	**9,813**	**66,789**
	Total Demand (MW) [33 kV]	**17,008**	**6,094**	**3,263**	**3,564**	**2,596**	**4,423**	**2,998**	**4,771**	**2,242**	**46,959**
	Total Demand (MW) [132 KV]	**17,518**	**6,277**	**3,361**	**3,671**	**2,674**	**4,556**	**3,088**	**4,914**	**2,309**	**48,368**
	Reserve Margin (%) [33 KV]	**-40**	**213**	**31**	**-81**	**21**	**19**	**52**	**105**	**338**	**42**
	Reserve Margin (%) [132 KV]	**-42**	**203**	**27**	**-82**	**17**	**16**	**48**	**99**	**325**	**38**
2033	Existing Capacity (MW)	843	230	717	0	744	214	184	830	188	**3,950**
	Committed Capacity (MW)	4,823	3,476	1,952	315	1,396	4,954	480	3,764	1,741	**22,901**
	Candidate Capacity (MW)	4,528	15,942	1,610	360	1,000	0	4,805	5,209	7,884	**41,338**
	Total Capacity (MW)	**10,194**	**19,648**	**4,279**	**675**	**3,140**	**5,168**	**5,469**	**9,803**	**9,813**	**68,189**
	Total Demand (MW) [33 kV]	**18,245**	**6,634**	**3,483**	**3,914**	**2,761**	**4,702**	**3,254**	**5,068**	**2,441**	**50,502**
	Total Demand (MW) [132 KV]	**18,792**	**6,833**	**3,587**	**4,031**	**2,844**	**4,843**	**3,352**	**5,220**	**2,514**	**52,017**
	Reserve Margin (%) [33 KV]	**-44**	**196**	**23**	**-83**	**14**	**10**	**68**	**93**	**302**	**35**
	Reserve Margin (%) [132 KV]	**-46**	**188**	**19**	**-83**	**10**	**7**	**63**	**88**	**290**	**31**
2034	Existing Capacity (MW)	843	230	717	0	744	214	184	830	188	**3,950**
	Committed Capacity (MW)	4,469	3,376	1,602	115	1,396	4,841	480	3,654	1,741	**21,674**
	Candidate Capacity (MW)	5,058	15,942	1,610	360	1,000	0	5,705	5,209	7,884	**42,768**
	Total Capacity (MW)	**10,370**	**19,548**	**3,929**	**475**	**3,140**	**5,055**	**6,369**	**9,693**	**9,813**	**68,392**
	Total Demand (MW) [33 kV]	**19,507**	**7,094**	**3,678**	**4,174**	**2,915**	**4,999**	**3,523**	**5,400**	**2,634**	**53,924**
	Total Demand (MW) [132 KV]	**20,092**	**7,307**	**3,788**	**4,299**	**3,002**	**5,149**	**3,629**	**5,562**	**2,713**	**55,542**
	Reserve Margin (%) [33 KV]	**-47**	**176**	**7**	**-89**	**8**	**1**	**81**	**80**	**273**	**27**
	Reserve Margin (%) [132 KV]	**-48**	**168**	**4**	**-89**	**5**	**-2**	**76**	**74**	**262**	**23**

Zone-wise Total Generation Capacity (Existing, Committed and Candidate) and Power Demand at 33 kV level for High Case Studies (2017 to 2041) **Attachment-04**

Year	Zone	Dhaka	Chattogram	Cumilla	Mymensingh	Sylhet	Rajshahi	Rangpur	Khulna	Barishal	Total
2035	Existing Capacity (MW)	705	230	717	0	744	214	184	830	188	**3,812**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,833	16,672	1,610	360	1,772	775	6,605	5,209	7,884	**46,720**
	Total Capacity (MW)	**10,292**	**19,598**	**3,487**	**360**	**3,912**	**5,717**	**7,041**	**9,593**	**9,813**	**69,813**
	Total Demand (MW) [33 kV]	**20,843**	**7,604**	**3,903**	**4,454**	**3,096**	**5,360**	**3,780**	**5,702**	**2,807**	**57,549**
	Total Demand (MW) [132 KV]	**21,468**	**7,832**	**4,020**	**4,588**	**3,189**	**5,521**	**3,893**	**5,873**	**2,891**	**59,275**
	Reserve Margin (%) [33 KV]	**-51**	**158**	**-11**	**-92**	**26**	**7**	**86**	**68**	**250**	**21**
	Reserve Margin (%) [132 KV]	**-52**	**150**	**-13**	**-92**	**23**	**4**	**81**	**63**	**239**	**18**
2036	Existing Capacity (MW)	400	230	717	0	661	0	0	830	188	**3,026**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	17,592	1,610	360	1,772	775	7,505	5,184	9,484	**49,965**
	Total Capacity (MW)	**9,837**	**20,518**	**3,487**	**360**	**3,829**	**5,503**	**7,757**	**9,568**	**11,413**	**72,272**
	Total Demand (MW) [33 kV]	**21,969**	**8,082**	**4,123**	**4,724**	**3,271**	**5,745**	**4,055**	**6,018**	**3,003**	**60,990**
	Total Demand (MW) [132 KV]	**22,628**	**8,324**	**4,247**	**4,866**	**3,369**	**5,917**	**4,177**	**6,199**	**3,093**	**62,820**
	Reserve Margin (%) [33 KV]	**-55**	**154**	**-15**	**-92**	**17**	**-4**	**91**	**59**	**280**	**18**
	Reserve Margin (%) [132 KV]	**-57**	**146**	**-18**	**-93**	**14**	**-7**	**86**	**54**	**269**	**15**
2037	Existing Capacity (MW)	400	230	559	0	320	0	0	830	188	**2,527**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	17,592	1,610	360	1,772	775	8,005	5,184	9,484	**50,465**
	Total Capacity (MW)	**9,837**	**20,518**	**3,329**	**360**	**3,488**	**5,503**	**8,257**	**9,568**	**11,413**	**72,273**
	Total Demand (MW) [33 kV]	**23,126**	**8,574**	**4,363**	**5,004**	**3,456**	**6,135**	**4,329**	**6,333**	**3,181**	**64,501**
	Total Demand (MW) [132 KV]	**23,820**	**8,831**	**4,494**	**5,154**	**3,560**	**6,319**	**4,459**	**6,523**	**3,276**	**66,436**
	Reserve Margin (%) [33 KV]	**-57**	**139**	**-24**	**-93**	**1**	**-10**	**91**	**51**	**259**	**12**
	Reserve Margin (%) [132 KV]	**-59**	**132**	**-26**	**-93**	**-2**	**-13**	**85**	**47**	**248**	**9**
2038	Existing Capacity (MW)	400	230	559	0	320	0	0	600	188	**2,297**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	18,512	1,610	360	1,772	775	8,005	5,184	9,484	**51,385**
	Total Capacity (MW)	**9,837**	**21,438**	**3,329**	**360**	**3,488**	**5,503**	**8,257**	**9,338**	**11,413**	**72,963**
	Total Demand (MW) [33 kV]	**24,284**	**9,124**	**4,558**	**5,304**	**3,691**	**6,522**	**4,654**	**6,648**	**3,357**	**68,142**
	Total Demand (MW) [132 KV]	**25,013**	**9,398**	**4,695**	**5,463**	**3,802**	**6,718**	**4,794**	**6,847**	**3,458**	**70,186**
	Reserve Margin (%) [33 KV]	**-59**	**135**	**-27**	**-93**	**-6**	**-16**	**77**	**40**	**240**	**7**
	Reserve Margin (%) [132 KV]	**-61**	**128**	**-29**	**-93**	**-8**	**-18**	**72**	**36**	**230**	**4**
2039	Existing Capacity (MW)	0	230	559	0	320	0	0	600	188	**1,897**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	18,512	1,610	360	1,772	775	8,005	5,184	9,484	**51,385**
	Total Capacity (MW)	**9,437**	**21,438**	**3,329**	**360**	**3,488**	**5,503**	**8,257**	**9,338**	**11,413**	**72,564**
	Total Demand (MW) [33 kV]	**25,500**	**9,714**	**4,769**	**5,614**	**3,882**	**6,948**	**4,959**	**6,952**	**3,542**	**71,880**
	Total Demand (MW) [132 KV]	**26,265**	**10,005**	**4,912**	**5,782**	**3,998**	**7,156**	**5,108**	**7,161**	**3,648**	**74,036**
	Reserve Margin (%) [33 KV]	**-63**	**121**	**-30**	**-94**	**-10**	**-21**	**67**	**34**	**222**	**1**
	Reserve Margin (%) [132 KV]	**-64**	**114**	**-32**	**-94**	**-13**	**-23**	**62**	**30**	**213**	**-2**
2040	Existing Capacity (MW)	0	230	349	0	320	0	0	600	0	**1,499**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	18,212	1,610	360	1,772	1,175	8,005	5,184	9,484	**51,485**
	Total Capacity (MW)	**9,437**	**21,138**	**3,119**	**360**	**3,488**	**5,903**	**8,257**	**9,338**	**11,225**	**72,265**
	Total Demand (MW) [33 kV]	**26,768**	**10,324**	**5,003**	**5,964**	**4,076**	**7,403**	**5,296**	**7,270**	**3,740**	**75,844**
	Total Demand (MW) [132 KV]	**27,571**	**10,634**	**5,153**	**6,143**	**4,198**	**7,625**	**5,455**	**7,488**	**3,852**	**78,119**
	Reserve Margin (%) [33 KV]	**-65**	**105**	**-38**	**-94**	**-14**	**-20**	**56**	**28**	**200**	**-5**
	Reserve Margin (%) [132 KV]	**-66**	**99**	**-39**	**-94**	**-17**	**-23**	**51**	**25**	**191**	**-7**
2041	Existing Capacity (MW)	0	230	0	0	0	0	0	600	0	**830**
	Committed Capacity (MW)	3,754	2,696	1,160	0	1,396	4,728	252	3,554	1,741	**19,281**
	Candidate Capacity (MW)	5,683	18,962	1,610	360	1,772	1,175	8,005	5,184	9,484	**52,235**
	Total Capacity (MW)	**9,437**	**21,888**	**2,770**	**360**	**3,168**	**5,903**	**8,257**	**9,338**	**11,225**	**72,346**
	Total Demand (MW) [33 kV]	**28,070**	**10,844**	**5,273**	**6,284**	**4,286**	**7,879**	**5,655**	**7,640**	**3,965**	**79,896**
	Total Demand (MW) [132 KV]	**28,912**	**11,169**	**5,431**	**6,473**	**4,415**	**8,115**	**5,825**	**7,869**	**4,084**	**82,293**
	Reserve Margin (%) [33 KV]	**-66**	**102**	**-47**	**-94**	**-26**	**-25**	**46**	**22**	**183**	**-9**
	Reserve Margin (%) [132 KV]	**-67**	**96**	**-49**	**-94**	**-28**	**-27**	**42**	**19**	**175**	**-12**

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
Projects Completion by Year 2017								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2017)	**0**						
Projects Completion by Year 2018								
Public Sector								
1	Panchagarh 30 MW Solar Power Plant, Boda, Panchagarh	30	RPCL	Solar	Rangpur	2018	Land procurement is in process	2038
	Sub-Total (Public)	**30**						
Private Sector								
1	Dhormopasha, Sunamgonj 32 MW Solar PP	32	IPP	Solar	Sylhet	Mar-18	Under construction	
2	Sutakhali, Mymensingh 50 MW Solar PP (HDFC SinPower Ltd.)	50	IPP	Solar	Mymensingh	Apr-18	Under construction	
3	Teknaf 200 MW Solar Park (Southern Solar Power Ltd.)	200	IPP	Solar	Chattogram	Jul-18	Under construction	
4	Teknaf 20 MW Solar Park (Teknaf SolarTech Energy Ltd.)	20	IPP	Solar	Chattogram	Jul-18	Running	
5	Cox's Bazar 60 MW Wind Power Plant	60	IPP	Wind	Chattogram	Dec-18	Under construction	
6	Gongachhora, Rangpur 30 MW Solar Park	30	IPP	Solar	Rangpur	Jun-18	Under Tender Process	
7	Dhorola 30 MW Power Plant	30	IPP	Solar	Rangpur	Jun-18	Under Tender Process	
8	Patgram, Lalmonirhat 5 MW Solar Power Plant	5	IPP	Solar	Rangpur	Jun-18	Under Tender Process	
9	Sekgachha, Tetulia 30 MW Solar Park (Beximco)	30	IPP	Solar	Rangpur	Dec-18	Under Tender Process	
	Sub-Total (Private)	**457**						
	Total (2018)	**487**						
Projects Completion by Year 2019								
Public Sector								
1	Kaptai 7.4MWp Grid connected Solar PV Power Plant	7	BPDB	Solar	Chattogram	2019	BPDB's own project (EPC)	
2	1 MW Garbage based Power Plant at Keraniganj	1	BPDB	Biomass	Dhaka	2019	BPDB's own project (EPC) on BPDB's own land	
3	200 MWp Solar Power Plant at Sonagazi, Feni	200	EGCB	Solar	Chattogram	Jun-19	Land acquisition is under progress	
4	100 MW Wind Power Plant at Sonagazi, Feni	100	EGCB	Wind	Chattogram	Dec-19	Land acquisition is under progress	

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
5	Sirajgonj 7.6 MW Grid Connected Photovoltaic Solar Power Plant Project	7.6	NWPGCL	Solar	Rajshahi	2019	1. TEC report of EPC Bid Proposal has been approved by the company board 2. DPP is under process of ECNEC approval.	
6	Sirajganj 12 MW Grid connected Solar PP Project	12	NWPGCL	Solar	Rajshahi	2019	Letter submitted to Ministry for Administrative Approval.	
7	Pabna 60 MW Grid connected Solar PP Project	60	NWPGCL	Solar	Rajshahi	2019	Land Acquisition is under process.	
8	Mollahat 100 MW Solar Power Plant, Mollahat, Bagerhat	100	RPCL	Solar	Khulna	2019	* Land Acquisition process is giong on, * Project will be implemented under Indian LOC-III, * DPP submitted to the Power Division.	2039
9	Madargonj 100 MW Solar Power Plant, Madarganj, Jamalpur	100	RPCL	Solar	Mymensingh	2019	Technical & Financial (Tariff) proposal submitted to Power Division.	2039
10	Madargonj 100 MW Solar Power Plant (JV CIRE & B-R Powergen Ltd.)	100	BR Powergen	Solar	Mymensingh	30.12.2019	Documents laying in BPDB	
	Sub-Total (Public)	**687.6**						
Private Sector								
1	Lotashal, Gaibandha 200 MW Solar Park (Beximco)	200	IPP	Solar	Rangpur	Jan-19	Under Tender Process	
2	Majhipara, Tetulia 8 MW Solar Power Plant (Paragon)	8	IPP	Solar	Rangpur	Jan-19	Under Tender Process	
3	Sekgachha, Tetulia, Panchagarh 50 MW Solar Park (Singapore Holdings)	50	IPP	Solar	Rangpur	Mar-19	Under Tender Process; LOI issued.	
3	Paturia, Shibaloy, Manikganj 35 MW Grid connected Solar PV Power Plant	35	IPP	Solar	Dhaka	Mar-19	Under Tender Process; LOI issued.	
4	Near Tista Barrage 100 MW Solar Power Plant (Solar Tech)	100	IPP	Solar	Rangpur	Oct-19	Under Tender Process	
5	Borodurgapur, Mongla, Bagerhat 100 MW Solar Power Plant (Enargon)	100	IPP	Solar	Khulna	Oct-19	Under Tender Process	
	Sub-Total (Private)	**493**						
	Total (2019)	**1180.6**						

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
Projects Completion by Year 2020								
Public Sector								
1	Construction of 60MWp Solar PV Grid-connected Power Plant at Rangunia, Chattogram	60	BPDB	Solar	Chattogram	2020	BPDB's own project (EPC)	
2	Construction of 55MWp Solar PV Grid-connected Power Plant at Gangachhora, Rangpur	55	BPDB	Solar	Rangpur	2020	BPDB's own project (EPC)	
3	Installation of a 100 MWp Solar PV based Grid-connected Power Generation Plant at Sonagazi, Feni	100	BPDB	Solar	Cumilla	2020	BPDB's own project (EPC)	
4	Faridpur 100 MW Grid connected Solar PP Project	100	NWPGCL	Solar	Khulna	2020	Land acquisition is under process.	
	Sub-Total (Public)	**315**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2020)	**315**						
Projects Completion by Year 2021								
Public Sector								
1	Padma char 100 MW Solar Power Plant, Rajshahi	100	RPCL	Solar	Rajshahi	2021	Feasibility Study is going on under Power Cell.	2041
2	100 MW Wind Power Project, Kalapara, Patuakhali	100	RPCL	Wind	Barishal	2021	Feasibility Study is going on.	2041
3	Payra 50 MW Wind Power Plant Project under BCPCL (JVC of NWPGCL & CMC)	50	BCPCL	Wind	Barishal	Jun-21	Appointment of Consultant for conducting Feasibility Study is under process.	
	Sub-Total (Public)	**250**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2021)	**250**						
Projects Completion by Year 2022								
Public Sector								
1	Ashuganj 100 MW grid-tied Solar Park, Kotiadi, Kishoreganj	100	APSCL	Solar	Dhaka	December, 2022	Proposed	2037
2	100 MW Solar, Padmar Char, Rajshahi	100	APSCL	Solar	Rajshahi	2022	Feasibility Study is going on under Power Cell.	2038
3	Payra 100 MW Solar Power Plant Project under BCPCL (JVC of NWPGCL & CMC)	100	BCPCL	Solar	Barishal	2022	Land Acquisition is completed.	
	Sub-Total (Public)	**300**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2022)	**300**						

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
Projects Completion by Year 2023								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2023)	**0**						
Projects Completion by Year 2024								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2024)	**0**						
Projects Completion by Year 2025								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2025)	**0**						
Projects Completion by Year 2026								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2026)	**0**						
Projects Completion by Year 2027								
Public Sector								
1	50 MW Wind Power	50	BR Powergen	Wind	Chattogram	30/12/2027	Under Process	
	Sub-Total (Public)	**50**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2027)	**50**						
Projects Completion by Year 2028								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2028)	**0**						
Projects Completion by Year 2029								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2029)	**0**						

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
Projects Completion by Year 2030								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2030)	**0**						
Projects Completion by Year 2031								
Public Sector								
1	100 MW Solar Power Plant	100	BR Powergen	Solar	Mymensingh	30/12/2031	Under Planning	
	Sub-Total (Public)	**100**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2031)	**100**						
Projects Completion by Year 2032								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2032)	**0**						
Projects Completion by Year 2033								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2033)	**0**						
Projects Completion by Year 2034								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2034)	**0**						
Projects Completion by Year 2035								
Public Sector								
1	100 MW Wind Power Project Patuakhali	100	RPCL	Wind	Barishal	2035	* Pre feasibility study is complete, * Land selection is in process.	2055
2	50 MW Wind Power Plant	50	BR Powergen	Wind	Chattogram	30/12/2035	Under Planning	
	Sub-Total (Public)	**150**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2035)	**150**						

Year-wise Renewable Energy Generation Plan (2017 to 2041) Attachment-05

Sl. No	Name of the Power Plant	Capacity (MW)	Ownership	Type of Fuel	Zone	Expected COD	Status	Retirement Year
Projects Completion by Year 2036								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2036)	**0**						
Projects Completion by Year 2037								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2037)	**0**						
Projects Completion by Year 2038								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2038)	**0**						
Projects Completion by Year 2039								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2039)	**0**						
Projects Completion by Year 2040								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2040)	**0**						
Projects Completion by Year 2041								
Public Sector								
	Sub-Total (Public)	**0**						
Private Sector								
	Sub-Total (Private)	**0**						
	Total (2041)	**0**						

Total	**2,833 MW**

Year-wise Total Transmission Infrastructure (2017 to 2041) Attachment-06

Year	Substation			Transmission Line	
	Voltage Level	Number	Capacity (MVA)	Voltage Level	Length (Ckt. Km)
2017	132/33kV	122	18,927	132kV	7,236
	230/132kV	23	12,085	230kV	3,353
	400/230kV	3	2,080	400kV	700
	400/132kV	1	650	-	-
	Total	**149**	**33,742**	**Total**	**11,289**
2018	132/33kV	139	24,559	132kV	7,876
	230/132kV	27	15,535	230kV	3,531
	400/230kV	3	2,080	400kV	700
	400/132kV	1	650	-	-
	Total	**170**	**42,824**	**Total**	**12,107**
2019	132/33kV	177	36,678	132kV	8,817
	230/132kV	35	23,135	230kV	4,105
	400/230kV	3	2,080	400kV	1,148
	400/132kV	2	650	-	-
	Total	**217**	**62,543**	**Total**	**14,069**
2020	132/33kV	197	41,503	132kV	9,275
	230/132kV	42	28,985	230kV	4,673
	400/230kV	6	7,390	400kV	2,496
	400/132kV	2	650	-	-
	Total	**247**	**78,528**	**Total**	**16,443**
2021	132/33kV	210	45,107	132kV	9,846
	230/132kV	52	35,085	230kV	5,086
	400/230kV	7	8,890	400kV	3,194
	400/132kV	3	1,300	-	-
	Total	**272**	**90,382**	**Total**	**18,126**
2022	132/33kV	220	47,747	132kV	10,111
	230/132kV	64	45,985	230kV	6,218
	400/230kV	9	11,890	400kV	4,473
	400/132kV	4	1,950	765kV	180
	Total	**297**	**107,572**	**Total**	**20,982**
2023	132/33kV	235	49,427	132kV	10,713
	230/132kV	72	52,985	230kV	6,750
	400/230kV	13	16,830	400kV	4,537
	400/132kV	4	1,950	765kV	380
	Total	**324**	**121,192**	**Total**	**22,380**
2024	132/33kV	242	60,282	132kV	11,053
	230/132kV	72	52,985	230kV	6,750
	400/230kV	13	16,830	400kV	4,537
	400/132kV	4	1,950	765kV	880
	Total	**331**	**132,047**	**Total**	**23,220**
2025	132/33kV	254	63,871	132kV	11,281
	230/132kV	73	54,335	230kV	6,774
	400/230kV	13	16,830	400kV	4,537
	400/132kV	4	1,950	765kV	880
	Total	**344**	**136,986**	**Total**	**23,472**
2026	132/33kV	268	69,586	132kV	11,889
	230/132kV	75	55,735	230kV	7,020
	400/230kV	15	18,910	400kV	4,752
	400/132kV	6	3,250	765kV	880
	Total	**364**	**147,481**	**Total**	**24,541**

Year-wise Total Transmission Infrastructure (2017 to 2041) Attachment-06

Year	Substation			Transmission Line	
	Voltage Level	Number	Capacity (MVA)	Voltage Level	Length (Ckt. Km)
2027	132/33kV	282	74,164	132kV	12,405
	230/132kV	77	57,135	230kV	7,189
	400/230kV	16	19,950	400kV	4,934
	400/132kV	6	3,250	765kV	880
	Total	381	154,499	Total	25,408
2028	132/33kV	293	78,125	132kV	12,867
	230/132kV	81	59,935	230kV	7,362
	400/230kV	18	22,030	400kV	5,175
	400/132kV	7	3,900	765kV	1,380
	Total	**399**	**163,990**	**Total**	**26,784**
2029	132/33kV	302	81,111	132kV	13,241
	230/132kV	84	62,035	230kV	7,597
	400/230kV	19	23,070	400kV	5,367
	400/132kV	7	3,900	765kV	1,380
	Total	**412**	**170,116**	**Total**	**27,585**
2030	132/33kV	312	84,800	132kV	13,627
	230/132kV	87	64,135	230kV	7,783
	400/230kV	21	25,150	400kV	5,530
	400/132kV	8	4,550	765kV	1,380
	Total	**428**	**178,635**	**Total**	**28,320**
2031	132/33kV	317	87,602	132kV	13,930
	230/132kV	90	66,235	230kV	7,979
	400/230kV	23	27,230	400kV	5,790
	400/132kV	9	5,200	765kV	1,380
	765/400kV	-	-	800kV(DC)	396
	Total	**439**	**186,267**	**Total**	**29,475**
2032	132/33kV	339	94,246	132kV	14,499
	230/132kV	92	67,635	230kV	8,124
	400/230kV	24	28,270	400kV	6,140
	400/132kV	9	5,200	765kV	1,380
	765/400kV	2	4,000	800kV(DC)	396
	Total	**466**	**195,351**	**Total**	**30,539**
2033	132/33kV	355	98,806	132kV	14,939
	230/132kV	94	69,035	230kV	8,220
	400/230kV	26	30,350	400kV	6,404
	400/132kV	10	5,850	765kV	1,380
	765/400kV	2	4,000	800kV(DC)	396
	Total	**487**	**204,041**	**Total**	**31,339**
2034	132/33kV	361	100,771	132kV	15,192
	230/132kV	96	70,435	230kV	8,356
	400/230kV	27	31,390	400kV	6,654
	400/132kV	10	5,850	765kV	1,380
	765/400kV	4	8,000	800kV(DC)	396
	Total	**498**	**208,446**	**Total**	**31,978**
2035	132/33kV	363	101,731	132kV	15,365
	230/132kV	99	72,535	230kV	8,481
	400/230kV	29	33,470	400kV	6,814
	400/132kV	11	6,500	765kV	1,380
	765/400kV	4	8,000	800kV(DC)	396
	Total	**506**	**214,236**	**Total**	**32,436**

Year-wise Total Transmission Infrastructure (2017 to 2041) Attachment-06

Year	Substation			Transmission Line	
	Voltage Level	Number	Capacity (MVA)	Voltage Level	Length (Ckt. Km)
2036	132/33kV	363	101,971	132kV	15,551
	230/132kV	101	73,935	230kV	8,707
	400/230kV	31	35,550	400kV	6,974
	400/132kV	13	7,800	765kV	1,380
	765/400kV	4	8,000	800kV(DC)	396
	Total	**512**	**219,256**	**Total**	**33,008**
2037	132/33kV	370	103,771	132kV	15,854
	230/132kV	104	76,035	230kV	8,876
	400/230kV	32	36,590	400kV	7,334
	400/132kV	13	7,800	765kV	1,380
	765/400kV	5	10,000	800kV(DC)	796
	Total	**524**	**224,196**	**Total**	**34,240**
2038	132/33kV	376	105,211	132kV	16,120
	230/132kV	106	77,435	230kV	9,100
	400/230kV	34	38,670	400kV	7,494
	400/132kV	14	8,450	765kV	1,740
	765/400kV	6	12,000	800kV(DC)	796
	Total	**536**	**229,766**	**Total**	**35,250**
2039	132/33kV	382	106,651	132kV	16,373
	230/132kV	108	78,835	230kV	9,293
	400/230kV	35	39,710	400kV	7,642
	400/132kV	14	8,450	765kV	1,740
	765/400kV	6	12,000	800kV(DC)	796
	Total	**545**	**233,646**	**Total**	**35,844**
2040	132/33kV	386	107,971	132kV	16,545
	230/132kV	110	80,235	230kV	9,462
	400/230kV	37	41,790	400kV	7,802
	400/132kV	15	9,100	765kV	1,740
	765/400kV	6	12,000	800kV(DC)	796
	Total	**554**	**239,096**	**Total**	**36,345**
2041	132/33kV	388	108,451	132kV	16,655
	230/132kV	113	82,335	230kV	9,717
	400/230kV	39	43,870	400kV	7,962
	400/132kV	16	9,750	765kV	1,740
	765/400kV	6	12,000	800kV(DC)	796
	Total	**562**	**244,406**	**Total**	**36,870**

New Construction of Distribution Lines with respect to Demand

Attachment-07

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DPDC	33 kV line	15	27	30	36	38	40	37	35	25	24	25	22	25	25	28	32	35	50	55	36	24	30	35	45	50
	11 kV line	35	53	56	60	58	61	63	67	72	56	58	53	70	65	56	67	88	70	88	42	39	35	32	28	35
	0.4 kV line	65	98	104	111	107	114	117	124	133	104	107	98	130	120	104	124	163	130	163	78	72	65	59	52	65

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DESCO	33 kV line	70	60	150	126	75	75	50	60	20	30	30	40	40	27	20	20	40	40	40	20	20	40	40	40	20
	11 kV line	80	185	300	315	200	200	200	200	260	20	50	50	100	100	100	100	100	100	120	100	100	100	100	120	100
	0.4 kV line	40	150	150	35	35	75	75	75	75	100	100	100	100	100	120	120	120	120	170	150	150	150	150	200	150

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BPDB	33 kV line	120	270	386	359	381	275	268	263	245	249	241	219	205	203	82	89	99	95	99	99	100	106	110	113	108
	11 kV line	228	1,340	1,832	1,740	1,550	1,295	1,280	1,305	1,305	1,290	1,320	1,385	1,365	1,395	430	390	405	460	450	345	390	355	390	390	400
	0.4 kV line	361	1,529	1,880	1,850	1,780	1,800	1,870	1,880	1,940	2,020	2,030	2,050	2,110	2,110	430	390	405	460	450	345	390	355	390	390	400

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
NESCO	33 kV line	88	149	201	67	70	74	77	81	85	54	55	57	59	61	42	42	43	44	45	46	47	48	49	50	51
	11 kV line	366	660	808	322	338	355	373	391	411	259	267	275	283	291	200	204	208	212	216	221	225	230	234	239	244
	0.4 kV line	410	790	939	445	468	491	516	541	569	358	369	380	391	403	415	428	441	454	467	481	496	511	526	542	458

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BREB	33 kV line	875	1,300	1,375	1,250	750	750	750	708	708	375	375	375	375	375	302	308	313	311	311	390	345	303	269	234	198
	11 kV line	11,379	16,900	17,875	16,250	9,750	9,750	9,750	9,750	9,750	4,875	4,875	4,875	4,875	4,875	3,401	3,435	3,469	3,504	3,838	5,855	5,483	5,050	4,605	4,030	3,538
	0.4 kV line	5,250	7,800	8,250	7,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	2,921	2,974	3,033	3,094	3,440	5,310	4,770	4,290	3,735	3,310	2,725

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
WZPDCL	33 kV line	0	92	112	129	140	143	154	156	168	168	180	193	206	189	134	139	145	150	117	121	124	128	132	136	140
	11 kV line	0	281	344	394	428	437	472	478	514	515	551	590	631	579	409	426	443	460	359	370	381	392	404	416	429
	0.4 kV line	0	411	503	577	626	639	690	699	751	754	807	863	923	847	598	622	647	673	525	541	557	574	591	609	627

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
TOTAL	33 kV line (in thousand km)	1.17	1.90	2.25	1.97	1.45	1.36	1.34	1.30	1.25	0.90	0.91	0.91	0.91	0.88	0.61	0.63	0.68	0.69	0.67	0.71	0.66	0.65	0.63	0.62	0.57
	11 kV line (in thousand km)	12.09	19.42	21.21	19.08	12.32	12.10	12.14	12.19	12.31	7.02	7.12	7.23	7.32	7.31	4.60	4.62	4.71	4.81	5.07	6.93	6.62	6.16	5.76	5.22	4.75
	0.4 kV line (in thousand km)	6.13	10.78	11.83	10.52	7.52	7.62	7.77	7.82	7.97	7.84	7.91	7.99	8.15	8.08	4.59	4.66	4.81	4.93	5.22	6.91	6.43	5.94	5.45	5.10	4.43

Maintenance/Renovation of Distribution Lines with respect to Demand

Attachment-08

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DPDC	33 kV line	16	16	17	18	18	19	20	20	20	20	20	19	19	19	18	18	18	17	17	17	16	15	14	13	12
	11 kV line	62	62	62	62	62	62	62	62	61	60	59	58	57	56	54	52	51	49	47	45	42	39	36	32	29
	0.4 kV line	116	116	116	116	116	116	115	115	114	112	110	108	106	104	100	97	95	91	88	83	78	72	66	60	54

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DESCO	33 kV line	10	10	40	30	20	20	35	35	25	20	20	10	10	25	20	15	15	20	15	15	10	15	10	10	15
	11 kV line	45	40	50	50	60	40	40	55	55	60	50	65	45	45	40	50	50	40	30	50	50	40	30	30	25
	0.4 kV line	60	50	60	70	70	60	70	80	80	60	60	80	75	75	50	50	40	50	60	40	30	40	55	65	45

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BPDB	33 kV line	190	207	315	360	274	196	161	169	176	183	191	197	203	209	212	214	217	220	223	226	229	232	236	239	242
	11 kV line	565	610	740	765	634	701	813	869	926	982	1,040	1,100	1,160	1,221	1,239	1,256	1,273	1,293	1,312	1,327	1,343	1,358	1,375	1,393	1,410
	0.4 kV line	716	943	1,120	1,205	1,116	1,159	1,327	1,417	1,509	1,605	1,702	1,800	1,901	2,001	2,022	2,040	2,059	2,082	2,103	2,120	2,138	2,155	2,174	2,193	2,213

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
NESCO	33 kV line	49	57	67	70	74	77	81	85	90	92	95	98	101	104	106	108	110	112	115	117	119	122	124	127	129
	11 kV line	248	281	322	338	355	373	391	411	431	444	458	471	485	500	510	520	531	541	552	563	574	586	598	610	622
	0.4 kV line	359	399	445	468	491	516	541	569	597	615	633	652	672	692	713	734	756	779	802	826	851	877	903	930	953

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BREB	33 kV line	9,674	10,401	11,170	11,870	12,302	12,735	13,168	13,600	14,033	14,249	14,465	14,682	14,898	15,114	15,290	15,470	15,652	15,833	16,014	16,236	16,431	16,602	16,755	16,888	17,002
	11 kV line	125,005	134,080	144,009	153,212	159,248	164,874	170,501	176,127	181,754	184,908	187,722	190,535	193,348	196,161	198,274	200,257	202,259	204,282	206,504	209,694	212,853	215,743	218,401	220,734	222,762
	0.4 kV line	50,199	49,569	53,834	57,937	60,906	63,337	65,768	68,198	70,629	73,059	75,490	77,921	80,351	82,782	84,767	86,459	88,188	89,952	91,751	94,452	97,080	99,450	101,526	103,356	104,892

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
WZPDCL	33 kV line	106	141	211	127	120	26	41	52	44	37	37	44	52	37	56	74	111	67	63	15	27	40	46	31	24
	11 kV line	260	347	520	312	295	80	125	160	137	114	114	137	160	114	171	228	342	205	194	50	93	136	155	105	81
	0.4 kV line	352	469	704	422	399	123	194	247	212	176	176	212	247	176	265	353	529	317	300	63	118	173	197	134	102

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
TOTAL	33 kV line (in thousand km)	10.05	10.83	11.82	12.47	12.81	13.07	13.50	13.96	14.39	14.60	14.83	15.05	15.28	15.51	15.70	15.90	16.12	16.27	16.45	16.63	16.83	17.03	17.18	17.31	17.42
	11 kV line (in thousand km)	126.19	135.42	145.70	154.74	160.65	166.13	171.93	177.68	183.36	186.57	189.44	192.37	195.26	198.10	200.29	202.36	204.51	206.41	208.64	211.73	214.96	217.90	220.60	222.90	224.93
	0.4 kV line(in thousand km)	51.80	51.55	56.28	60.22	63.10	65.31	68.02	70.62	73.14	75.63	78.17	80.77	83.35	85.83	87.92	89.73	91.67	93.27	95.10	97.58	100.30	102.77	104.92	106.74	108.26

Total 33/11 kV Distribution Substations with respect to Demand

Attachment-09

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DPDC	Total 33/11 kV Substation	Number of Transformers	105	130	151	161	170	181	192	204	216	228	240	249	272	292	313	336	359	383	383	399	418	437	456	477	495
		Number of Substations	44	55	65	70	74	79	84	89	94	99	104	108	118	127	136	146	156	166	166	173	181	189	197	206	214
		Capacity (MVA)	2,618	3,479	4,214	4,704	5,154	5,704	6,254	6,854	7,454	8,054	8,654	9,104	10,254	11,254	12,304	13,454	14,604	15,804	16,610	17,410	18,360	19,310	20,260	21,310	22,210

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DESCO	Total 33/11 kV Substation	Number of Transformers	83	83	157	157	157	157	160	160	199	199	199	199	199	265	265	265	265	265	313	313	313	313	313	385	391
		Number of Substations	34	34	53	53	53	53	54	54	67	67	67	67	67	89	89	89	89	89	105	105	105	105	105	129	131
		Capacity (MVA)	2,156	2,156	4,144	4,144	4,144	4,144	4,234	4,234	6,334	6,334	6,334	6,334	6,334	9,814	9,814	9,814	9,814	9,814	12,214	12,214	12,214	12,214	12,214	15,814	16,114

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BPDB	Total 33/11 kV Substation	Number of Transformers	189	211	259	324	366	388	411	436	462	490	518	548	579	608	648	690	738	783	829	875	923	974	1,026	1,081	1,131
		Number of Substations	126	137	161	194	216	232	250	268	287	308	329	351	373	395	415	436	460	482	506	529	552	578	604	631	657
		Capacity (MVA)	3,150	3,490	4,341	5,440	6,045	6,397	6,781	7,188	7,619	8,080	8,555	9,042	9,553	10,041	10,692	11,385	12,162	12,889	13,646	14,385	15,151	15,984	16,848	17,734	18,546

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
NESCO	Total 33/11 kV Substation	Number of Transformers	117	125	134	137	141	143	151	166	176	187	198	211	232	255	275	297	321	347	375	405	437	472	510	551	595
		Number of Substations	65	71	76	77	80	81	85	92	96	102	109	114	125	138	141	153	163	172	186	198	214	230	248	268	290
		Capacity (MVA)	1,108	1,219	1,341	1,475	1,622	1,784	1,963	2,159	2,375	2,613	2,874	3,161	3,477	3,825	4,131	4,462	4,819	5,204	5,620	6,070	6,556	7,080	7,646	8,258	8,919

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BREB	Total 33/11 kV Substation	Number of Transformers	2,332	2,461	2,600	2,746	2,874	2,991	3,105	3,230	3,358	3,491	3,643	3,799	3,974	4,189	4,358	4,514	4,662	4,798	4,925	5,043	5,153	5,249	5,332	5,403	5,460
		Number of Substations	785	882	981	1,085	1,184	1,270	1,356	1,434	1,519	1,601	1,679	1,763	1,837	1,931	2,020	2,106	2,181	2,255	2,331	2,404	2,475	2,540	2,601	2,656	2,702
		Capacity (MVA)	8,955	11,065	13,180	15,405	17,625	19,645	21,665	23,515	25,835	28,145	30,335	32,545	35,115	38,030	40,140	42,110	43,890	45,560	47,320	48,960	50,610	52,150	53,470	54,520	55,340

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
WZPDCL	Total 33/11 kV Substation	Number of Transformers	134	146	186	212	212	216	230	250	274	274	288	312	342	370	370	386	410	438	470	470	482	502	522	542	556
		Number of Substations	66	70	87	100	100	102	109	119	131	131	138	150	165	179	179	187	199	213	229	229	235	245	255	265	272
		Capacity (MVA)	1,456	1,733	2,491	2,891	2,891	2,997	3,368	3,898	4,534	4,534	4,905	5,541	6,336	7,078	7,078	7,502	8,138	8,880	9,728	9,728	10,046	10,576	11,106	11,636	12,007

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
TOTAL	Total 33/11 kV Substation	Number of Transformers (in thousands)	2.96	3.16	3.49	3.74	3.92	4.08	4.25	4.45	4.68	4.87	5.09	5.32	5.60	5.98	6.23	6.49	6.75	7.01	7.29	7.50	7.73	7.95	8.16	8.44	8.63
		Number of Substations (in thousands)	1.12	1.25	1.42	1.58	1.71	1.82	1.94	2.06	2.19	2.31	2.43	2.55	2.69	2.86	2.98	3.12	3.25	3.38	3.52	3.64	3.76	3.89	4.01	4.16	4.27
		Capacity (in thousand MVA)	19.44	23.14	29.71	34.06	37.48	40.67	44.26	47.85	54.15	57.76	61.66	65.73	71.07	80.04	84.16	88.73	93.43	98.15	105.14	108.77	112.94	117.31	121.54	129.27	133.14

Note: Total for a year = Data of previous year + New Transformer addition + Upgradation in that Year
Upgradation= New Capacity -Previous Capacity

Up-gradation of 33/11kV Disrtibution Substations with respect to Demand

Attachment-10

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DPDC	Total 33/11 kV Substation	Number of Transformers	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0
		Capacity (MVA)	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	806	0	0	0	0	0	0

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DESCO	Total 33/11 kV Substation	Number of Transformers	0	6	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Capacity (MVA)	0	168	224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BPDB	Total 33/11 kV Substation	Number of Transformers	0	0	16	18	28	15	0	0	3	5	6	2	2	0	0	0	10	23	32	14	0	0	4	8	7
		Capacity (MVA)	0	0	204	328	363	180	0	0	40	67	80	27	27	0	0	0	133	306	426	186	0	0	53	107	93

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
NESCO	Total 33/11 kV Substation	Number of Transformers	6	11	13	8	7	9	10	8	10	11	13	13	15	15	17	17	18	17	18	20	20	21	22	23	24
		Capacity (MVA)	55	100	120	80	70	90	100	80	100	110	130	130	150	150	170	170	180	170	180	200	200	210	220	230	240

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BREB	Total 33/11 kV Substation	Number of Transformers	33	52	55	58	51	47	46	50	51	53	61	62	70	86	68	62	59	54	51	47	44	38	33	28	23
		Capacity (MVA)	656	1,034	1,110	1,167	1,024	936	911	1,000	1,024	1,064	1,216	1,248	1,400	1,720	1,352	1,248	1,184	1,088	1,016	944	880	768	664	568	456

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
WZPDCL	Total 33/11 kV Substation	Number of Transformers	72	76	82	82	82	82	90	98	104	104	104	106	112	120	120	124	132	140	148	150	156	166	176	186	186
		Capacity (MVA)	1,456	1,707	1,980	1,980	1,980	1,980	2,086	2,194	2,275	2,275	2,275	2,328	2,409	2,543	2,543	2,649	2,861	3,073	3,285	3,338	3,497	3,762	4,027	4,292	4,292

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Total	Total 33/11 kV Substation	Number of Transformers	110.80	144.71	178.48	175.37	168.20	152.80	145.56	156.00	168.20	173.20	183.80	183.40	199.00	221.00	204.60	203.40	219.20	234.40	277.80	231.20	220.00	225.40	235.20	245.40	239.80
		Capacity (in thousand MVA)	2.17	3.01	3.64	3.64	3.44	3.19	3.10	3.27	3.44	3.52	3.70	3.73	3.99	4.41	4.07	4.07	4.36	4.64	5.71	4.67	4.58	4.74	4.96	5.20	5.08

Total Transformers with respect to Demand of Future Transformer Planning

Attachment-11

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DPDC	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	17,657	18,707	19,657	20,787	21,987	23,052	24,027	24,917	26,067	27,317	28,817	30,387	32,007	33,637	35,287	36,977	38,577	40,127	41,527	43,067	44,667	46,367	47,867	49,217	50,667
		Capacity (MVA)	3,531	3,779	4,030	4,324	4,639	4,933	5,214	5,457	5,761	6,092	6,484	6,898	7,330	7,770	8,222	8,690	9,143	9,590	10,008	10,465	10,943	11,453	11,919	12,353	12,819

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
DESCO	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	6,567	7,067	7,867	8,331	8,831	9,331	9,831	10,431	10,909	11,109	11,309	11,509	11,709	11,909	12,109	12,409	12,709	12,959	13,209	13,409	13,809	14,209	14,509	15,009	15,309
		Capacity (MVA)	1,102	1,413	1,573	1,666	1,766	1,866	1,966	2,086	2,182	2,222	2,262	2,302	2,342	2,382	2,422	2,482	2,542	2,592	2,642	2,682	2,762	2,842	2,902	3,002	3,062

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BPDB	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	15,778	18,458	21,547	24,547	27,297	29,567	31,832	34,102	36,347	38,567	40,802	43,012	45,172	47,302	49,444	51,616	54,052	56,350	58,756	61,108	63,528	66,156	68,873	71,668	74,244
		Capacity (MVA)	3,156	3,692	4,309	4,909	5,459	5,913	6,366	6,820	7,269	7,713	8,160	8,602	9,034	9,460	12,361	12,904	13,513	14,088	14,689	15,277	15,882	16,539	17,218	17,917	18,561

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
NESCO	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	6,613	6,835	7,436	8,047	8,710	9,480	10,161	11,063	12,170	13,186	14,505	15,955	17,551	19,306	20,850	22,518	24,320	26,265	28,366	30,636	33,086	35,733	38,592	41,679	45,014
		Capacity (MVA)	1,118	1,230	1,353	1,489	1,637	1,801	1,981	2,180	2,397	2,637	2,901	3,191	3,510	3,861	4,170	4,504	4,864	5,253	5,673	6,127	6,617	7,147	7,718	8,336	9,003

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
BREB	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	117,810	131,877	145,977	160,810	175,610	189,077	202,543	214,877	230,343	245,743	260,343	275,077	292,210	311,643	325,710	338,843	350,710	361,843	373,577	384,510	395,510	405,777	414,577	421,577	427,043
		Capacity (MVA)	12,231	14,341	16,456	18,681	20,901	22,921	24,941	26,791	29,111	31,421	33,611	35,821	38,391	41,306	43,416	45,386	47,166	48,836	50,596	52,236	53,886	55,426	56,746	57,796	58,616

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
WZPDCL	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers	6,447	6,801	7,264	7,828	8,476	9,173	9,967	10,807	11,757	12,748	13,857	15,100	16,492	18,050	19,214	20,471	21,829	23,295	24,483	25,742	27,075	28,490	29,739	31,051	32,428
		Capacity (MVA)	1,098	1,186	1,302	1,443	1,605	1,779	1,978	2,188	2,425	2,673	2,950	3,261	3,609	3,998	4,289	4,604	4,943	5,310	5,607	5,921	6,255	6,608	6,921	7,249	7,593

	Year		2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
TOTAL	11/0.4 kV Transformers with respect to demand (50/100/200/250 kVA)	Number of Transformers (in thousands)	170.87	189.74	209.75	230.35	250.91	269.68	288.36	306.20	327.59	348.67	369.63	391.04	415.14	441.85	462.61	482.83	502.20	520.84	539.92	558.47	577.68	596.73	614.16	630.20	644.70
		Capacity (in thousand MVA)	22.24	25.64	29.02	32.51	36.01	39.21	42.45	45.52	49.15	52.76	56.37	60.08	64.22	68.78	74.88	78.57	82.17	85.67	89.21	92.71	96.35	100.01	103.42	106.65	109.65