

འབྲུག་རྒྱུག་ཤུགས་ཅིང་ལྷུགས་ལས་སྦྱོང་པ།
Bhutan Power System Operator

རྒྱལ་ཤུགས་དང་རང་བཞིན་ཐོན་སྐྱེད་ལྷན་ཁག
Ministry of Energy and Natural Resources

Power System Operation Division



Transmission Performance System Report

Second Quarterly Report 2026

July 2026

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Content

1	Introduction	2
2	Generation Capacity.....	2
	2.1 Performance of generating plants for the Second quarterly 2026:	4
3.	Power and Energy Generation.....	4
4.	Energy Availability and Requirement for the country.....	8
	4.1. Energy (MU) consumed by Country.....	8
5.	National Peak Demand	9
	5.1. Power (MW) consumed by country.....	9
6.	Export and Import of Electricity.....	12
7.	Frequency profile.....	13
	7.1. Frequency Summary for the month of April to June 2026	17
8.	Voltage Profile of selected substation	14
	8.1 Voltage Summary for the Month of April to June 2026.....	15

1. Introduction

The electricity transmission network in Bhutan is solely owned by Bhutan Power Corporation limited (BPC) and electricity generation is solely owned by Druk Green Power Corporation Limited (DGPC). Bhutan Power System Operator (BPSO) under Ministry of Energy and Natural Resource is responsible for safe, secure and efficient operation of Bhutan transmission network and generation.

This quarterly report is prepared in compliance to the Grid Code Regulation (GCR) 2024, clause 153, and "System Operator has to submit a quarterly report covering the performance of the Transmission System to all Licensees, Authority and Ministry". This transmission performance report contains summary of growth of peak demand, performance of generating stations (power and energy generation), energy availability and requirement for the country, export and import of electricity to/ from India, frequency profile of selected substation and voltage profile of few important substations. All the index and other calculations in this report have been executed based on the data received from SCADA, substations and generating plants.

2. Generation Capacity

The second quarter saw addition of two generating stations Yungichu (32MW) and Burigangchu (54 MW). The installed capacity increased to **3590.38 MW**. Details are as given below.

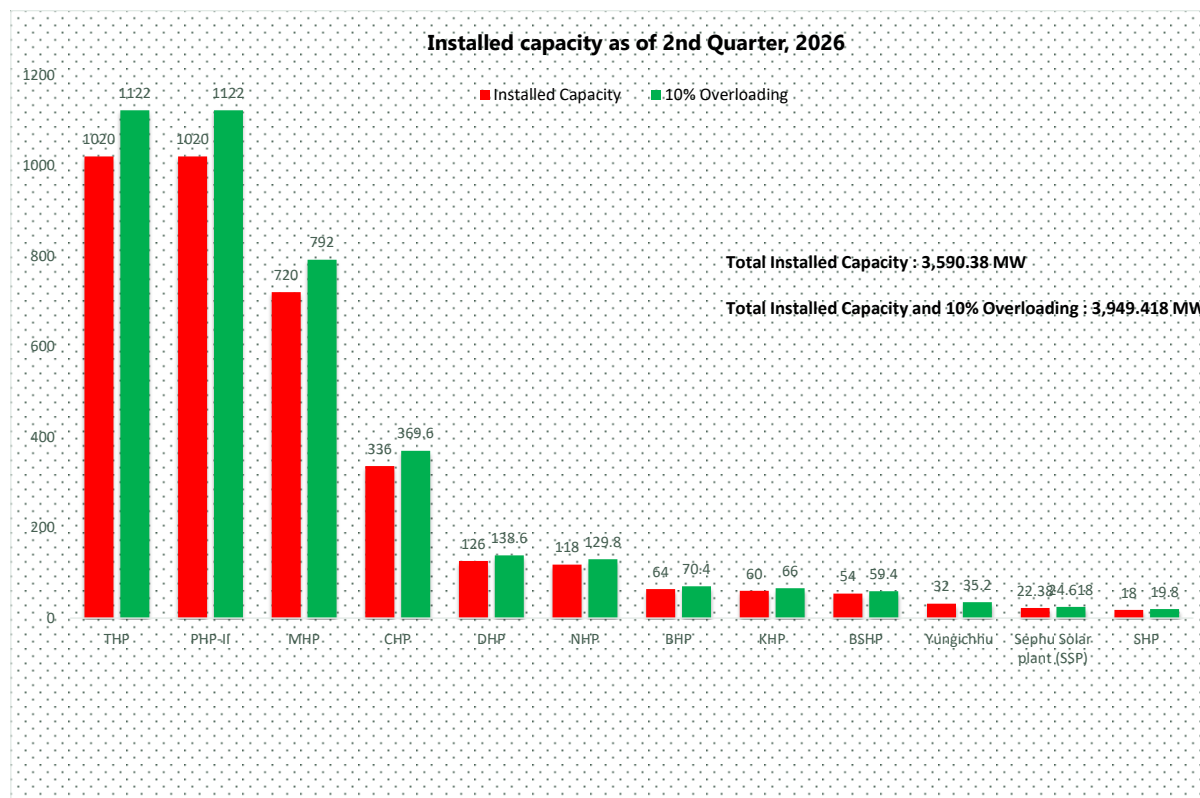


Figure 1 Installed Capacity and Overloading Capacity

2.1. Performance of generating plants for the Second quarter 2026:

Table 1 *Performance of the generating plants:*

Sl.No	Generating Station	Installed Capacity (MW)	Maximum Generation (MW)	Average Generation (MW)	Average Availability (%)	Remarks
1	SHP	18.00	10.09	8.96	49.80	Normal operation
2	SSP (Solar)	22.38	17.67	21.34	95.35	Normal operation
3	YHP	32.00	32.02	15.94	49.82	Normal operation
4	BSHP	54.00	54.68	27.92	51.71	Normal operation
5	KHP	60.00	66.00	25.71	42.86	Normal operation
6	BHP	64.00	65.30	20.77	32.45	Normal operation
7	DHP	126.00	120.46	43.46	34.49	Normal operation
8	NHP	118.00	129.90	84.25	71.40	Normal operation
9	CHP	336.00	322.00	250.72	74.62	Normal operation
10	MHP	720.00	789.18	459.48	63.82	Normal operation
11	THP	1,020.00	1,122.00	608.82	59.69	Normal operation
12	PHP-II	1,020.00	746.75	465.78	45.66	Normal operation

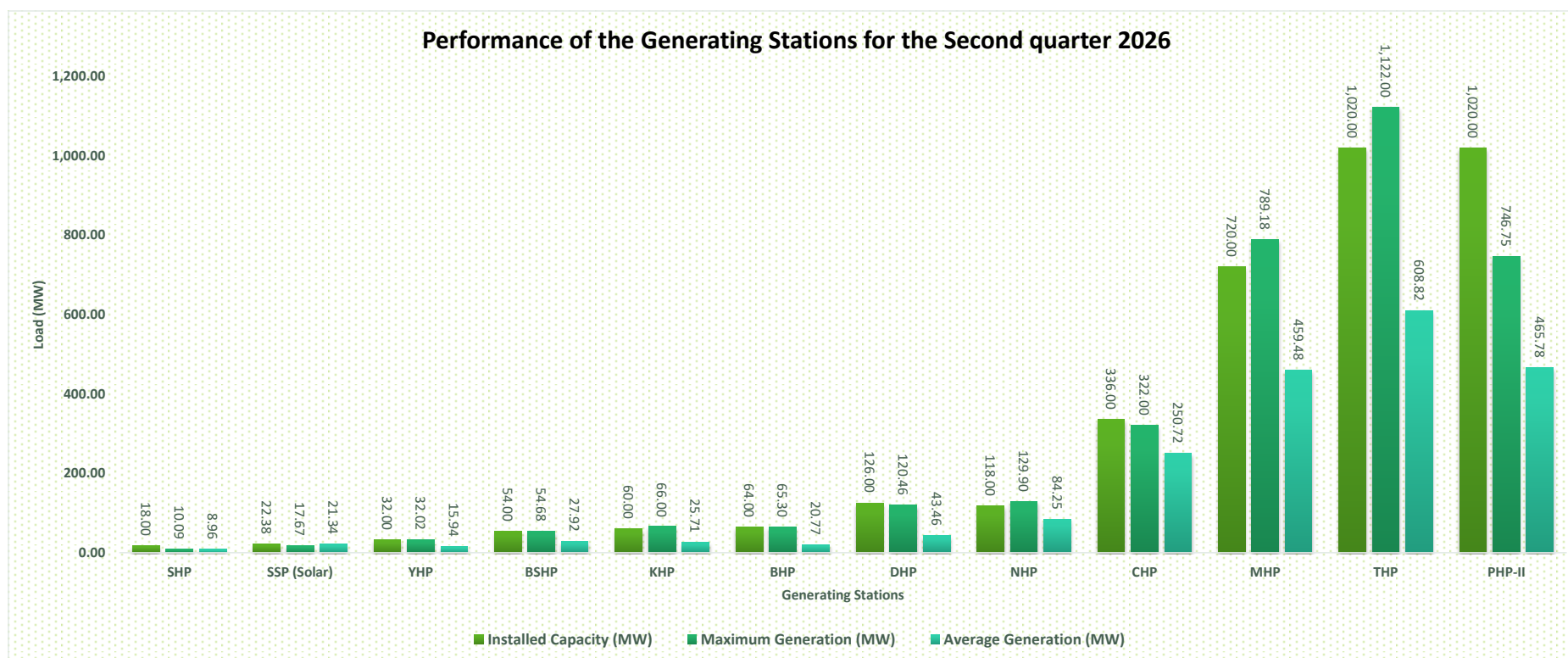


Figure 2 *Installed Capacity and Maximum Generation and Average Generation.*

3. Power and Energy Generation

The maximum total generation for the Second quarter of year 2026 was 2,203.82 MW in month of May and minimum generation was 250.17 MW in the month of April.

Table 2 Summary of maximum and minimum generation by various hydropower plant

Generation By	SSP (MW)		SHP (MW)		YHP (MW)		BSHP (MW)		KHP (MW)		BHP (MW)		NHP(MW)		DHP (MW)		CHPC (MW)		MHP (MW)		PHP-II(MW)		THP(MW)		TOTAL (MW)	
Month	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
April	17.67	0.00	10.00	0.01	0.00	0.00	0.00	0.00	66.00	22.34	63.10	7.10	85.03	20.02	0.00	0.00	184.80	41.29	594.73	40.71	601.60	118.70	561.00	31.00	1,622.93	250.17
May	17.53	0.00	10.09	0.00	32.02	0.00	27.60	0.00	66.00	16.50	65.10	4.20	129.87	28.00	62.94	0.00	318.43	181.81	787.11	91.82	746.75	147.00	1,121.91	233.20	2,203.82	469.33
June	17.67	0.00	10.08	0.00	28.24	14.84	54.68	0.00	48.33	31.91	65.30	14.00	129.90	45.03	120.46	0.00	322.00	45.20	789.18	276.31	559.11	147.00	1,122.00	42.00	2,062.03	559.45

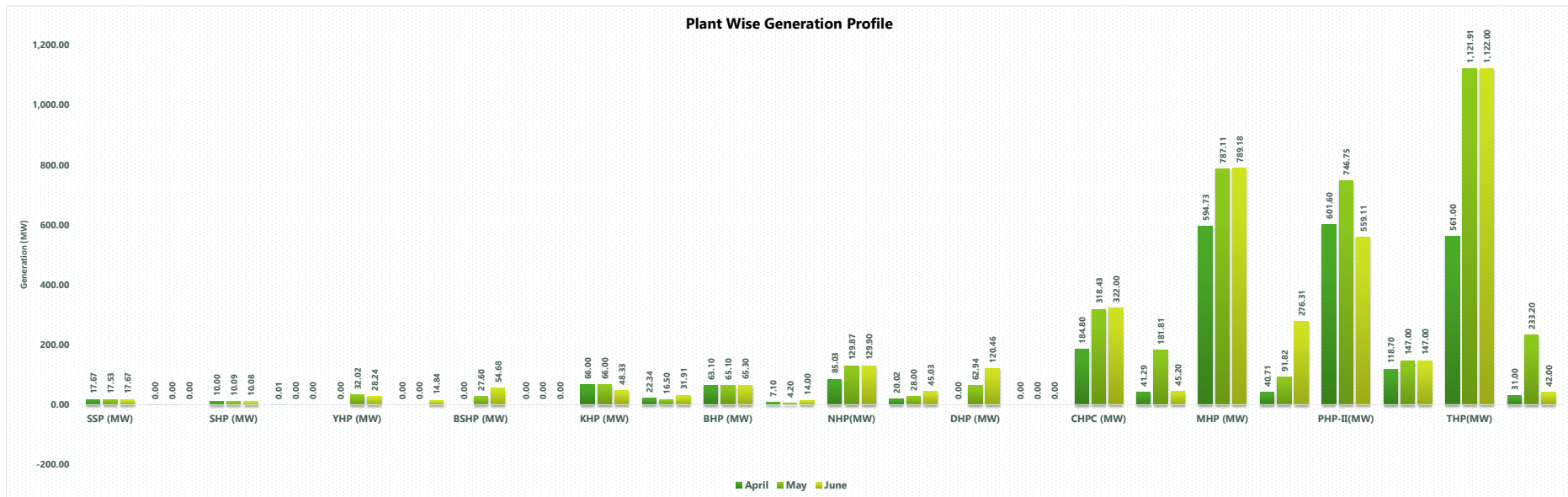


Figure 3 Summary of maximum and minimum generation by various hydropower plant

3.1. The capacity factor of each generating plant was calculated as below:

$$\text{Capacity factor} = \frac{\text{Total energy plant has produce over a period}}{\text{Total energy plant would produce when operated at full capacity}}$$

Table 3 Total generation and capacity factor of various hydropower plants

Month	Plant Capacity Factor																							
	SSP (MU)	SSP(CF)	SHP (MU)	SHP(CF)	YHP(MU)	YHP(CF)	BSHP(MU)	BSHP(CF)	KHP (MU)	KHP(CF)	BHP (MU)	BHP(CF)	NHP(MU)	NHP(CF)	DHP (MU)	DHP(CF)	CHPC (MU)	CHPC(CF)	MHP (MU)	MHP(CF)	PHP-II(MU)	PHP-II(CF)	THP(MU)	THP(CF)
April	0.00	0.02	5.34	0.17	0.00	0.16	0.00	0.00	27.22	0.64	13.48	0.29	22.51	0.22	0.00	0.00	105.99	0.43	183.81	0.34	192.35	0.16	236.62	0.27
May	0.00	0.03	7.39	0.25	12.10	0.25	17.15	0.20	39.77	0.89	20.74	0.45	41.02	0.40	11.38	0.11	147.25	0.59	301.38	0.56	350.14	0.46	447.15	0.60
June	0.00	0.21	11.34	0.00	11.34	0.01	23.88	0.26	45.54	0.70	30.20	0.64	61.03	0.57	30.98	0.34	196.50	0.72	414.71	0.62	456.82	0.34	441.62	0.58

Source: TD, BPC

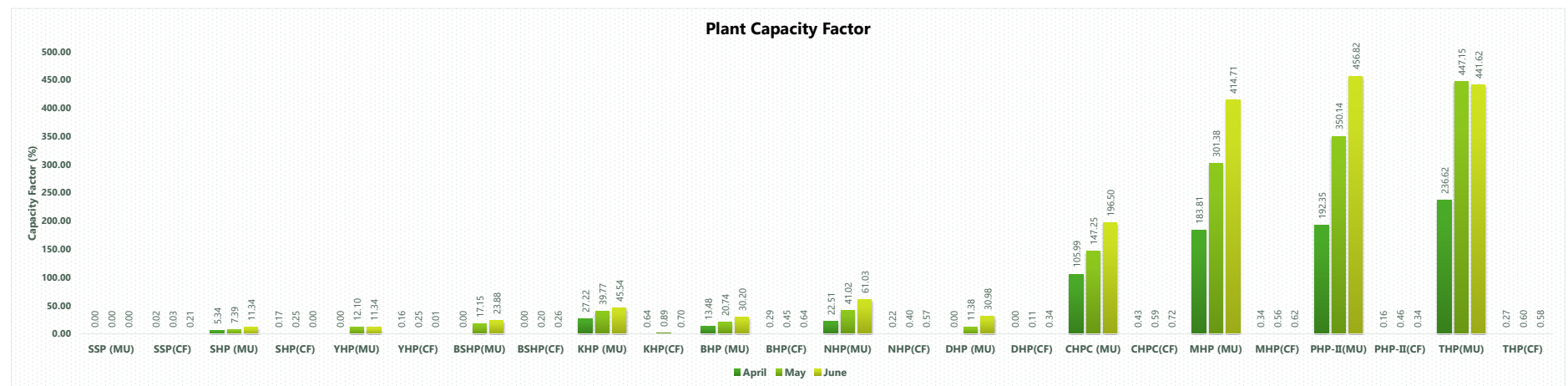


Figure 4 Plant Capacity Factor

4. Energy Availability and Requirement for the country

4.1. Energy (MU) consumed by Country

The total energy consumed within Bhutan is computed based on the total energy sold by DGPC to BPC, including royalty energy.

Table 4 *Energy purchased by BPC from DGPC*

Month	Total Ex-bus (MU)	Total energy sold to BPC (MU)
April	787.31	696.98
May	1,395.47	1,021.69
June	1,719.22	1,053.11

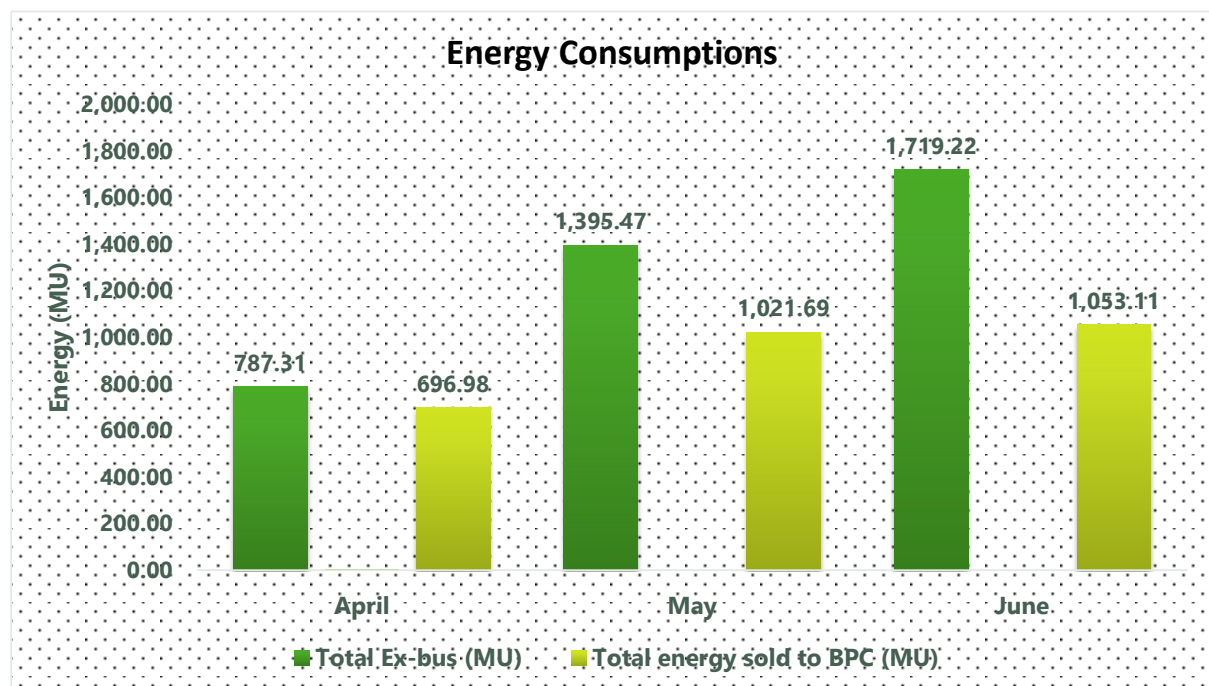


Figure 5 *Energy Consumptions*

5. National Peak Demand

The national peak demand for Second Quarterly report for the year 2026 is recorded at **1,513.55 MW** (As per SCADA Data) which occurred on June 19th, 2026, at 19:30:35 hours. This is calculated by (Sum of all total generation)- (Sum of all Export or Import).

Table 5 *The National Peak Demand since 2008*

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Peak Load (MW)	187.05	237.17	256.95	276.24	282.44	313.94	333.41	336.52	335.87	362.09	399.35	387.66	374.53	435.35	629.61	955.51	1026.4	1477	1,513.55
% Growth over previous Year	18.87	26.79	8.34	7.51	2.24	11.15	6.20	0.93	-0.19	7.81	10.29	-2.93	-3.39	16.24	44.62	51.76	7.42	43.90	2.47

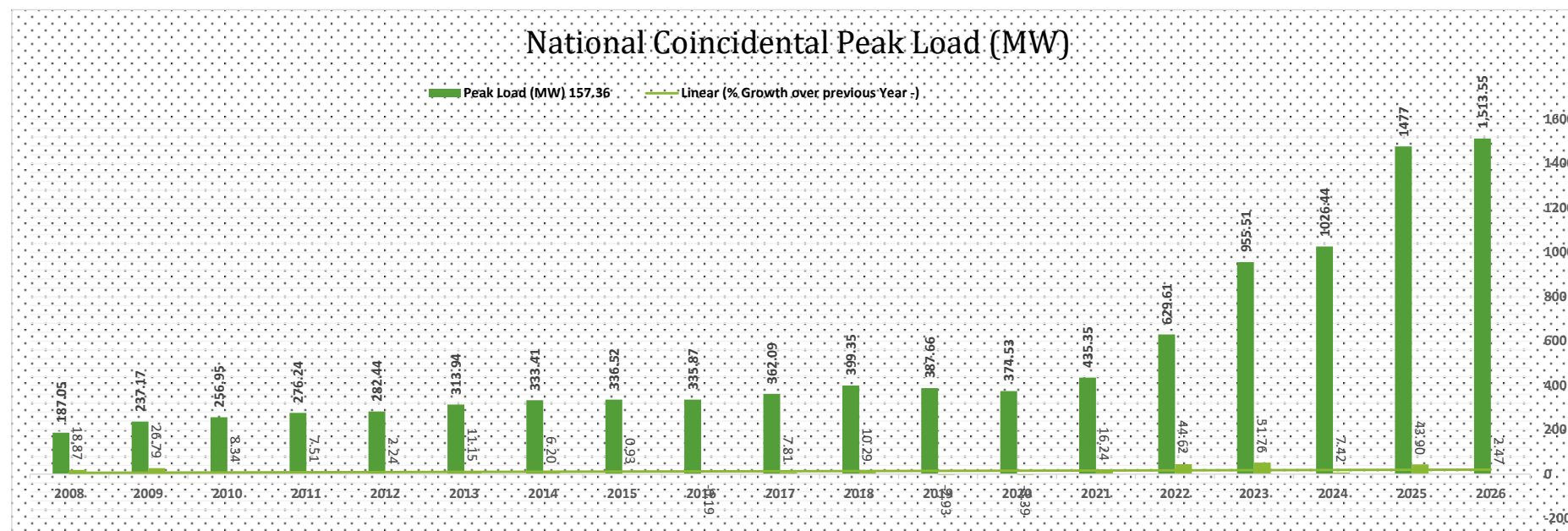


Figure 6 *National Coincidental Peak Load (MW)*

5.1 Power (MW) consumed by country

Following methods are used to calculate peak demand for the Eastern Grid, Western Grid and National demand.

1. **National Demand** = (Sum of all total generation)- (Sum of all Export or Import)
2. **National Demand** = (Sum of all feeders loading at hydropower station) – (Sum of all Export/Import)
3. **National Demand** = (Sum of all substation loading)

5.1.1. Peak Load from Generation-Export/Import. (Data from the Site)

Table 6 *Bhutan's national demand load using method- 1*

National Load		
Month	Max	Min
April	1,446.99	775.10
May	1,476.94	1,092.64
June	1,513.00	967.46

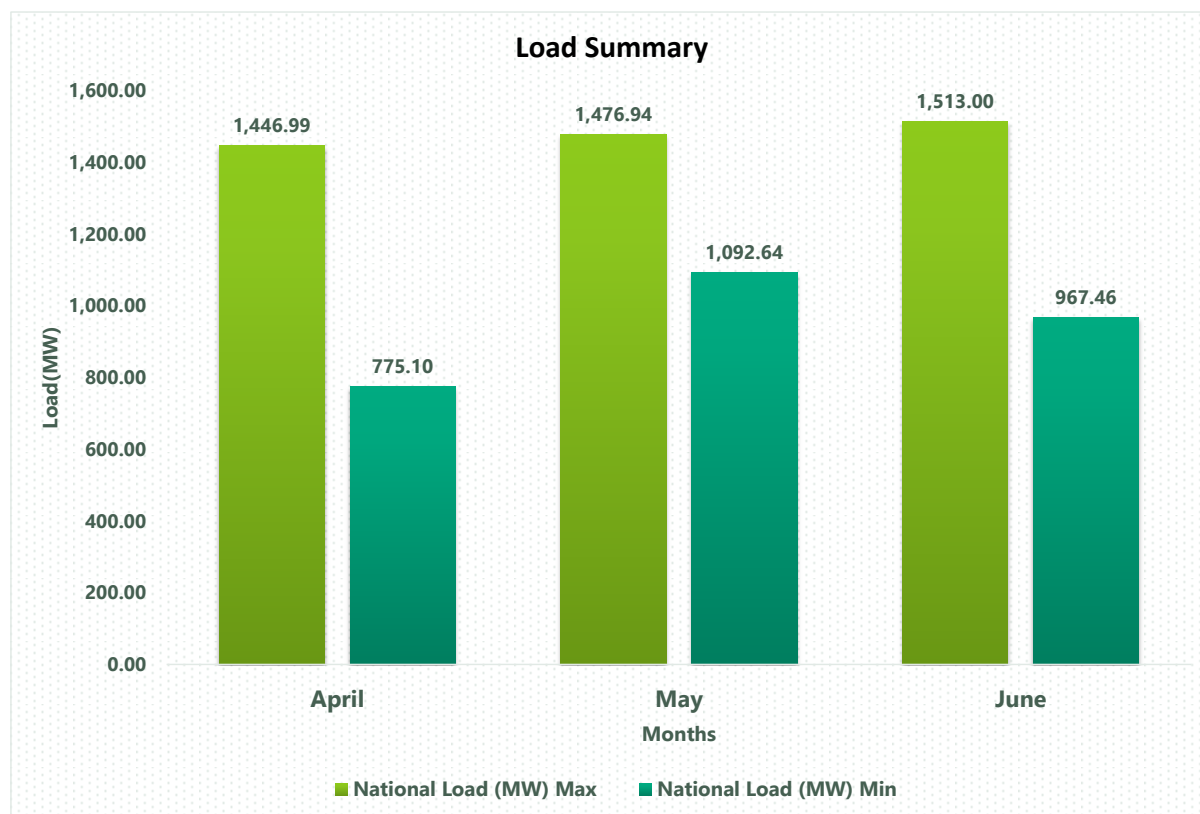


Figure 7 *Bhutan's national demand load using method -1*

5.1.2. Peak Load from Submission of Stations. This is based on individual stations reports:

Table 7 Bhutan's National Demand Load using method-3

National Load		
Month	Max	Min
April	1,442.81	348.91
May	1,504.85	956.76
June	1,503.21	598.47



Figure 8 Bhutan's National Demand Load using method-3

5.1.3 Main Reason for Difference between the above two Load:

It has been observed that there is a difference in the peak load values obtained from:

1. Generation and Export/Import data and
2. Submission of peak load as submitted by individual station.

The peak load derived from generation data is calculated as:

Peak Load=Total Generation – Net Export/Import.

Whereas the station based peak load is obtained by summing the loads reported by all the stations.

The variation between the two values maybe attributed to the following factors:

- Transmission and transformation losses within the grid, which inherently included in generation-based calculation but not

fully reflected in station submission.

- Difference in metering accuracy at generation points, interconnections, and stations data.
- Time mismatch in peak recordings, as system peaks may not occur at the exact same time.
- Reporting inconsistencies, including possible omission or duplication in station submissions.

In general, the peak load calculated from generation minus export/import represents the actual system demand, as it reflects the total power supplied to meet the load including system losses.

Therefore, for system level analysis and reporting, the generation-based peak load is considered more accurate and reliable. However, station-wise data remains essential for operational analysis and validation purposes.

6. Export and Import of Electricity

Maximum export for the Second quarter of year 2026 was 1346.62 MW to Alipurduar substation in India. The minimum export recorded was 0.00 MW to Alipurduar substation.

Table 8 *Export of electricity to India*

Export To Month	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)		Alipurduar (MW)	
	Max	Min	Max	Min	Max	Min	Max	Min
April	513.33	0.11	29.60	23.00	14.78	1.98	414.34	0.00
May	724.61	2.43	22.58	2.23	56.09	0.06	1,085.40	11.30
June	857.56	0.00	121.62	0.00	74.95	0.00	1,346.62	0.00

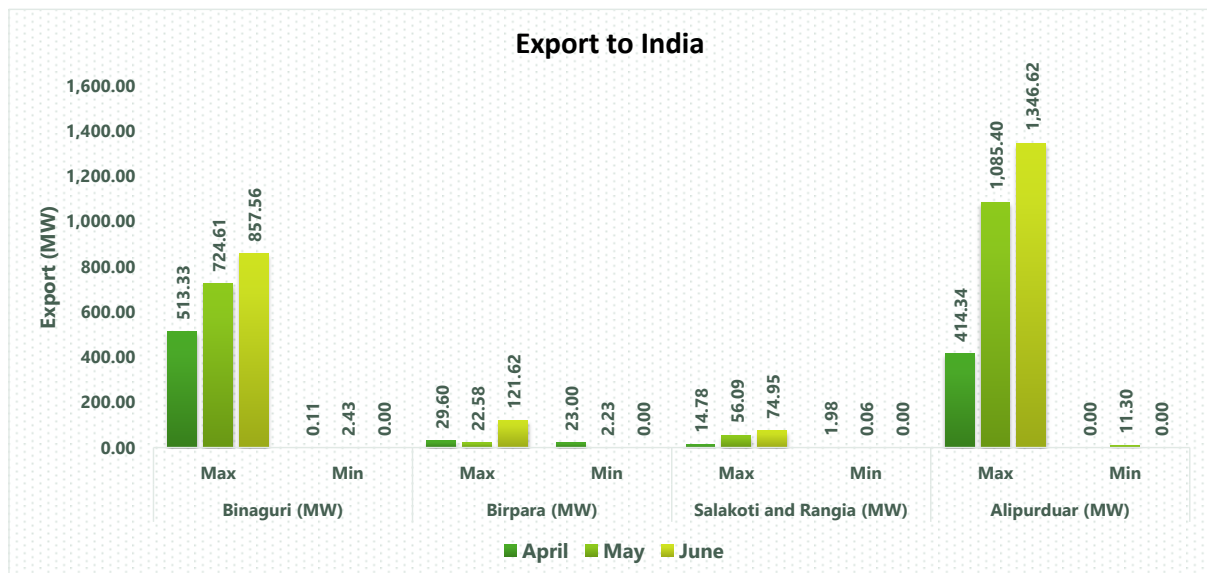


Figure 9 *Export of electricity to India*

Table 9 *Import of electricity from India*

Import From Month	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)		Alipurduar (MW)	
	Max	Min	Max	Min	Max	Min	Max	Min
April	371.93	0.26	431.11	46.72	119.63	0.30	401.82	120.00
May	146.23	1.86	261.25	0.22	87.49	0.08	66.82	39.47
June	365.13	0.00	150.57	0.00	69.21	0.00	0.00	0.00

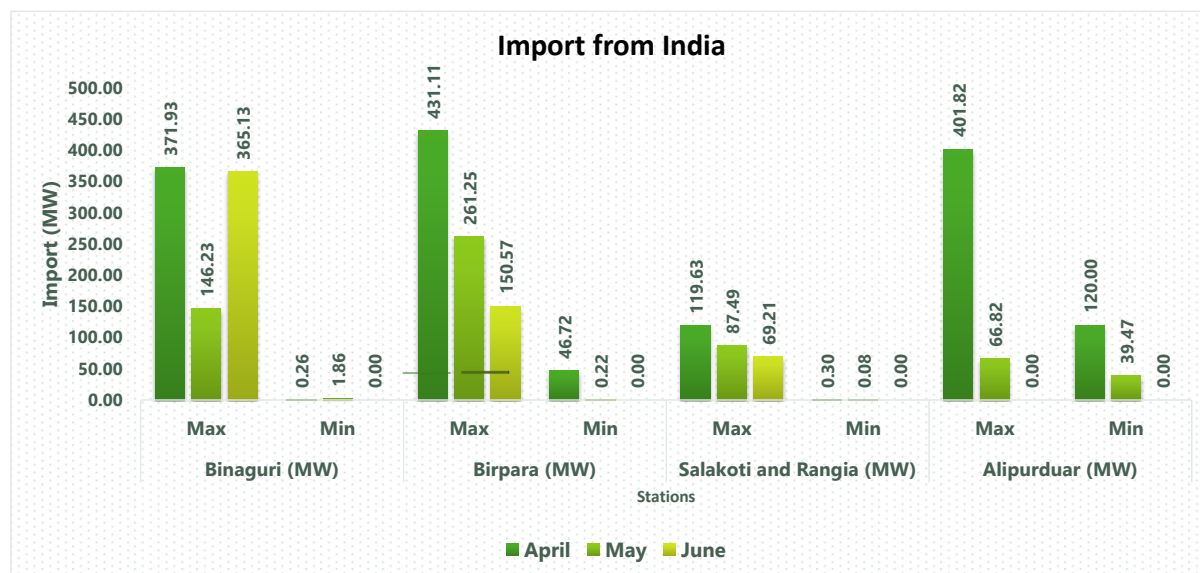


Figure 10 *Import of electricity from India*

7. Frequency profile

The nominal allowed frequency range shall be 50Hz $\pm$ 1% in Bhutan. The system is normally managed such that frequency is maintained within operational limit of 49.5 Hz to 50.5 Hz. However, frequency may move outside these limits under faulty conditions.

As per the Grid Code 2024, the frequency is classified into three different bands as follows:

- Normal state**
The transmission System frequency is within the limit of 49.5Hz to 50.5Hz.
- Alert state**
The Transmission System frequency is beyond the normal operating limit but within 49.0Hz to 50.0Hz.
- Emergency state**
There is generation deficiency and frequency are below 49.0Hz.

The national grid frequency for Bhutan is taken with reference to 220/66/11kV Semto-kha substation.

7.1. Frequency Summary for the month of April to June 2026

Table 10 Frequency summary for the month of April to June 2026.

Grid Frequency		
Month	Max	Min
April	50.10	49.60
May	50.20	49.60
June	50.10	49.60

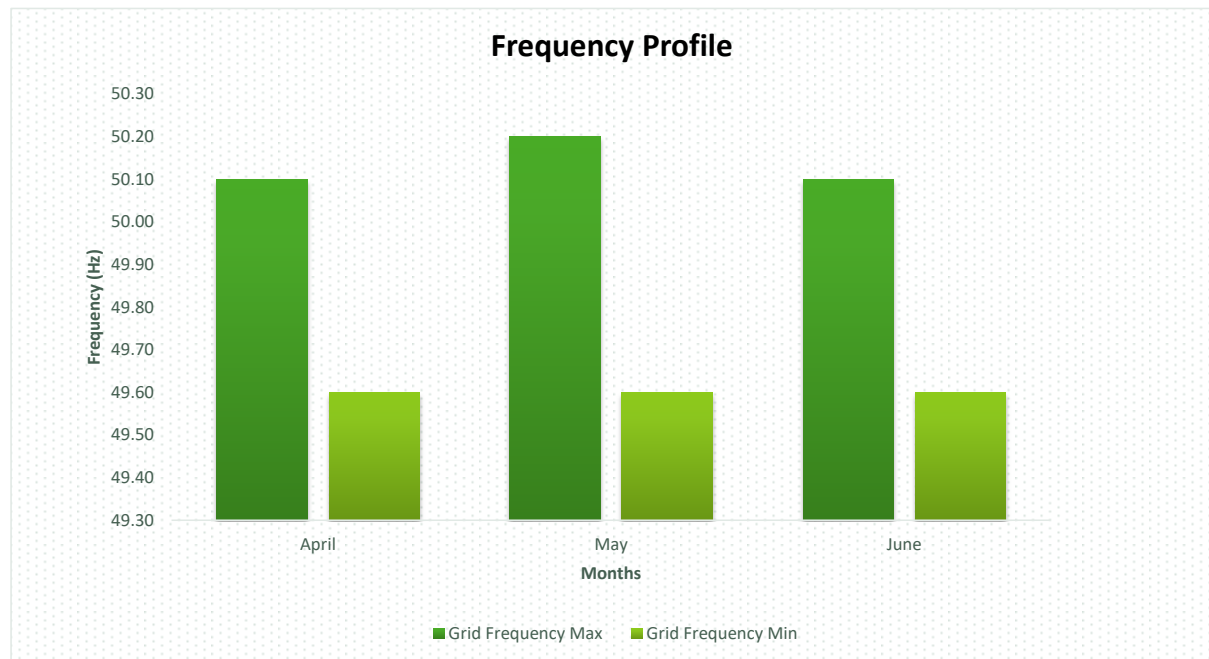


Figure 11 Frequency summary for the month of April to June 2026

8. Voltage Profile of selected substation

As per the Grid Code 2024, the voltage at all connection points is classified into three different bands as follows:

1. Normal State
The voltage at all connection points is within the limits of 0.95 times and 1.05 times of the normal values
2. Alert State
The voltage at all connection points is outside the normal limit but within the limits of 0.9 times and 1.1 times of the nominal values.
3. Emergency State
Transmission system voltages are outside the limit of 0.9 times and 1.1 times of nominal values.

Due to the location the voltage level for 400kV, 220kV, and 66kV is taken with reference to 400/220/66/11kV Malbase substation and for 132kV voltage level with reference to 132/33/11kV Nangkhor substation, the voltage profile of these substations is considered.

8.1. Voltage Summary for the Month of April to June 2026

Table 11 Voltage Summary for the month of April to June 2026

Voltage Level	Grid Voltage							
	400kV Bus Voltage (kV)		220kV Bus Voltage (kV)		66kV Bus Voltage (kV)		132kV Bus Voltage (kV)	
	Max	Min	Max	Min	Max	Min	Max	Min
April	410.50	391.00	225.50	210.00	67.90	62.80	135.27	129.04
May	411.50	393.50	227.50	212.70	69.50	62.50	135.90	127.38
June	413.00	396.50	227.00	213.50	68.35	64.00	136.24	127.51

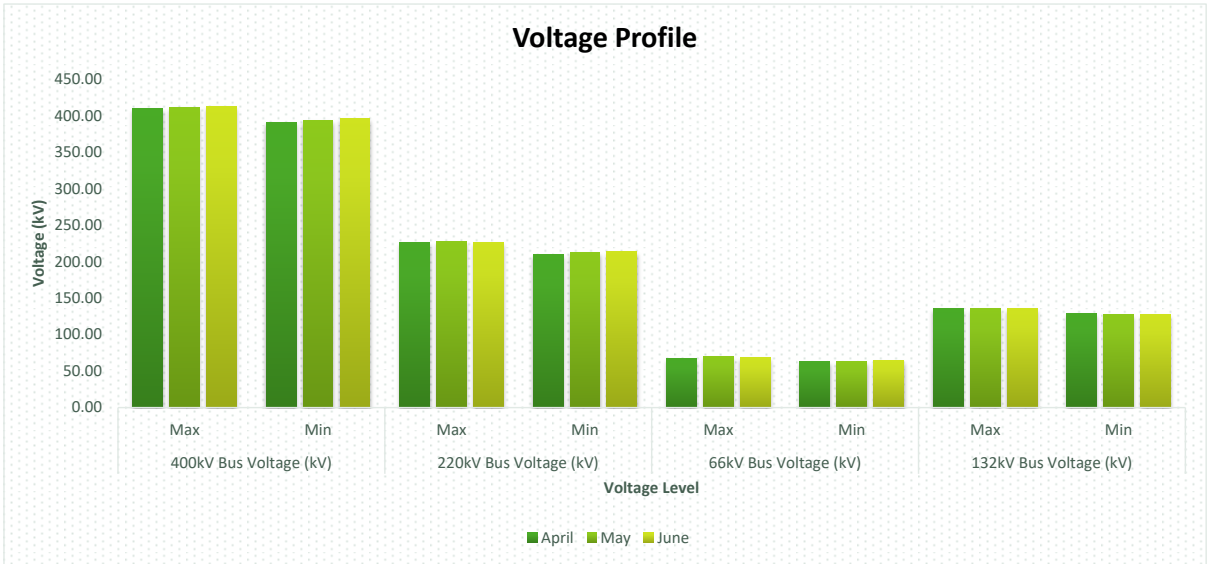


Figure 12 Voltage Summary for the month of April to June 2026