Ministry of Energy and Natural Resource

Bhutan Power System Operator

Thimphu: Bhutan

Transmission System Performance Report

Fourth Quarterly Report 2022

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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) 2008, clause 6.14.1, 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 substations and generating plants.

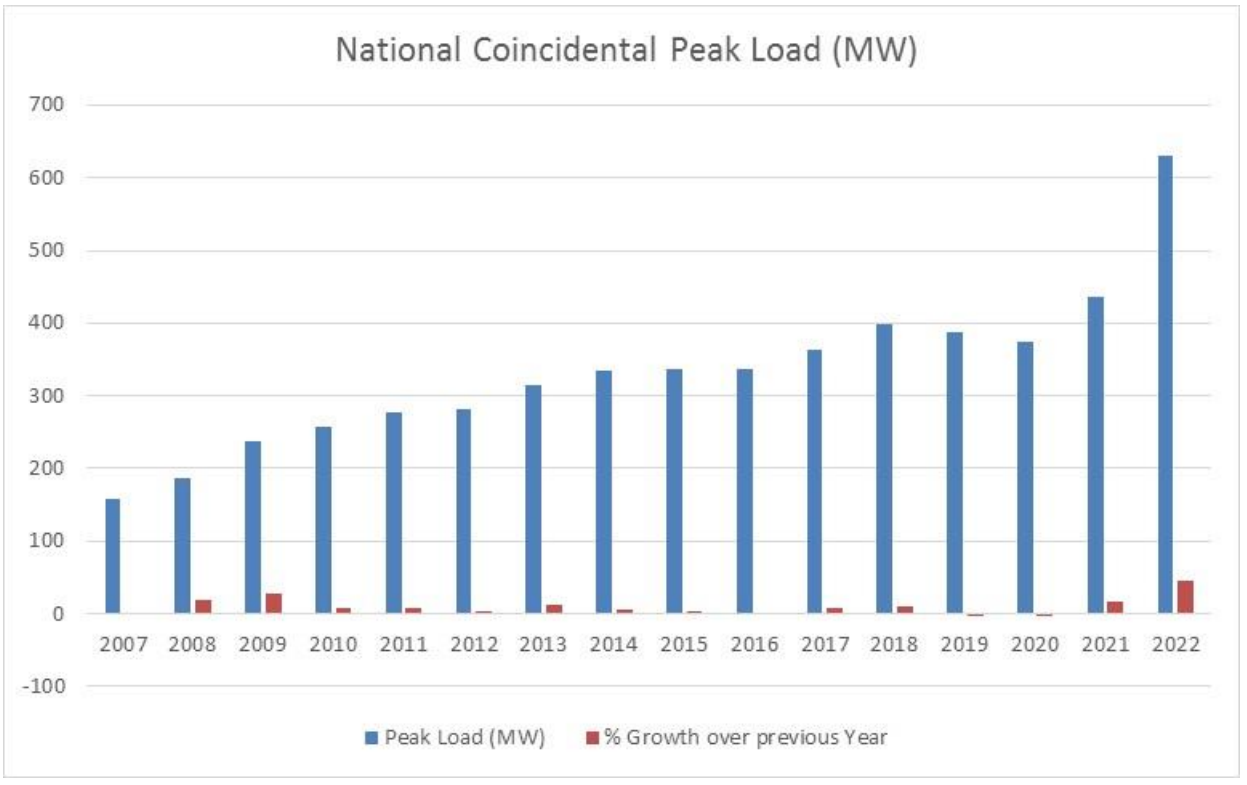
2. National Peak Demand

The national peak demand till now is recorded at **629.61MW** which was occurred on December 28, 2021 at 18:00 hours. This is calculated by summation of Generation minus Export/Import.

Table 2.1. The National Peak Demand since 2007

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Peak Load (MW)	157.36	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
% 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

Graph 2.1. The growth in National Peak Demand since 2007



2.1. Power (MW) consumed by country

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

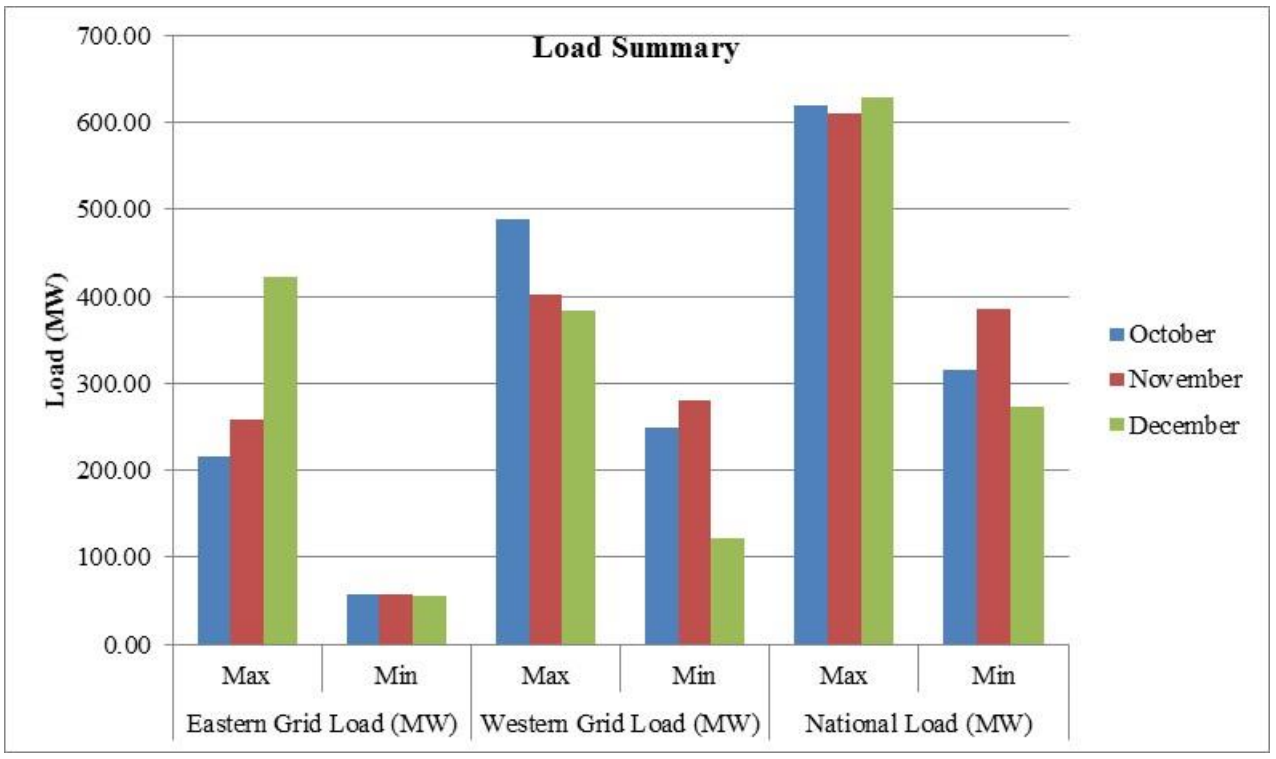
1. **National Demand** = (Sum of all total generation)-(Sum of all Export of Import)
2. **National Demand** = (Sum of all feeders loading at hydropower station) – (Sum of all Export/Import)
3. **National Demand** = (Sum of all substation loading)

For this report, the National Demand was calculated using method-1.

Table 2.1.2. Domestic demand for Eastern Grid, Western Grid and National using method- 1

LOAD PROFILE (GENERATION - EXPORT OR IMPORT)						
Grid	Eastern Grid Load (MW)		Western Grid Load (MW)		National Load (MW)	
Month	Max	Min	Max	Min	Max	Min
October	216.57	57.00	489.21	248.39	620.02	315.03
November	258.38	58.37	401.46	281.30	610.81	385.78
December	421.76	55.43	384.26	121.52	629.61	273.03

Graph 2.1.2. Domestic demand for Eastern Grid, Western Grid and National using method- 1



The national load pattern for the month of October to December, 2022 calculated using method-1 is attached as **Annexure-II**

3. Energy Availability and Requirement for the country

3.1. Energy (MU) consumed by Country

The total energy consumed within Bhutan is computed from the total energy DGPC had sold to BPC including the royalty energy.

Table 3.1.1. Total Energy (MU) consumed

Month	Total Ex-bus (MU)	Total Export/Import (MU)	Total energy sold to BPC (MU)
October	1305.11218586	967.19178003	339.56401465
November	627.98740620	256.74075804	372.87634970
December	432.18065425	53.86571309	379.96705038

Graph 3.1.1. Total Energy (MU) consumed

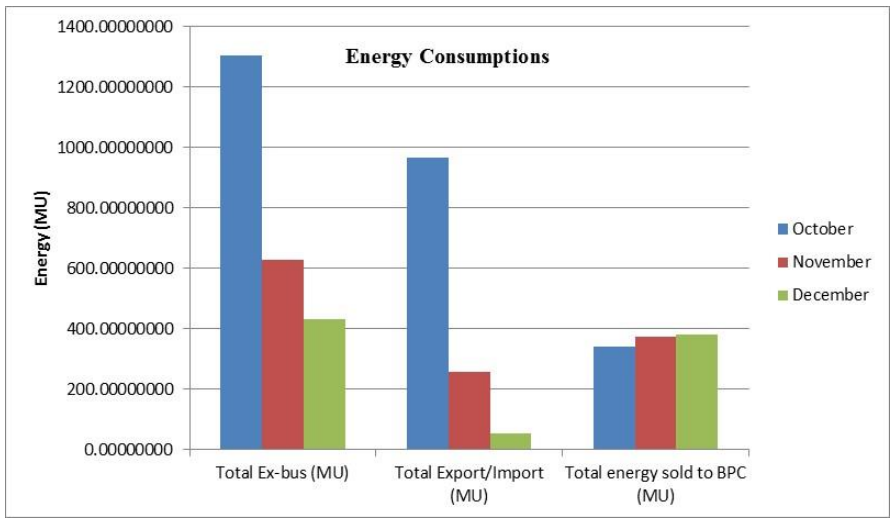
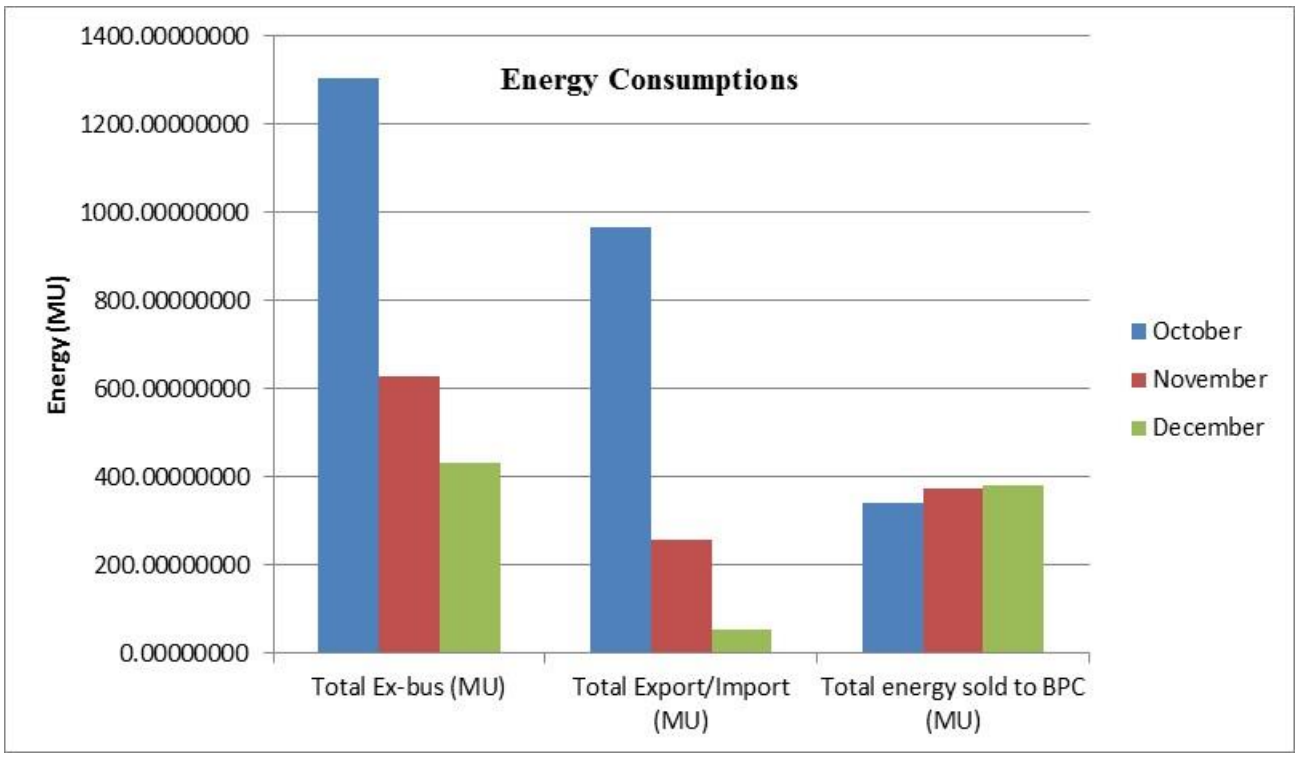


Table 3.1.2. Energy (MU) consumed

Grid	Eastern Grid Consumption	Western Grid Consumption	Total Consumption
Month	(MU)	(MU)	(MU)
October	72.24	251.66	323.90
November	83.40	278.10	361.50
December	85.15	284.07	369.22

Graph 3.1.2. Energy (MU) consumed



4. Performance of generating plants

4.1. Power and Energy Generation

The maximum total generation for the fourth quarter of year 2022 was 2,463.69 MW in month of October and minimum generation was 284.68 MW in the December month.

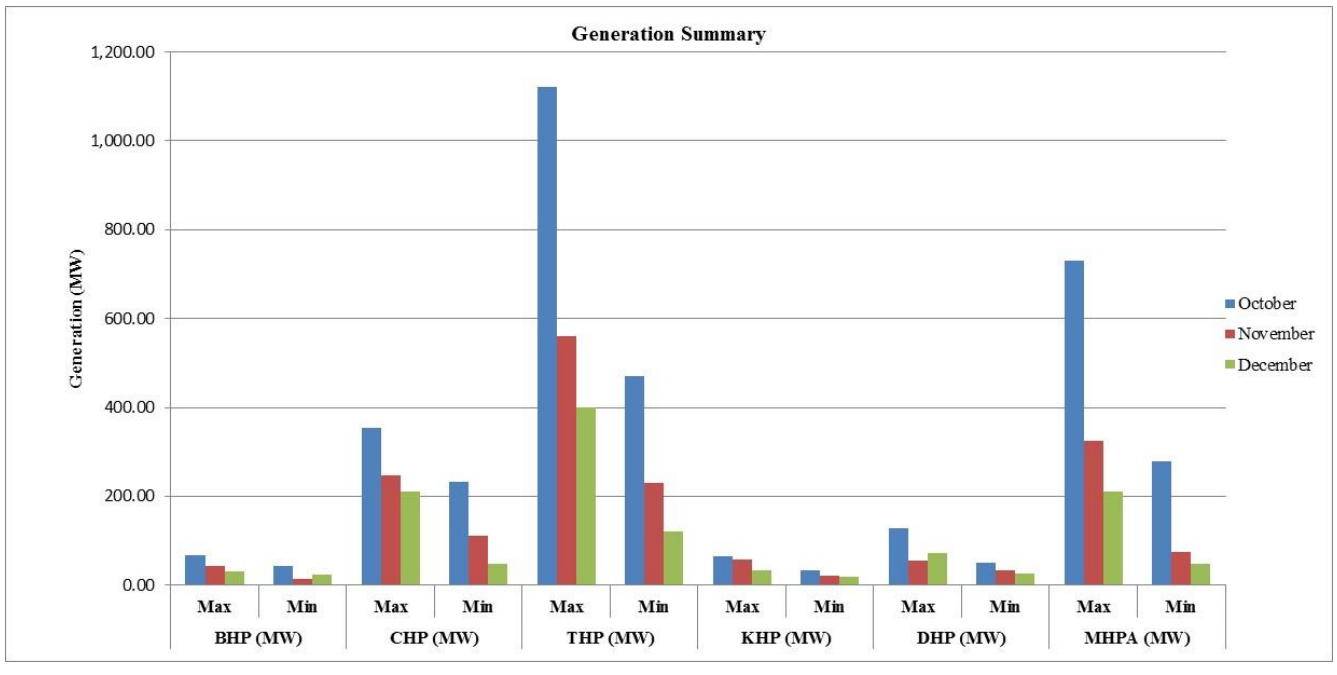
Table: 4.1.1 Summary of maximum and minimum generation by various hydropower plant

GENERATION PROFILE

Generation By	BHP (MW)		CHP (MW)		THP (MW)		KHP (MW)		DHP (MW)		MHPA (MW)		TOTAL (MW)	
Month	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
October	66.25	43.80	353.14	233.02	1,122.00	470.00	66.00	33.00	126.96	50.69	729.34	279.19	2,463.69	1,109.70
November	43.22	14.01	247.58	111.09	560.00	230.00	56.60	20.95	54.99	33.36	325.11	75.37	1,287.50	484.78
December	31.30	22.90	211.65	48.38	400.00	120.00	32.63	20.03	72.86	24.99	211.65	48.38	960.09	284.68

Source: Hydropower Plants (DGPC)

Graph: 4.1.1 Summary of maximum and minimum generation by various hydropower plant



Daily maximum, minimum and average generation by each generating plant for the month of October to December, 2022 is attached as **Annexure-I.**

4.2.Plant Capacity Factor

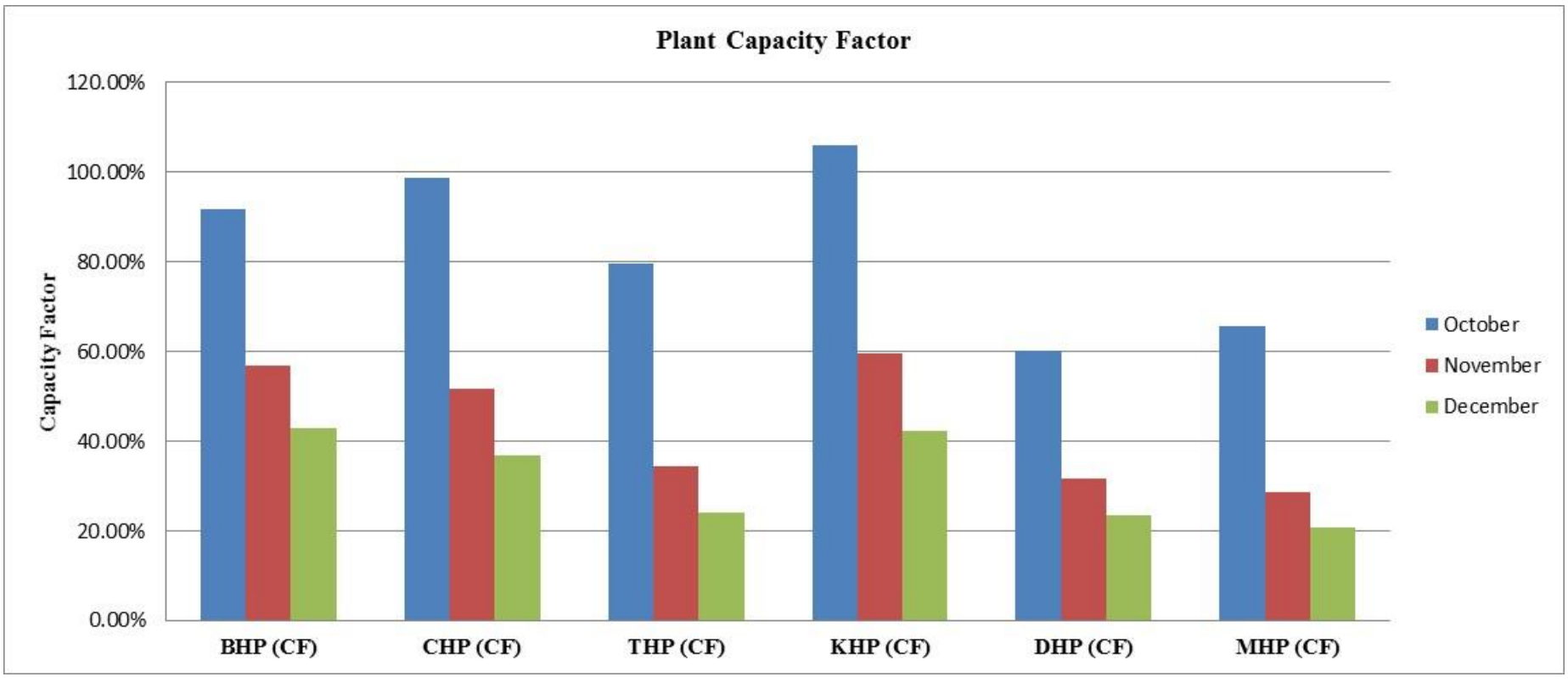
The capacity factor of each generating plant was calculated as below:

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

Table 4.2.1: Total generation and capacity factor of various hydropower plants

Month	BHP (MU)	BHP (CF)	CHP (MU)	CHP (CF)	THP (MU)	THP (CF)	KHP (MU)	KHP (CF)	DHP (MU)	DHP (CF)	MHP (MU)	MHP (CF)
October	42.21639	91.62%	238.66318	98.65%	583.707636	79.48%	45.792046	106.00%	54.51	60.09%	340.22	65.63%
November	27.02209	56.75%	129.07581	51.63%	262.216000	34.55%	26.537898	59.45%	29.70	31.68%	153.44	28.64%
December	19.71457	42.78%	89.46728	36.98%	176.38545	24.02%	18.337206	42.45%	21.24	23.41%	107.04	20.65%
Source: TD, BPC												

Graph 4.2.1: Capacity factor of various hydropower plants



5. Export and Import of Electricity

Maximum export for the fourth quarter of year 2022 was 1,071.00 MW in the month of October to Binaguria substation in India. The minimum export recorded was 0.04 MW to Salakoti and Rangia substation in India during the month of November and December.

Table 5.1. Export of electricity to India

Export To	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)		Alipurdur (MW)	
Month	Max	Min	Max	Min	Max	Min	Max	Min
October	1,071.00	336.00	224.12	56.09	99.48	9.54	716.21	119.62
November	496.36	131.91	93.70	0.38	43.27	0.04	174.63	1.02
December	332.64	17.00	85.54	9.90	30.09	0.04	88.46	0.04

Graph 5.1. Export of electricity to India

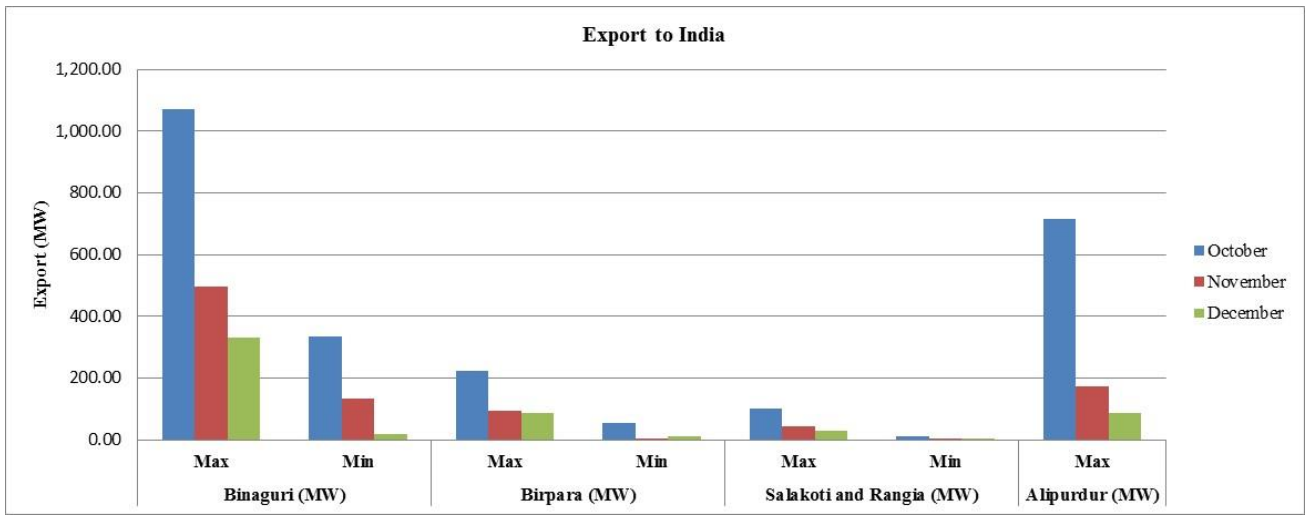
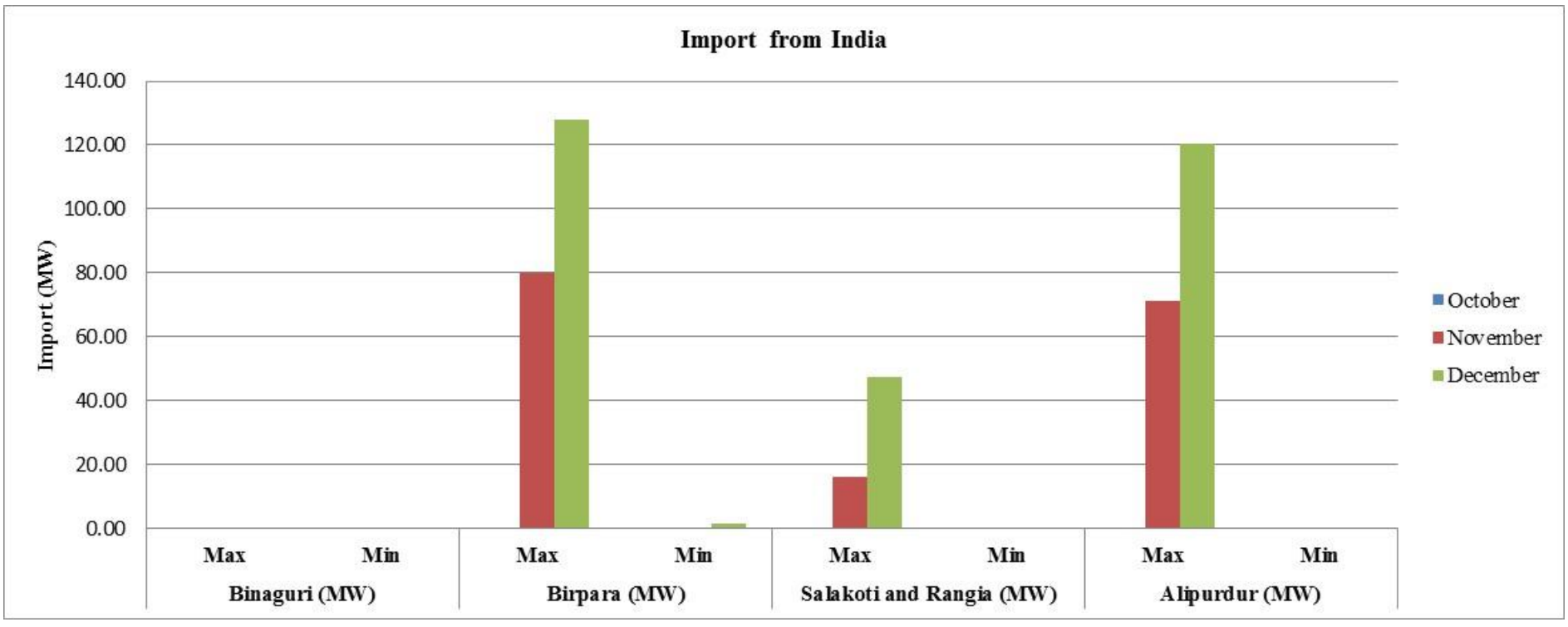


Table 5.2. Import of electricity from India.

Import From	Binaguri (MW)		Birpara (MW)		Salakoti and Rangia (MW)		Alipurdur (MW)	
Month	Max	Min	Max	Min	Max	Min	Max	Min
October	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
November	0.00	0.00	80.08	0.02	16.08	0.01	71.19	0.22
December	0.00	0.00	128.04	1.75	47.59	0.06	120.51	0.15

Graph 5.2. Import of electricity from India



6. Frequency profile

The nominal allowed frequency range shall be 50Hz ± 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 limit under faulty condition.

As per the Grid Code 2008, clause 6.4.1 the frequency is classified into three different bands as follows:

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

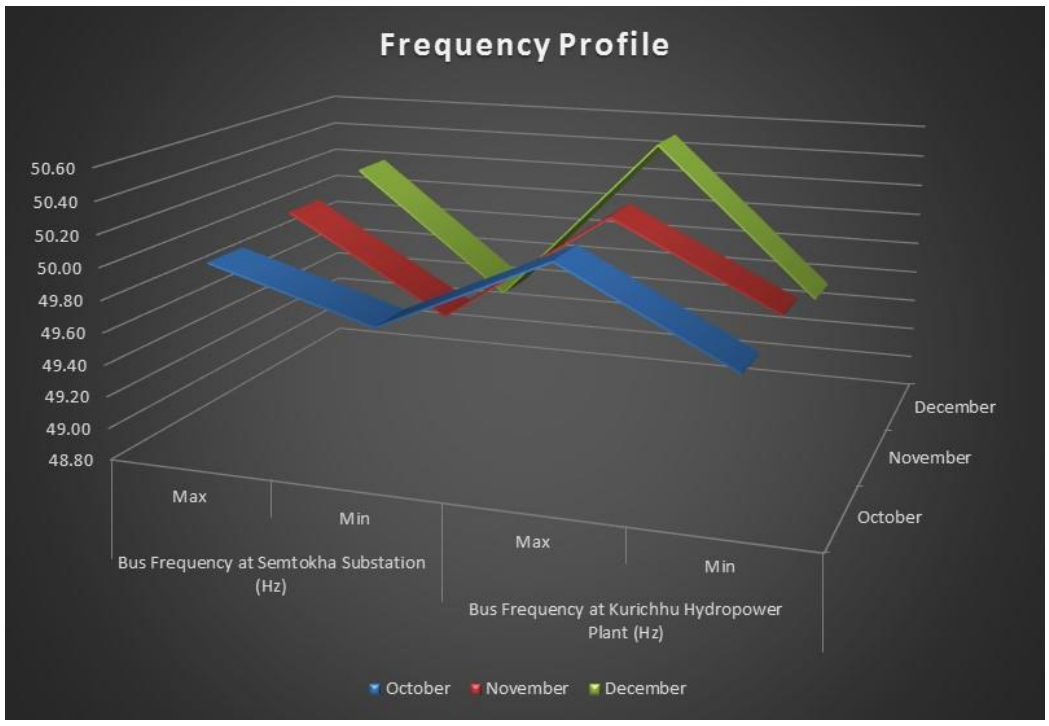
The frequency at 220kV Bus at 220/66/11kV Semtokha substation in the western grid and 132kV Bus at 60MW Kurichhu Hydropower Plant in the eastern grid is considered.

6.1.Frequency Summary for the month of October to December, 2022

Table 6.1.1. Frequency summary for the month of October to December, 2022.

Substation/Plant	Bus Frequency at Semtokha Substation (Hz)		Bus Frequency at Kurichhu Hydropower Plant (Hz)	
Month	Max	Min	Max	Min
October	50.00	49.70	50.18	49.64
November	50.10	49.50	50.22	49.70
December	50.20	49.40	50.50	49.54

Graph 6.1.2. Frequency summary for the month of October to December, 2022



Daily maximum, minimum and average Frequency of Semtokha substation in western grid and Kurichhu Hydro Power Plant in eastern grid for the month of October to December, 2022 is attached as **Annexure-III**

7. Voltage Profile of selected substation

As per the Grid Code 2008, clause 6.4.1 the voltage at all connection point is classified into three different bands as follows:

1. *Normal State*
   The voltage at all connection points are within the limits of 0.95 times and 1.05 times of the normal values

2. *Alert State*
   The voltage at all connection points are 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.

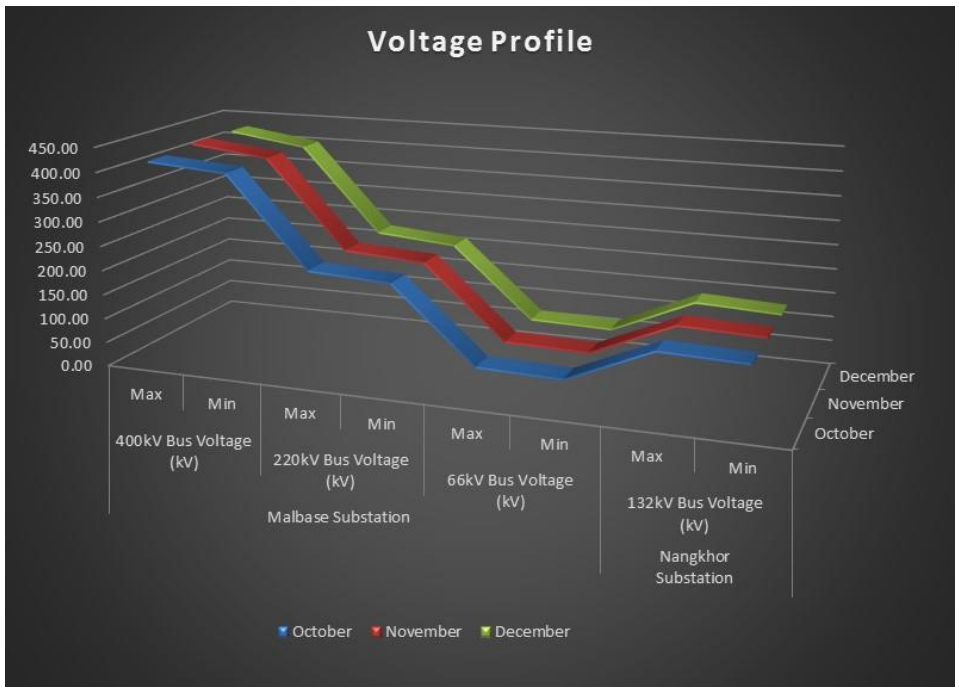
Due to the location of 400/22/66/11kV Malbase substation in western grid and 132/33/11kV Nangkhor substation in the eastern grid, the voltage profile of these substations are considered.

7.1.Voltage Summary for the Month of October to December, 2022

Table 7.1.1 Voltage Summary for the month of October to December, 2022

Substation	Malbase Substation						Nangkhor Substation	
Voltage Level	400kV Bus Voltage (kV)		220kV Bus Voltage (kV)		66kV Bus Voltage (kV)		132kV Bus Voltage (kV)	
Month	Max	Min	Max	Min	Max	Min	Max	Min
October	417.50	405.50	224.50	215.50	67.00	62.60	136.52	130.70
November	425.50	406.00	225.50	215.00	67.00	63.00	136.32	130.08
December	425.00	401.00	225.50	211.50	66.00	62.00	136.31	128.21

Graph 7.1.2 Voltage Summary for the month of October to December, 2022



Daily maximum, minimum and average bus voltage of Malbase substation in western grid and Nangkhor substation in eastern grid for the month of October to December, 2022 is attached as **Annexure-IV**

8. Major Outages of Feeders and Equipment

The transmission lines and equipment which were shut down for annual maintenance and hand/force trip are not considered in the report.

8.1.Major Outages in Eastern Grid

It had been observed that there was not much major tripping during the fourth quarter of the year compare to the previous quarter. Restoration time ranges from 10-37hrs.

The feeders and equipment outages for the Eastern grid is attached as **Annexure-V**.

8.2.Major Outages in Western Grid

During the Fourth quarter of the year, there was no major outage occurred in western grid though there were multiple tripping happened. One major tripping happened at 66/33/11kV Gomtu substation due to puncturing of 33kv Bus PT which lasted for 110hrs.

The detail tripping report of any element is compiled and circulated to relevant stakeholder every month.The feeders and equipment outages for the Western grid is attached as **Annexure-VI.**

Annexure-I

Table: Generation of October, 2022

Aug-22	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)			MHP (MW)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	63.78	58.93	60.65	352.49	351.36	352.00	820.00	770.00	807.50	0.00	0.00	0.00	69.38	64.30	65.90	541.92	470.94	494.94
2	62.47	56.74	58.59	352.71	259.78	329.07	800.00	680.00	766.25	66.00	66.00	66.00	67.37	61.34	63.96	495.87	440.62	467.06
3	56.99	54.36	55.91	353.00	351.52	352.03	800.00	740.00	750.00	66.00	49.50	64.63	62.80	59.32	61.45	441.43	426.02	434.19
4	0.00	54.64	63.56	353.14	351.37	352.09	1,122.00	740.00	865.00	66.00	66.00	66.00	121.59	94.65	110.23	728.92	425.84	537.39
5	0.00	66.16	66.24	352.57	350.94	351.93	1,122.00	1,122.00	1,122.00	66.00	65.11	65.72	126.96	94.44	110.84	729.34	616.22	699.13
6	0.00	65.49	66.13	352.32	351.17	351.81	1,122.00	1,122.00	1,122.00	66.00	33.00	62.58	95.48	81.57	87.50	655.22	566.21	611.62
7	66.25	65.12	65.75	352.33	350.68	351.92	1,122.00	861.00	948.83	66.00	66.00	66.00	81.37	74.51	77.21	571.41	500.45	535.19
8	66.19	62.10	64.68	352.51	351.72	352.13	901.00	801.00	852.25	66.00	66.00	66.00	83.42	71.40	73.99	540.41	471.37	513.21
9	66.19	64.64	65.62	352.85	351.46	352.09	1,122.00	841.00	1,030.54	66.00	66.00	66.00	95.47	78.39	89.23	724.10	511.46	583.01
10	66.19	64.77	65.80	352.49	351.09	351.91	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	95.50	82.37	87.90	726.65	646.35	694.67
11	65.36	58.23	63.68	352.76	351.21	351.98	1,122.00	1,122.00	1,122.00	66.00	66.00	66.00	112.45	82.38	90.89	724.22	616.36	673.90
12	66.23	58.65	65.78	352.39	350.58	351.72	1,122.00	1,122.00	1,122.00	66.00	65.58	65.93	126.95	86.39	120.04	729.14	626.37	720.63
13	66.15	65.09	65.84	352.84	350.28	351.78	1,122.00	1,122.00	1,122.00	66.00	65.55	65.89	111.45	86.40	97.50	606.49	541.06	577.33
14	64.77	59.55	63.09	352.76	351.11	351.76	1,122.00	1,035.00	1,111.13	66.00	65.78	65.94	86.39	79.35	82.64	541.20	481.06	511.34
15	62.09	57.39	59.19	352.98	351.43	352.24	928.00	851.00	892.88	66.00	65.85	65.99	78.40	74.34	76.44	481.09	431.16	449.57
16	59.02	56.34	57.37	353.02	350.72	352.35	851.00	771.00	824.75	66.00	65.79	65.98	74.39	70.34	72.38	431.21	394.22	417.12
17	56.41	55.05	55.85	352.82	351.59	352.38	837.00	720.00	767.17	66.00	64.25	65.19	70.34	67.85	69.21	445.16	374.37	395.33
18	55.13	54.16	54.53	352.79	351.22	352.17	820.00	730.00	754.04	64.68	44.31	61.09	67.86	64.32	66.82	380.50	325.00	374.24
19	54.25	51.76	53.02	352.11	326.22	344.98	750.00	690.00	734.17	64.44	57.01	60.87	66.38	64.28	65.14	370.74	350.69	360.55
20	53.15	49.22	52.43	327.11	315.71	320.67	690.00	650.00	660.00	64.18	56.96	58.75	64.31	62.22	63.34	350.73	331.27	343.38
21	51.62	49.25	50.86	323.30	275.92	300.49	650.00	570.00	618.33	61.20	56.71	58.63	63.28	60.23	61.73	335.87	329.59	330.75
22	51.07	49.52	50.00	303.33	290.25	297.06	640.00	510.00	607.50	57.19	55.14	56.66	63.23	52.52	60.46	330.51	300.81	318.09
23	49.94	48.79	49.16	291.39	285.54	290.05	590.00	570.00	580.83	56.75	53.12	54.34	60.00	57.98	59.03	320.38	290.78	304.28
24	49.91	47.67	48.26	287.39	277.04	283.16	600.00	570.00	573.75	60.31	52.66	54.33	59.00	56.36	57.87	359.73	299.36	327.64
25	66.08	49.23	61.78	348.77	281.27	317.92	848.00	600.00	714.50	66.00	54.30	63.87	123.51	50.69	84.38	640.42	359.73	577.16
26	63.38	50.54	54.92	345.06	271.26	295.76	700.00	540.00	605.83	65.03	64.43	64.72	85.39	62.35	70.49	640.36	400.93	458.15
27	59.55	48.18	49.88	280.43	249.67	268.36	540.00	540.00	540.00	65.42	64.63	64.92	63.35	56.99	60.34	470.57	359.71	401.27
28	50.04	45.17	48.27	275.89	250.39	262.77	540.00	520.00	536.67	64.80	60.40	63.46	59.37	56.40	57.96	360.34	340.45	352.95
29	46.73	45.23	46.33	273.99	243.93	253.36	520.00	490.00	512.50	60.56	53.84	57.65	56.62	54.87	55.91	340.60	305.66	319.17
30	51.01	43.94	46.36	252.04	243.71	248.22	490.00	490.00	490.00	56.39	51.83	54.19	54.89	53.36	54.26	306.02	280.59	294.62
31	44.91	43.80	44.29	247.85	233.02	242.67	490.00	470.00	477.50	53.30	49.09	51.85	53.67	52.34	52.99	300.10	279.19	289.57
Max	66.25			353.14			1,122.00			66.00			126.96			729.34		
Min		43.80			233.02			470.00			0.00			50.69			279.19	
Source: THP, CHP, BHP, KHP,MHP (DGPC)																		

Graph: Generation for the month October, 2022

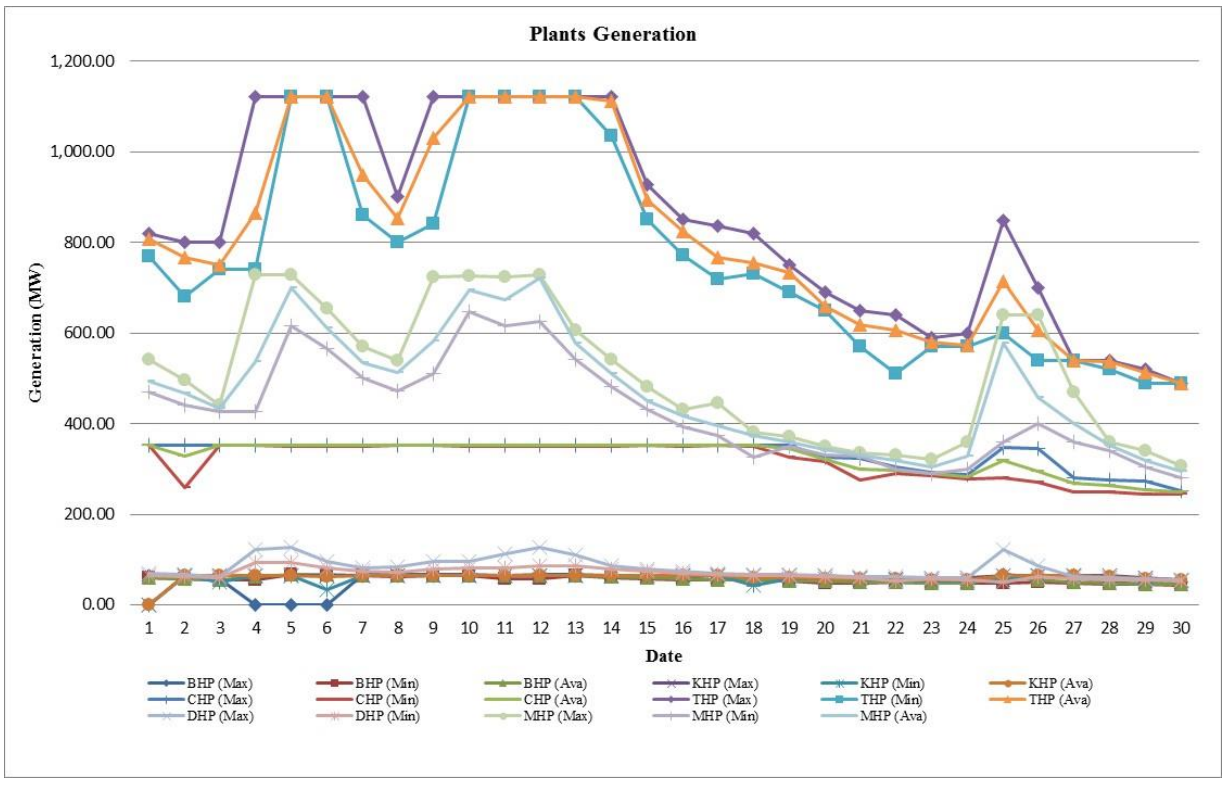


Table: Generation for the month of November, 2022

Nov-22	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)			MHP (MW)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	14.10	14.01	14.05	241.37	222.38	234.68	470.00	470.00	470.00	0.00	0.00	0.00	52.37	50.36	51.71	280.86	270.40	276.94
2	43.22	41.88	42.81	233.77	222.26	229.00	470.00	440.00	468.75	49.70	45.28	49.01	54.99	50.37	51.51	280.17	200.71	265.98
3	43.13	41.09	42.03	232.49	209.22	223.94	460.00	440.00	445.83	48.36	45.93	47.12	51.00	49.96	50.59	270.39	152.65	257.03
4	0.00	41.02	42.70	247.58	205.80	221.77	460.00	420.00	457.50	48.15	43.37	44.86	51.01	48.95	49.78	260.80	255.50	256.53
5	0.00	42.10	43.22	223.66	206.45	215.41	450.00	420.00	436.25	45.27	42.78	43.30	49.97	47.99	48.92	250.84	240.34	244.63
6	0.00	41.98	42.51	216.04	201.12	208.76	430.00	400.00	422.50	44.16	40.20	42.74	48.99	47.49	48.08	275.27	200.55	242.00
7	42.66	41.04	42.09	212.92	201.41	207.20	560.00	400.00	465.00	44.03	40.01	42.39	48.03	46.80	47.36	290.84	229.57	240.62
8	42.82	39.75	41.69	239.73	196.22	210.44	490.00	390.00	432.08	46.68	40.08	42.44	47.18	45.83	46.62	249.80	230.27	239.44
9	42.76	40.53	41.24	208.23	192.58	200.26	430.00	390.00	404.58	45.35	39.33	40.10	46.34	45.36	45.75	230.56	230.27	230.37
10	41.36	39.43	40.53	198.93	188.69	192.94	400.00	360.00	382.92	44.98	29.93	37.91	45.38	44.37	44.97	325.11	190.26	233.63
11	40.39	38.62	39.93	200.38	184.46	191.53	360.00	360.00	360.00	50.88	30.22	36.99	44.71	43.38	44.36	228.35	190.25	218.67
12	40.25	38.73	39.74	210.06	166.04	188.12	440.00	340.00	364.17	56.60	34.83	38.54	44.40	42.88	43.93	229.78	219.81	224.41
13	39.94	37.38	38.97	188.56	180.63	184.60	440.00	370.00	372.92	42.31	36.53	39.21	43.89	42.87	43.33	230.08	224.88	226.34
14	39.02	38.12	38.77	185.48	174.37	180.55	380.00	360.00	370.00	38.48	38.02	38.09	43.10	41.85	42.58	230.07	210.19	216.36
15	38.15	37.87	37.99	184.44	173.39	179.43	390.00	360.00	376.25	42.28	36.22	38.48	42.38	41.35	41.85	220.26	210.16	215.45
16	38.18	36.38	37.27	185.07	170.84	177.43	380.00	360.00	364.17	39.48	37.90	38.66	41.85	40.84	41.27	225.02	180.61	215.36
17	37.69	36.09	37.00	186.39	170.93	177.45	370.00	350.00	359.58	40.50	37.37	38.16	40.87	40.31	40.75	250.23	195.07	207.42
18	37.16	31.57	36.50	181.52	161.85	169.37	370.00	330.00	348.33	38.94	36.70	37.31	40.62	39.78	40.24	230.09	195.23	214.26
19	36.38	35.61	36.08	177.80	156.30	166.61	370.00	330.00	339.17	40.42	36.48	37.34	39.92	39.15	39.66	205.42	200.25	204.08
20	35.77	33.54	35.11	163.93	162.04	163.30	330.00	330.00	330.00	36.67	36.26	36.51	39.37	37.83	38.79	209.63	195.37	203.72
21	35.55	34.13	34.90	167.52	161.26	163.34	330.00	330.00	330.00	36.58	33.51	35.01	39.53	37.79	38.25	200.13	195.08	198.80
22	34.33	34.08	34.20	164.37	155.30	160.43	330.00	330.00	330.00	35.43	35.05	35.15	38.10	37.31	37.70	199.90	190.21	192.02
23	34.23	33.67	34.00	158.24	148.84	156.81	330.00	310.00	317.50	39.31	34.02	34.80	37.81	36.83	37.41	190.43	183.30	188.31
24	33.92	33.09	33.71	161.22	148.82	155.36	310.00	310.00	310.00	34.80	31.49	33.61	37.34	36.64	36.96	199.61	183.24	186.97
25	33.52	32.60	33.08	158.77	149.33	153.41	330.00	300.00	313.33	33.31	28.09	30.72	36.67	35.90	36.42	239.80	127.63	195.67
26	32.89	32.20	32.63	154.71	138.87	146.07	300.00	260.00	289.17	30.24	28.24	29.14	36.11	35.29	35.68	180.42	180.25	180.34
27	32.60	31.30	32.33	151.97	149.70	151.18	300.00	300.00	300.00	30.07	27.98	29.13	36.60	35.09	35.56	180.44	175.24	179.30
28	32.40	31.90	32.19	152.46	146.67	148.87	300.00	300.00	300.00	29.28	27.95	28.92	35.14	34.30	34.93	175.49	142.40	173.98
29	32.00	28.50	31.17	151.30	140.66	146.18	390.00	300.00	331.25	29.50	26.96	28.36	37.76	34.27	34.66	175.41	175.24	175.34
30	31.50	30.40	30.95	235.20	111.09	155.26	390.00	230.00	310.00	32.43	20.95	28.87	34.63	33.36	33.98	234.75	75.37	179.95
31	0.00	No Generati	Error	0.00	No Generati	Error	0.00	No Generati	Error	32.47	30.13	30.98	0.00	No Generati	Error	0.00	No Generation	Error
Max	43.22			247.58			560.00			56.60			54.99			325.11		
Min		14.01			111.09			230.00			0.00			33.36			75.37	
Source: THP, CHP, BHP, KHP,MHP (DGPC)																		

Graph: Generation for the month of November, 2022

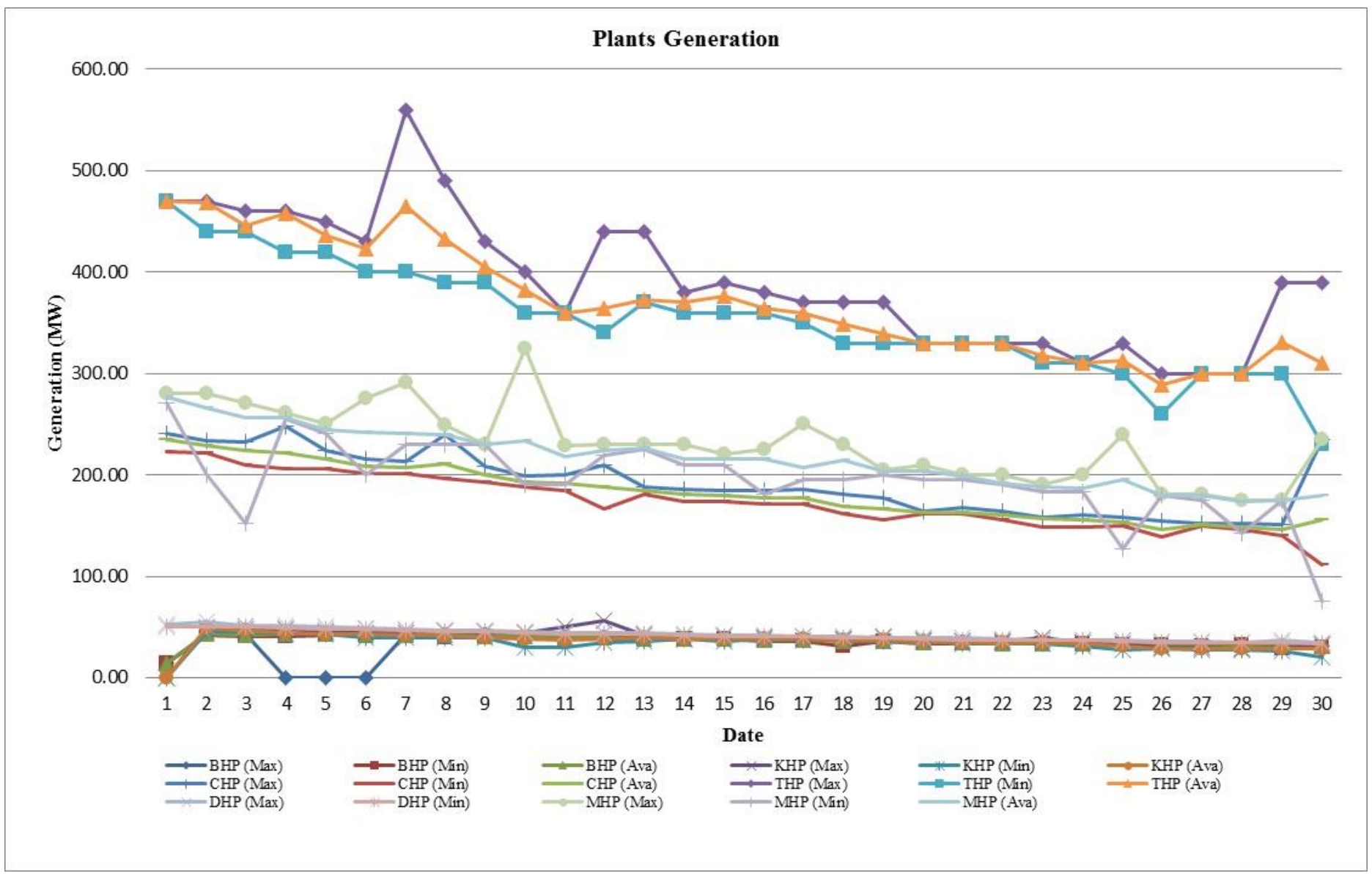


Table: Generation for the month of December, 2022

Dec-22	BHP (MW)			CHP (MW)			THP (MW)			KHP (MW)			DHP (MW)			MHP (MW)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	31.30	30.30	30.78	190.09	108.98	137.69	400.00	230.00	293.13	0.00	0.00	0.00	33.91	33.68	33.84	190.09	108.98	137.69
2	30.70	29.80	30.25	191.41	109.52	143.26	400.00	220.00	281.67	32.42	24.16	30.01	33.89	32.25	33.29	191.41	109.52	143.26
3	30.30	30.00	30.15	187.51	109.40	137.35	380.00	230.00	285.21	32.63	23.27	30.14	33.99	32.71	33.14	187.51	109.40	137.35
4	30.40	29.50	29.81	160.64	110.74	138.43	335.00	230.00	276.04	32.23	22.20	30.39	38.95	32.25	33.25	160.64	110.74	138.43
5	30.80	28.70	29.64	155.15	115.49	136.27	320.00	225.00	274.79	32.12	22.17	28.72	33.10	32.39	32.67	155.15	115.49	136.27
6	29.70	28.10	29.19	151.83	113.95	139.73	315.00	205.00	267.50	28.12	25.01	25.77	32.43	31.71	32.21	151.83	113.95	139.73
7	29.20	28.10	28.66	154.23	112.52	134.50	265.00	205.00	247.08	28.32	24.17	26.62	31.90	31.25	31.67	154.23	112.52	134.50
8	29.50	28.10	28.90	139.32	110.38	130.93	275.00	205.00	255.00	31.28	20.98	26.85	32.29	30.64	31.26	139.32	110.38	130.93
9	28.80	27.60	28.19	150.87	123.88	138.24	300.00	205.00	258.54	29.04	20.98	25.92	31.31	30.82	31.16	150.87	123.88	138.24
10	28.40	27.40	28.04	148.37	114.87	134.31	295.00	230.00	264.17	30.39	20.12	27.29	30.71	29.98	30.44	148.37	114.87	134.31
11	28.10	27.60	27.77	136.37	116.99	128.48	275.00	205.00	248.54	28.11	20.24	24.62	30.80	30.47	30.75	136.37	116.99	128.48
12	27.90	26.60	27.20	140.40	118.00	128.74	280.00	235.00	254.17	28.30	20.13	24.85	30.71	29.98	30.44	140.40	118.00	128.74
13	28.00	26.50	27.36	142.91	114.32	127.30	285.00	230.00	253.75	28.28	20.13	25.56	30.32	29.48	30.07	142.91	114.32	127.30
14	27.40	26.30	27.07	142.64	114.11	124.80	270.00	205.00	230.42	30.81	20.12	25.19	30.32	29.48	29.97	142.64	114.11	124.80
15	27.30	26.00	26.90	148.21	95.13	124.75	305.00	200.00	241.25	30.11	20.34	27.34	29.83	29.45	29.62	148.21	95.13	124.75
16	28.00	26.40	26.74	146.47	95.91	125.82	295.00	200.00	257.71	32.22	22.12	27.34	29.81	29.19	29.43	146.47	95.91	125.82
17	27.10	25.70	26.37	129.31	96.12	121.83	255.00	200.00	240.75	30.18	20.17	26.13	29.30	29.05	29.23	129.31	96.12	121.83
18	26.30	25.70	26.08	128.75	109.16	121.87	255.00	218.00	241.83	29.14	20.17	25.64	29.10	28.47	28.73	128.75	109.16	121.87
19	26.00	25.60	25.82	141.78	101.01	120.44	245.00	196.00	219.50	28.23	20.19	25.70	28.71	28.16	28.46	141.78	101.01	120.44
20	26.40	25.00	26.01	127.32	103.25	117.90	250.00	210.00	234.17	28.43	20.16	25.82	29.22	28.00	28.23	127.32	103.25	117.90
21	26.20	24.60	25.55	163.48	105.58	128.10	280.00	200.00	213.50	30.24	20.16	26.30	28.21	27.68	28.03	163.48	105.58	128.10
22	25.90	24.90	25.50	211.65	70.00	148.23	290.00	200.00	255.42	31.99	20.36	25.72	28.03	27.58	27.83	211.65	70.00	117.35
23	25.70	24.60	25.19	141.61	103.74	119.69	283.00	230.00	256.21	30.04	20.10	23.30	27.98	27.49	27.69	141.61	103.74	119.69
24	25.30	24.10	24.85	119.61	90.06	105.10	246.00	180.00	223.54	27.00	20.12	22.92	28.35	26.51	27.24	119.61	90.06	105.10
25	25.20	24.00	24.43	122.36	89.83	109.89	235.00	180.00	206.46	32.13	20.12	24.45	27.50	26.65	27.02	122.36	89.83	109.89
26	24.70	23.60	24.22	139.33	90.29	112.02	260.00	180.00	212.88	32.09	20.03	23.32	26.91	26.02	26.56	139.33	90.29	112.02
27	24.30	23.50	23.98	117.19	90.88	105.69	230.00	180.00	208.08	27.07	20.86	23.55	26.55	26.38	26.50	117.19	90.88	105.69
28	24.30	23.60	24.00	120.88	89.81	107.99	240.00	175.00	211.25	27.06	20.13	23.83	26.63	26.25	26.48	120.88	89.81	107.99
29	24.20	22.90	23.78	145.60	70.85	109.88	275.00	180.00	209.58	28.21	20.10	22.16	26.82	26.40	26.62	145.60	70.85	109.88
30	24.30	23.60	23.95	167.49	48.38	112.88	305.00	120.00	203.33	28.22	20.15	20.91	26.31	24.99	25.94	167.49	48.38	112.88
31	24.90	23.90	24.35	135.59	50.36	94.45	305.00	120.00	214.00	30.11	20.14	23.53	72.86	25.01	28.88	135.59	50.36	94.45
Max	31.30			211.65			400.00			32.63			72.86			211.65		
Min		22.90			48.38			120.00			0.00			24.99			48.38	
Source: THP, CHP, BHP, KHP,MHP (DGPC)																		

Graph: Generation for the month of December, 2022

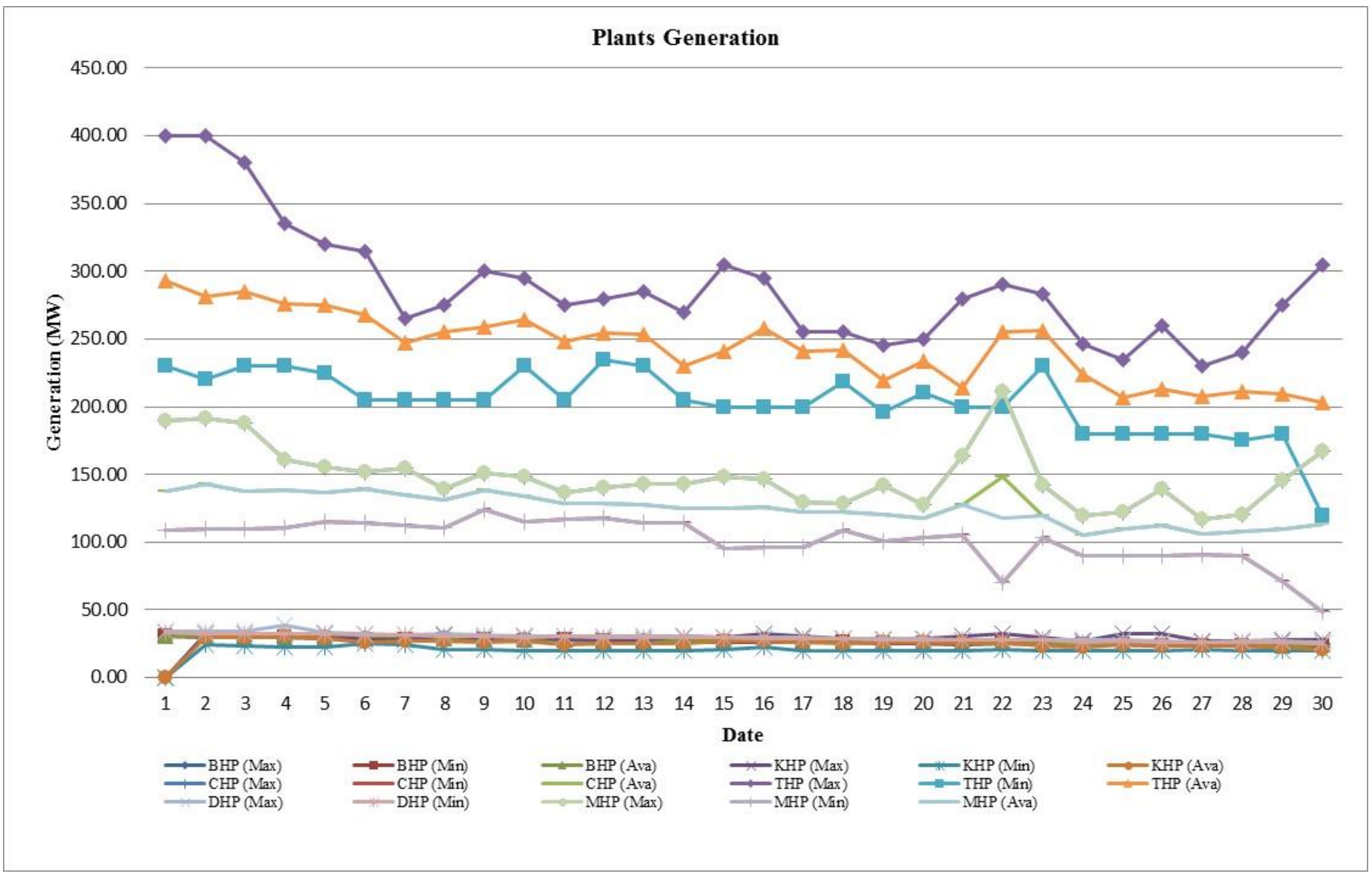
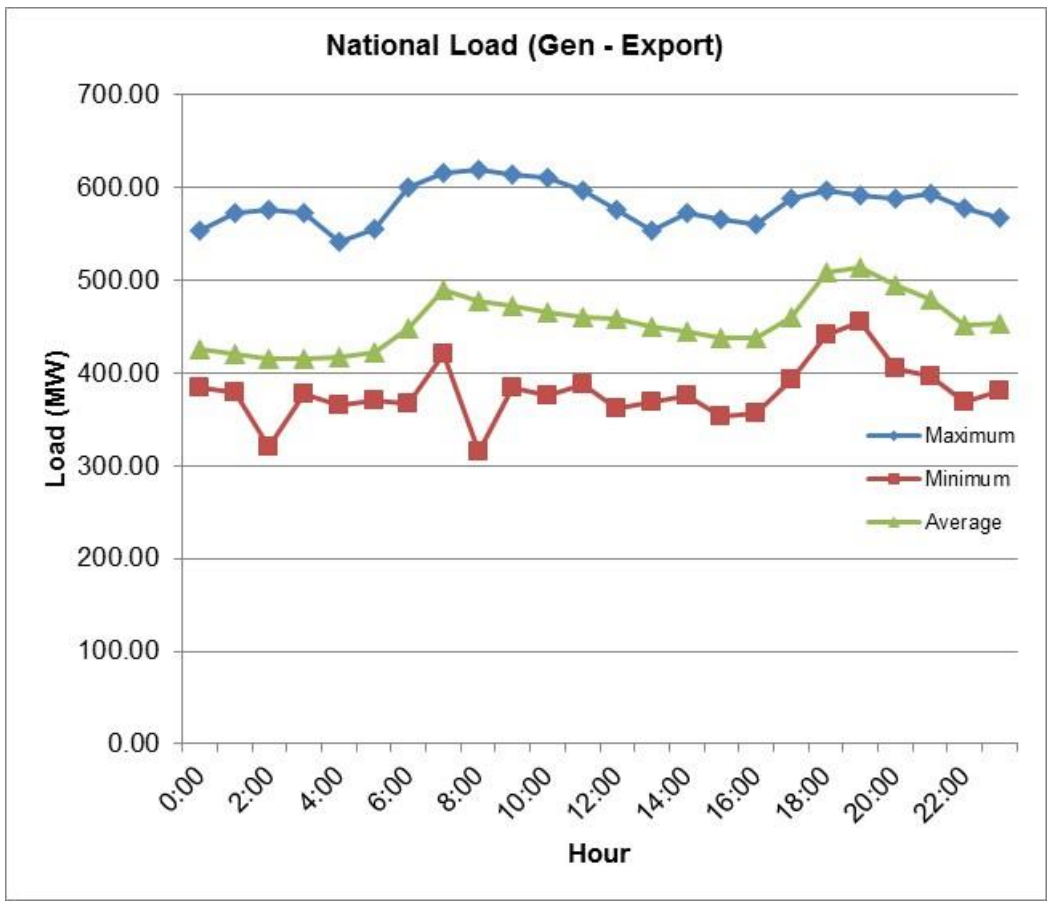


Table: National demand for October, 2022

Oct-22	Max	Min	Ava
0:00	554.00	383.88	425.26
1:00	573.35	378.78	420.10
2:00	575.67	320.63	415.98
3:00	572.94	377.20	415.09
4:00	541.78	365.60	416.51
5:00	555.25	370.91	422.28
6:00	599.78	366.76	449.29
7:00	615.52	421.10	490.03
8:00	620.02	315.03	477.45
9:00	614.03	384.27	472.26
10:00	611.24	375.56	465.67
11:00	597.90	387.16	461.15
12:00	577.07	362.13	459.02
13:00	554.20	368.26	450.53
14:00	572.59	375.39	445.65
15:00	565.11	354.16	438.82
16:00	560.41	356.23	437.66
17:00	588.07	393.06	459.79
18:00	597.19	440.74	508.87
19:00	591.05	454.94	514.47
20:00	587.85	405.93	495.01
21:00	592.87	397.21	480.32
22:00	578.55	368.28	451.85
23:00	568.48	380.35	454.47
	620.02		
		315.03	

Graph: National Demand for October, 2022



Annexure-II

Table: National Demand for November, 2022

Nov-22	Max	Min	Ava
0:00	506.97	416.89	476.56
1:00	491.89	400.31	463.00
2:00	501.00	389.97	459.68
3:00	479.42	399.29	458.97
4:00	493.27	406.94	461.96
5:00	500.78	385.78	467.57
6:00	522.68	431.91	491.66
7:00	597.37	481.11	552.82
8:00	599.30	468.00	553.53
9:00	589.79	453.66	540.68
10:00	589.00	452.36	525.09
11:00	566.28	438.55	510.42
12:00	563.97	418.41	515.23
13:00	552.90	446.27	511.12
14:00	561.66	417.27	503.79
15:00	539.51	429.12	501.89
16:00	547.42	433.95	510.83
17:00	580.34	461.34	545.22
18:00	610.55	514.99	587.01
19:00	610.81	516.38	589.26
20:00	609.04	523.71	587.02
21:00	604.33	505.61	570.13
22:00	572.79	460.27	539.16
23:00	549.89	398.50	501.11
	610.81		
		385.78	

Graph: National Demand for November, 2022

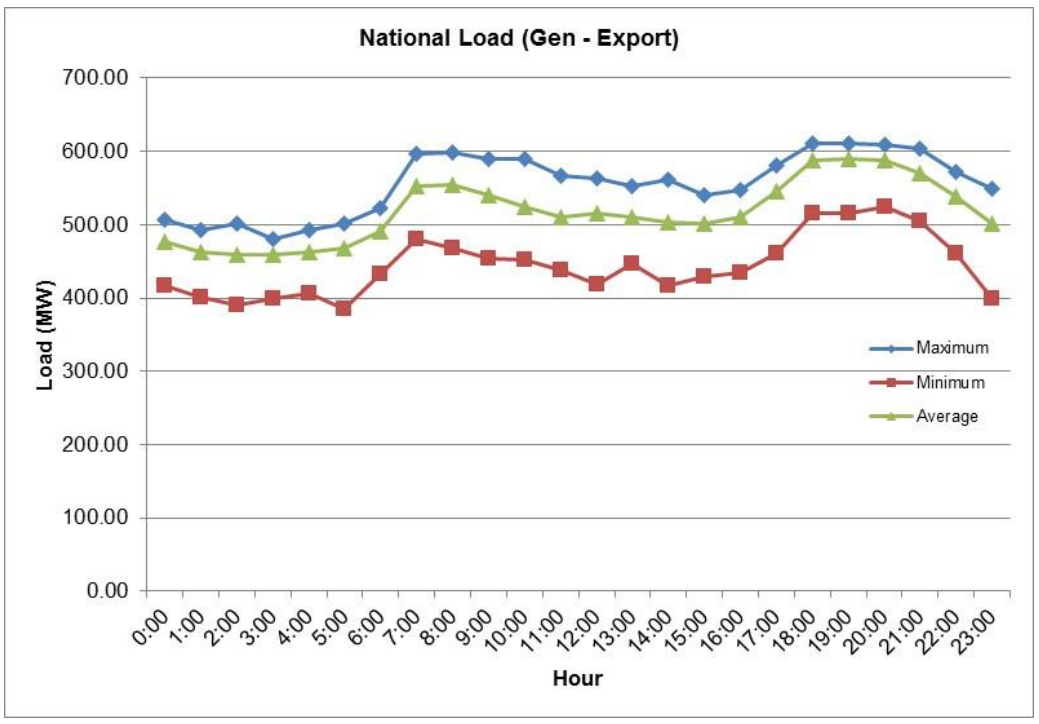
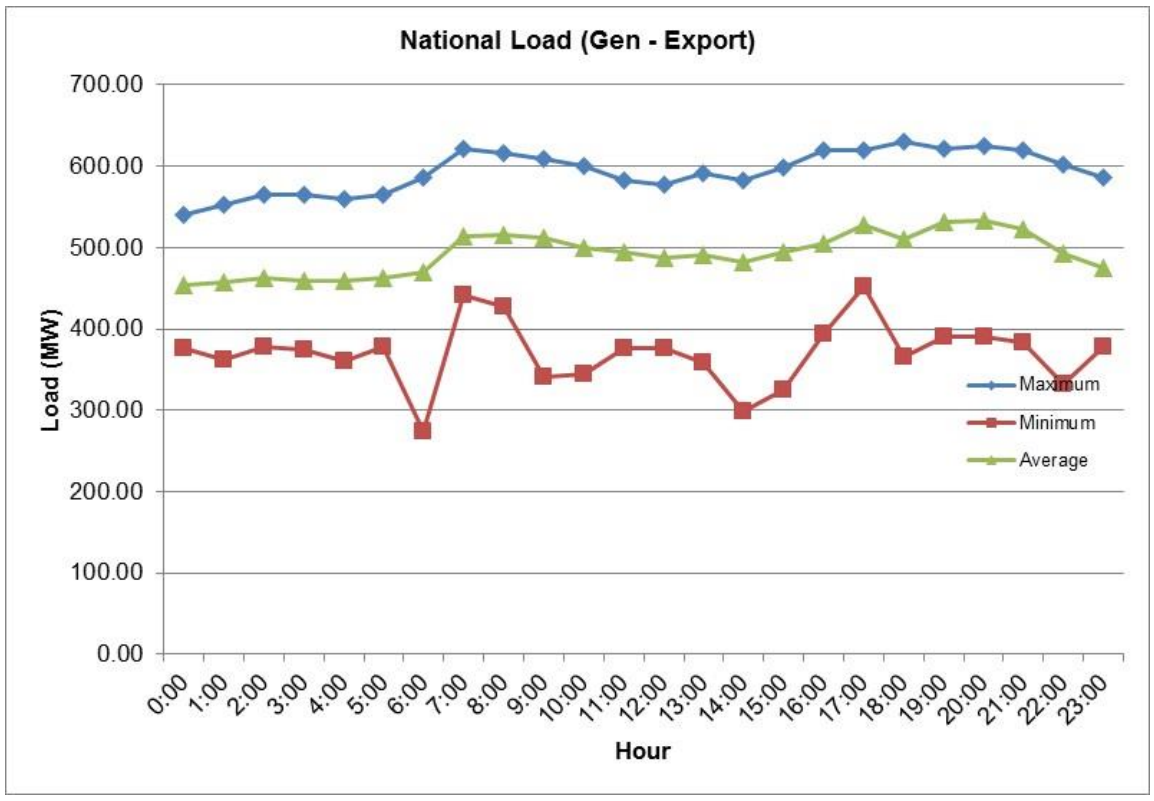


Table: National Demand for December, 2022

Dec-22	Max	Min	Ava
0:00	539.76	376.26	452.98
1:00	552.03	362.35	456.85
2:00	564.85	378.20	462.13
3:00	565.55	374.68	459.52
4:00	559.83	360.19	459.73
5:00	564.83	377.29	462.46
6:00	586.70	273.03	469.36
7:00	621.83	441.66	512.95
8:00	615.63	427.97	515.87
9:00	609.78	340.36	511.34
10:00	600.42	345.22	500.27
11:00	581.84	375.89	494.16
12:00	577.99	376.58	487.88
13:00	590.85	358.77	490.51
14:00	583.08	298.45	481.28
15:00	598.80	325.48	494.03
16:00	620.24	394.03	504.92
17:00	620.22	452.28	528.24
18:00	629.61	366.14	510.19
19:00	622.02	391.16	531.24
20:00	624.72	389.59	533.58
21:00	620.36	382.47	523.14
22:00	602.04	331.62	492.95
23:00	585.98	377.16	475.69
	629.61		
		273.03	

Graph: National Demand for December, 2022



Annexure-III

Table: Daily maximum, minimum and average frequency for the month of October, 2022

Oct-22	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
Date	Max	Min	Ava	Max	Min	Ava
1	50.00	49.90	49.98	50.08	49.96	50.03
2	50.00	49.90	49.97	50.06	49.93	50.01
3	50.00	49.80	49.96	50.06	49.89	49.99
4	50.00	49.80	49.93	50.07	49.84	49.99
5	50.00	49.80	49.96	50.08	49.64	49.98
6	50.00	49.80	49.97	50.07	49.96	50.02
7	50.00	49.90	49.98	50.08	49.90	50.00
8	50.00	49.70	49.93	50.09	49.86	50.00
9	50.00	49.80	49.97	50.10	49.86	50.01
10	50.00	49.80	49.95	50.13	49.90	50.00
11	50.00	49.90	49.97	50.09	49.91	50.02
12	50.00	49.90	49.98	50.08	49.96	50.03
13	50.00	49.90	49.98	50.12	49.90	50.02
14	50.00	49.80	49.95	50.08	49.90	50.03
15	50.00	49.80	49.95	50.08	49.82	50.00
16	50.00	49.90	49.95	50.07	49.89	50.02
17	50.00	49.80	49.95	50.07	49.89	50.01
18	50.00	49.90	49.98	50.07	49.88	50.01
19	50.00	49.90	49.95	50.09	49.87	50.01
20	50.00	49.90	49.96	50.09	49.94	50.02
21	50.00	49.80	49.96	50.16	49.94	50.02
22	50.00	49.90	49.96	50.10	49.88	50.02
23	50.00	49.90	49.96	50.08	49.91	50.01
24	50.00	49.80	49.98	50.18	49.88	50.03
25	50.00	49.80	49.96	50.17	49.84	50.03
26	50.00	49.80	49.93	50.12	49.83	49.99
27	50.00	49.80	49.91	50.14	49.89	49.98
28	50.00	49.70	49.92	50.05	49.81	49.98
29	50.00	49.80	49.92	50.07	49.86	49.99
30	50.00	49.80	49.96	50.11	49.91	50.00
31	50.00	49.90	49.95	50.09	49.86	49.99
Max	**50.00**			**50.18**		
Min		**49.70**			**49.64**	
Source: TD (BPC), KHP (DGPC)						

Graph: Daily maximum, minimum and average frequency for the month of October, 2022

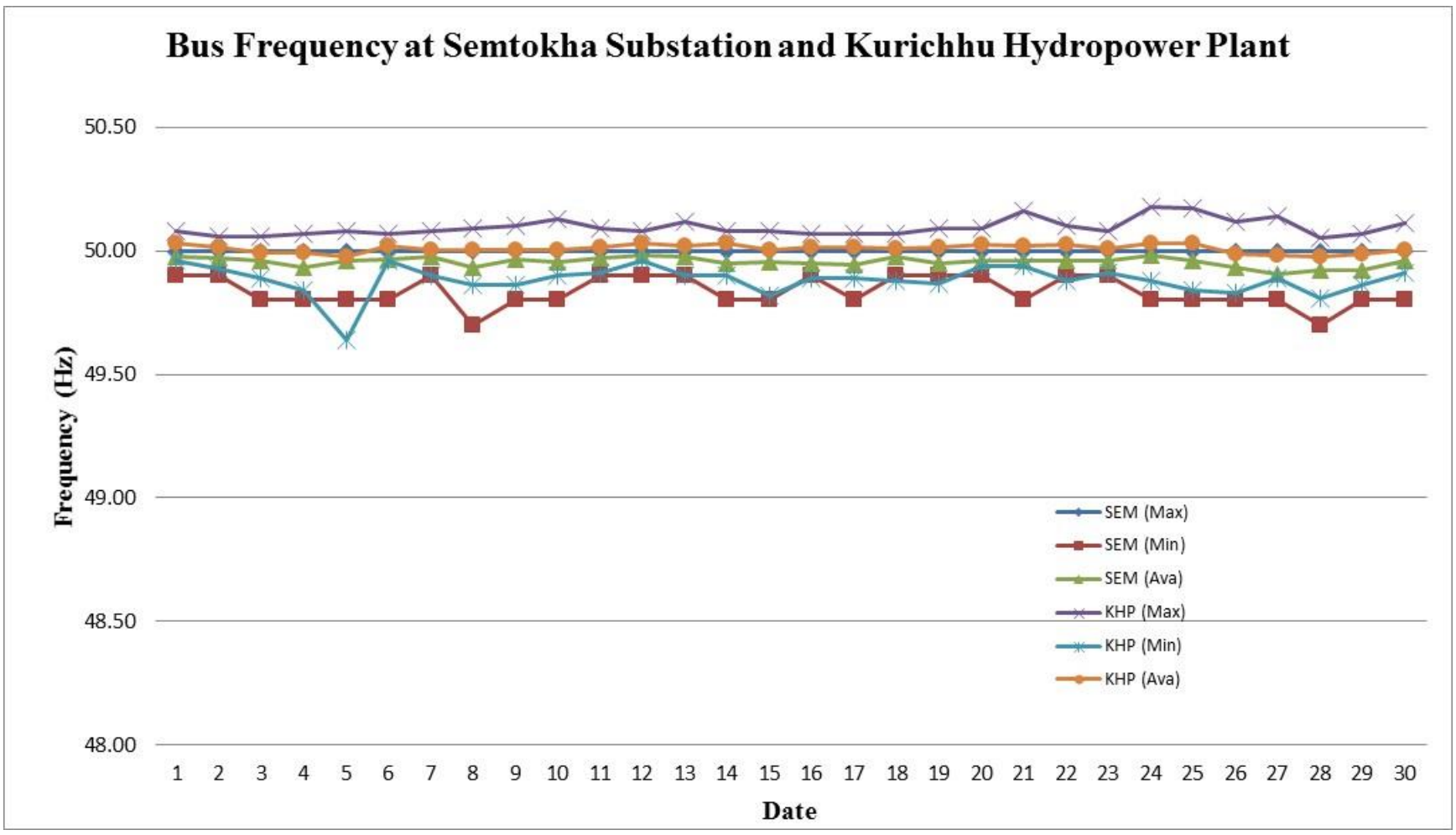


Table: Daily maximum, minimum and average frequency for the month of November, 2022

Nov-22	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
Date	Max	Min	Ava	Max	Min	Ava
1	50.00	49.70	49.93	50.08	49.70	49.98
2	50.00	49.80	49.95	50.07	49.81	49.98
3	50.00	49.80	49.95	50.07	49.92	50.01
4	50.00	49.80	49.92	50.11	49.87	49.99
5	50.00	49.70	49.92	50.08	49.77	49.96
6	50.00	49.90	49.98	50.07	49.86	49.99
7	50.00	49.80	49.95	50.07	49.91	49.99
8	50.00	49.50	49.95	50.08	49.88	49.99
9	50.00	49.90	49.96	50.07	49.90	50.01
10	50.00	49.90	49.96	50.08	49.90	50.01
11	50.00	49.90	49.97	50.09	49.94	50.02
12	50.00	49.90	49.97	50.07	49.79	50.00
13	50.00	49.90	49.98	50.10	49.90	50.02
14	50.00	49.80	49.95	50.09	49.90	50.02
15	50.00	49.80	49.94	50.22	49.81	50.00
16	50.00	49.80	49.94	50.10	49.79	50.00
17	50.00	49.80	49.95	50.08	49.97	50.03
18	50.00	49.80	49.95	50.10	49.86	50.01
19	50.00	49.80	49.97	50.07	49.84	50.01
20	50.00	49.80	49.96	50.11	49.81	50.00
21	50.10	49.90	49.95	50.11	49.90	50.00
22	50.00	49.70	49.92	50.10	49.87	49.99
23	50.00	49.80	49.95	50.10	49.87	50.01
24	50.00	49.80	49.95	50.10	49.90	49.99
25	50.00	49.90	49.96	50.08	49.94	50.02
26	50.00	49.90	49.96	50.07	49.90	50.01
27	50.00	49.80	49.95	50.10	49.87	49.99
28	50.00	49.80	49.94	50.08	49.90	50.00
29	50.00	49.80	49.94	50.08	49.88	49.99
30	50.00	49.90	49.95	50.13	49.90	50.00
31	0.00	Error	Error	50.09	49.90	49.98
Max	**50.10**			**50.22**		
Min		**49.50**			**49.70**	
Source: TD (BPC), KHP (DGPC)						

Graph: Daily maximum, minimum and average frequency for the month of November 2022

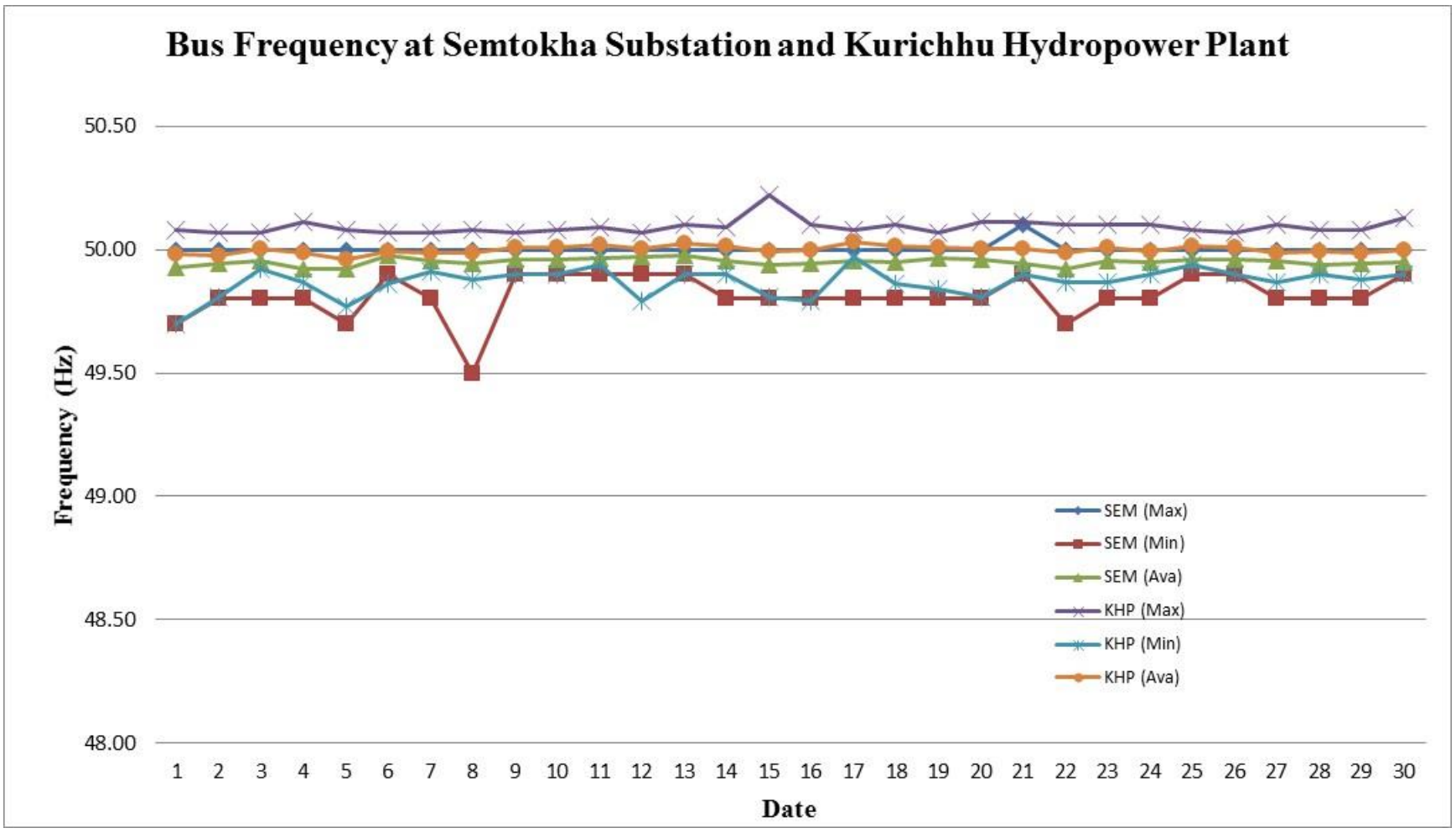
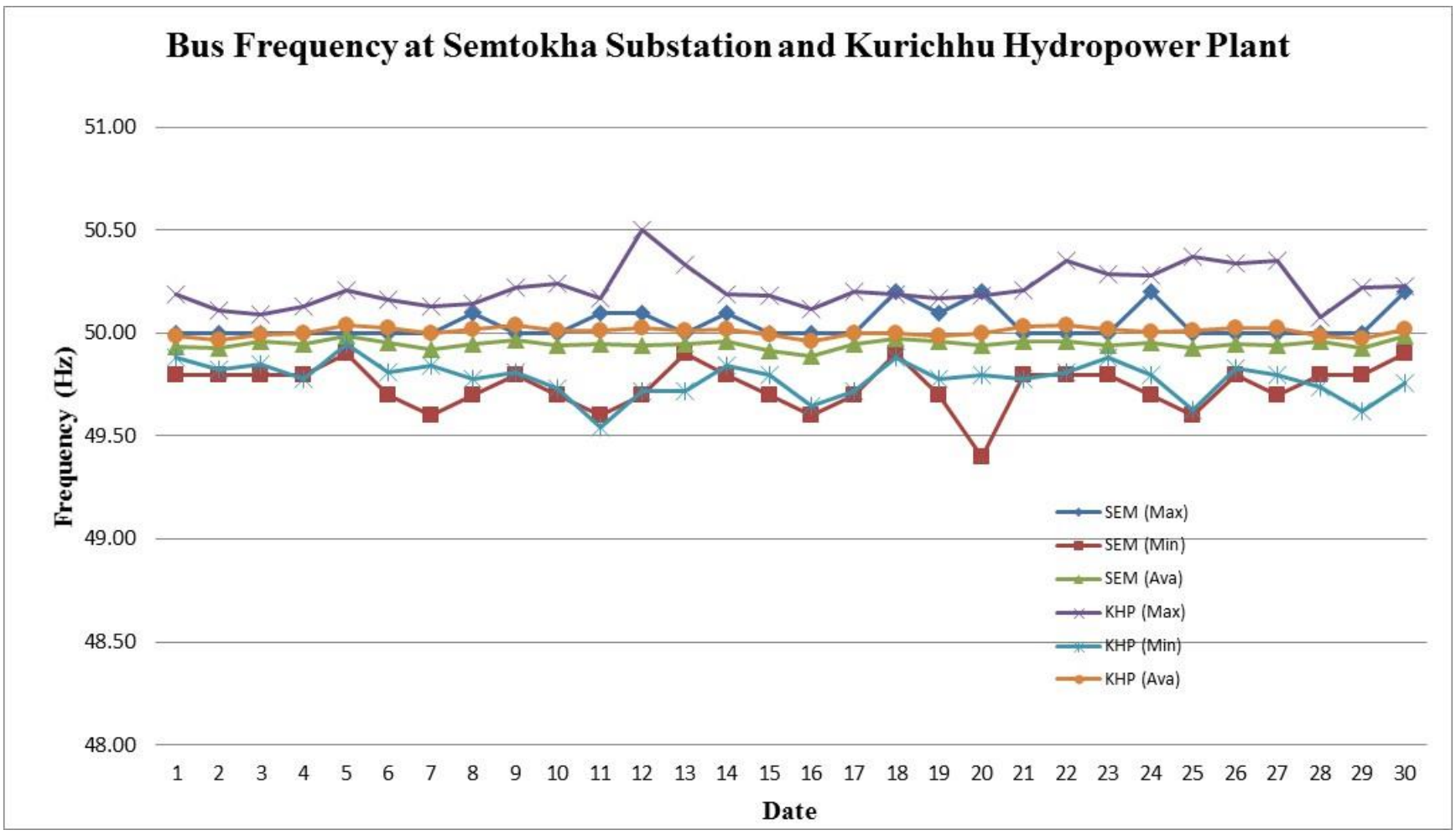


Table: Daily maximum, minimum and average frequency for the month of December, 2022

Dec-22	Bus Frequency at Semtokha Substation			Bus Frequency at Kurichhu Hydropower Plant		
Date	Max	Min	Ava	Max	Min	Ava
1	50.00	49.80	49.93	50.19	49.88	49.99
2	50.00	49.80	49.93	50.11	49.82	49.97
3	50.00	49.80	49.96	50.09	49.85	49.99
4	50.00	49.80	49.95	50.13	49.78	50.00
5	50.00	49.90	49.98	50.21	49.95	50.04
6	50.00	49.70	49.95	50.16	49.81	50.02
7	50.00	49.60	49.92	50.13	49.84	50.00
8	50.10	49.70	49.95	50.14	49.78	50.02
9	50.00	49.80	49.97	50.22	49.81	50.04
10	50.00	49.70	49.94	50.24	49.73	50.01
11	50.10	49.60	49.95	50.17	49.54	50.01
12	50.10	49.70	49.94	50.50	49.72	50.03
13	50.00	49.90	49.95	50.33	49.72	50.01
14	50.10	49.80	49.96	50.19	49.84	50.02
15	50.00	49.70	49.91	50.18	49.80	49.99
16	50.00	49.60	49.89	50.12	49.65	49.96
17	50.00	49.70	49.95	50.20	49.72	50.00
18	50.20	49.90	49.98	50.19	49.88	50.00
19	50.10	49.70	49.96	50.17	49.78	49.98
20	50.20	49.40	49.94	50.18	49.80	50.00
21	50.00	49.80	49.96	50.21	49.78	50.03
22	50.00	49.80	49.96	50.35	49.81	50.04
23	50.00	49.80	49.94	50.29	49.88	50.02
24	50.20	49.70	49.95	50.28	49.80	50.01
25	50.00	49.60	49.93	50.37	49.63	50.01
26	50.00	49.80	49.95	50.34	49.83	50.03
27	50.00	49.70	49.94	50.35	49.80	50.02
28	50.00	49.80	49.96	50.08	49.74	49.99
29	50.00	49.80	49.93	50.22	49.62	49.98
30	50.20	49.90	49.98	50.23	49.76	50.02
31	50.00	49.80	49.94	50.13	49.83	50.01
Max	**50.20**			**50.50**		
Min		**49.40**			**49.54**	
Source: TD (BPC), KHP (DGPC)						

Graph: Daily maximum, minimum and average frequency for the month of December, 2022



Annexure-IV

Table: Daily maximum, minimum and average Voltage for the month of October, 2022

Oct-22	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	410.00	406.00	408.31	219.50	215.50	217.19	65.00	63.00	63.85	134.65	131.20	133.17
2	413.00	406.00	410.17	220.50	216.50	218.83	65.70	63.60	64.56	135.00	132.00	133.53
3	415.00	408.50	411.46	221.50	216.00	219.15	65.00	63.54	64.40	135.69	132.57	133.97
4	414.00	407.00	410.90	221.50	217.00	219.42	65.00	63.50	64.37	135.10	131.98	133.47
5	409.50	407.50	408.19	219.50	216.00	218.02	65.30	63.00	63.96	135.07	132.00	133.26
6	410.00	407.50	408.50	218.50	216.00	217.54	65.00	63.00	63.99	135.27	131.95	133.92
7	410.50	408.00	409.35	220.00	217.00	218.49	65.00	63.45	64.29	135.07	131.53	133.82
8	410.00	407.50	409.40	220.50	216.50	218.32	64.75	64.00	64.15	134.24	132.00	133.21
9	410.50	407.00	409.10	220.00	216.50	218.56	65.00	63.50	64.28	134.44	132.57	133.49
10	410.00	408.00	408.75	220.50	217.00	218.98	65.00	64.00	64.81	135.48	131.53	134.13
11	412.00	408.00	410.25	220.50	217.00	218.88	65.25	63.00	64.47	136.52	132.50	134.70
12	411.50	407.00	409.25	220.50	216.50	218.33	65.10	64.00	64.26	136.20	132.98	134.59
13	410.00	406.00	408.25	220.00	216.50	218.38	65.00	63.60	64.13	135.48	131.00	133.79
14	411.00	406.50	409.15	220.00	216.50	218.35	65.00	63.00	64.18	135.27	131.90	133.64
15	412.00	408.00	409.94	220.50	217.00	218.77	65.00	63.50	64.35	134.44	131.54	132.98
16	415.00	408.00	411.58	221.00	216.50	219.46	65.00	63.50	64.28	135.27	132.50	134.08
17	413.00	408.00	411.56	220.00	216.00	218.83	65.00	63.00	64.32	135.40	132.57	133.89
18	414.00	407.50	411.83	220.50	217.50	219.50	65.00	64.00	64.52	135.07	131.12	133.63
19	414.00	408.50	411.67	221.00	216.50	218.90	65.45	63.00	64.27	135.30	132.16	134.13
20	415.50	409.50	413.17	221.50	217.00	219.65	65.00	63.50	64.46	134.86	132.86	133.61
21	416.50	408.00	412.90	221.50	216.00	219.35	65.00	63.70	64.36	134.80	132.20	133.56
22	417.00	408.50	412.81	222.50	216.00	219.54	65.50	63.00	64.41	135.27	130.70	133.28
23	417.00	408.00	412.02	224.50	216.50	219.23	67.00	62.60	64.13	134.65	131.53	133.22
24	417.00	410.50	414.33	222.50	218.50	220.48	65.40	64.00	64.63	135.20	132.16	133.75
25	417.00	405.50	412.27	222.00	216.00	220.06	66.00	63.20	64.54	135.07	131.32	133.44
26	413.50	406.50	410.23	221.00	217.50	218.96	65.00	63.80	64.22	134.44	132.78	133.55
27	411.50	406.50	409.46	220.50	216.50	218.94	65.50	63.50	64.40	134.50	131.90	133.50
28	415.50	408.50	412.19	221.50	218.00	219.92	65.65	63.90	64.73	135.27	132.10	133.92
29	415.00	407.50	412.00	222.00	218.00	219.79	65.00	64.00	64.50	135.07	131.90	133.79
30	417.00	410.50	413.38	223.00	218.50	220.46	65.50	64.00	64.83	135.69	133.00	134.03
31	417.50	408.50	413.42	224.00	216.00	220.52	65.75	64.00	64.73	135.90	132.57	133.91
Max	**417.50**			**224.50**			**67.00**			**136.52**		
Min		**405.50**			**215.50**			**62.60**			**130.70**	
Source: TD, BPC												

Graph: Daily maximum, minimum and average Voltage for the month of October, 2022

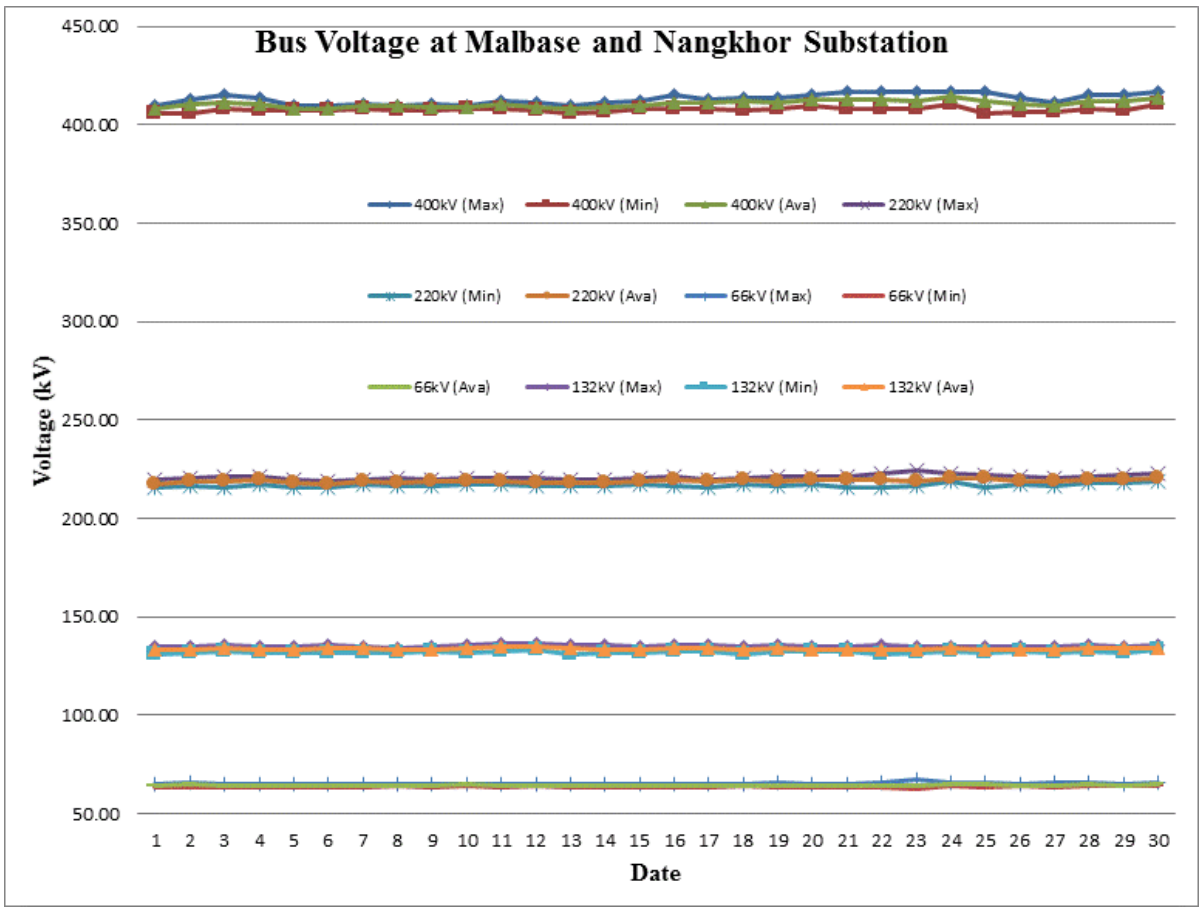


Table: Daily maximum, minimum and average Voltage for the month of November, 2022

Nov-22	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	417.50	406.50	412.79	222.50	215.50	219.77	65.50	63.00	64.42	135.48	132.00	133.67
2	415.50	408.00	411.90	222.00	215.50	219.06	65.00	63.00	63.95	135.40	132.10	133.99
3	415.50	409.50	412.96	222.50	216.50	219.83	66.00	64.00	64.61	135.48	132.57	133.89
4	418.00	408.50	413.73	222.50	216.50	219.44	65.40	64.00	64.80	135.07	132.10	133.92
5	420.50	410.00	416.21	223.50	217.50	220.75	66.00	64.00	65.08	135.48	131.50	134.09
6	421.50	409.50	416.48	223.50	216.50	220.52	65.85	63.00	64.77	135.28	131.74	134.07
7	420.50	406.00	413.73	223.50	215.50	219.48	66.00	63.50	64.43	135.16	132.16	133.64
8	419.50	406.00	414.52	222.50	215.50	219.73	66.00	63.00	64.32	135.65	131.70	133.63
9	422.00	409.00	415.46	223.50	217.00	220.00	65.00	63.90	64.49	135.28	131.33	133.67
10	421.00	409.50	416.29	222.50	216.50	219.88	66.00	63.00	64.69	135.07	132.36	133.95
11	423.50	407.50	416.33	223.50	215.50	220.33	66.50	63.30	64.50	136.32	132.16	134.02
12	422.50	409.50	416.69	224.50	216.50	220.46	66.20	63.00	64.62	136.31	132.10	133.99
13	420.50	411.50	416.96	223.00	217.50	220.21	66.00	64.00	64.90	134.86	132.30	133.56
14	422.50	411.00	417.56	224.00	216.50	220.85	66.00	63.50	65.02	135.48	132.37	133.74
15	421.00	410.50	416.23	222.50	217.00	220.23	66.00	64.00	64.73	134.86	132.30	133.79
16	422.00	408.00	416.40	223.50	216.50	220.15	66.20	63.00	64.89	134.86	131.50	133.18
17	420.00	408.00	415.90	223.50	216.50	220.47	66.73	63.60	64.85	134.86	131.33	133.55
18	422.00	407.50	416.38	224.00	215.50	220.96	67.00	64.00	65.38	135.90	132.10	133.89
19	422.00	410.00	416.69	224.50	218.50	221.15	66.00	63.50	64.94	134.44	131.12	133.23
20	421.50	409.50	417.21	223.50	217.00	220.96	66.00	63.75	64.92	135.00	132.28	133.70
21	422.00	411.00	416.23	225.00	218.00	220.90	66.00	63.50	65.06	135.12	131.30	133.89
22	422.50	411.50	417.69	225.25	218.50	221.49	67.00	64.00	65.37	135.27	131.12	133.24
23	423.50	409.50	417.52	225.50	217.50	221.57	66.50	63.75	65.37	134.85	131.60	133.36
24	422.00	408.50	416.50	223.50	216.50	220.81	66.00	63.00	65.12	135.27	130.49	132.75
25	422.00	408.00	416.71	223.90	216.00	220.64	66.00	63.00	64.80	135.48	131.40	133.71
26	422.00	410.00	416.81	224.00	216.50	220.58	66.00	63.65	64.94	135.60	131.50	133.71
27	425.50	409.50	417.46	225.50	217.00	221.31	66.00	63.00	65.00	135.70	132.10	133.70
28	422.50	408.00	416.25	224.00	216.50	220.60	66.15	63.00	65.10	134.50	131.53	133.44
29	422.50	406.50	415.52	224.00	215.50	220.21	66.10	63.00	64.98	135.48	130.08	133.48
30	422.00	409.00	416.33	224.00	215.00	220.17	66.00	63.40	64.74	135.48	131.32	133.53
31	0.00	Error	Error	0.00	Error	Error	0.00	Error	Error	0.00	Error	Error
Max	425.50			225.50			67.00			136.32		
Min		406.00			215.00			63.00			130.08	
Source: TD, BPC												

Graph: Daily maximum, minimum and average Voltage for the month of November, 2022

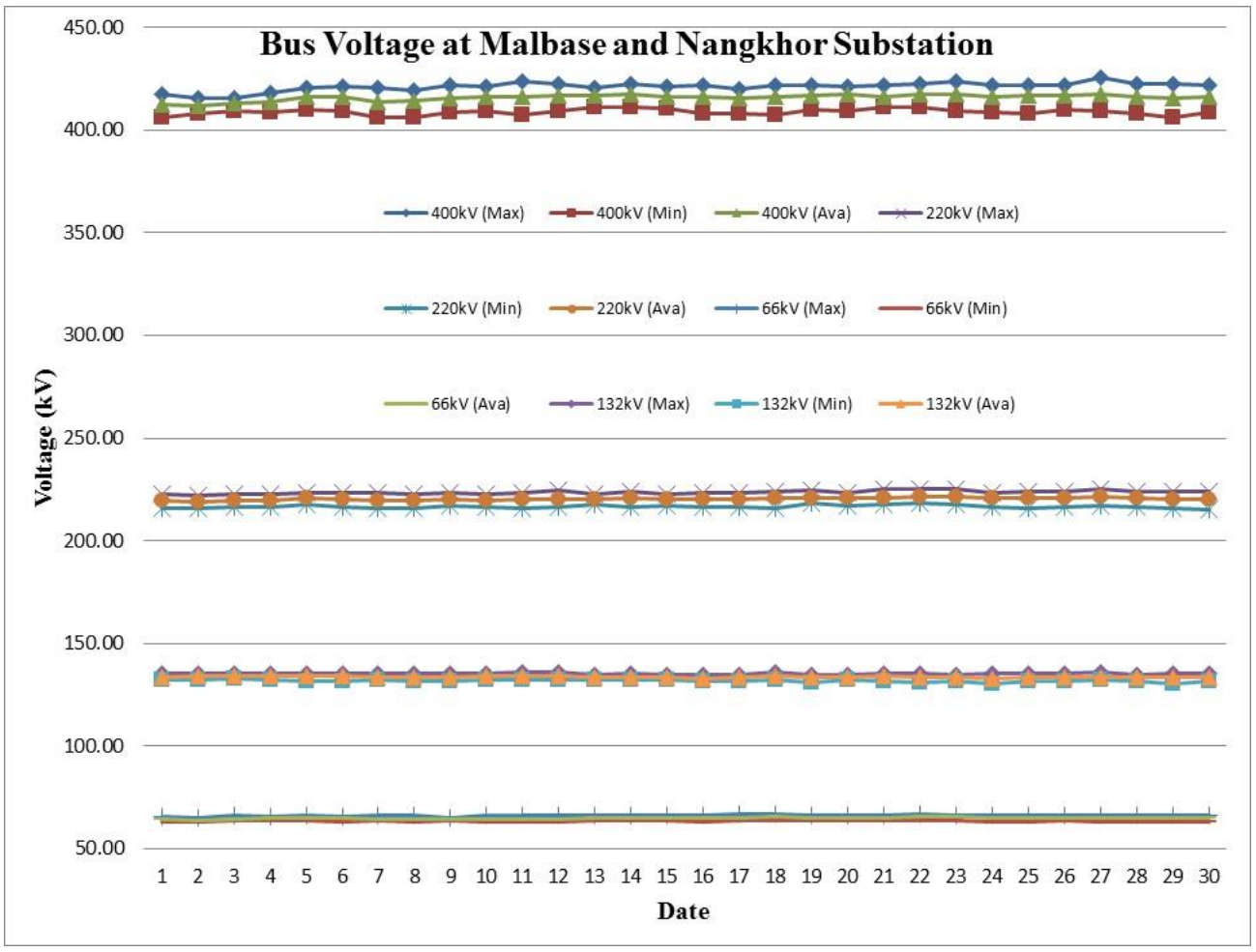
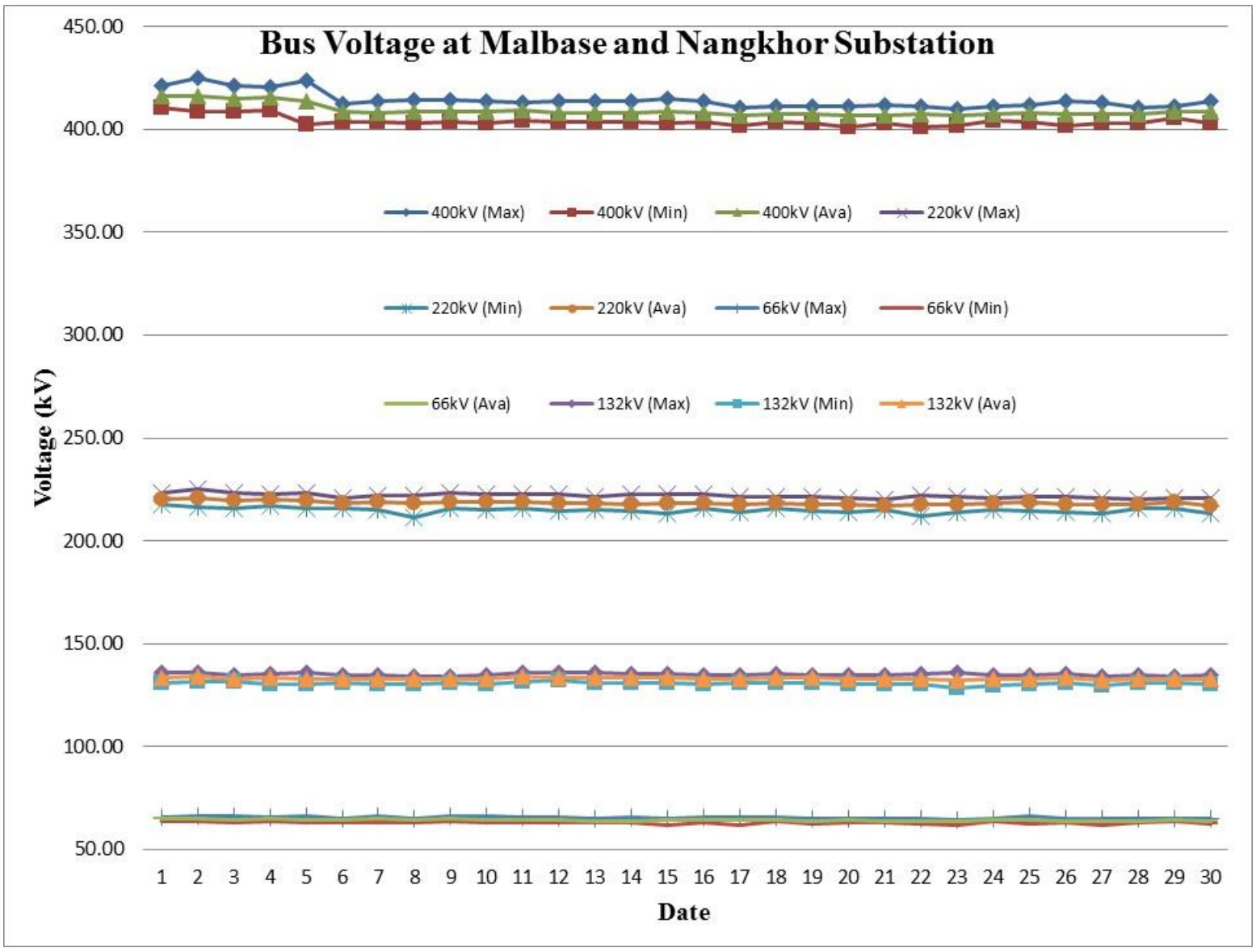


Table: Daily maximum, minimum and average Voltage for the month of December, 2022

Dec-22	Malbase Substation									Nangkhor Substation		
	400kV Bus Voltage (kV)			220kV Bus Voltage (kV)			66kV Bus Voltage (kV)			132kV Bus Voltage (kV)		
Date	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava	Max	Min	Ava
1	421.50	410.50	416.27	223.50	217.50	220.42	65.50	63.90	64.74	136.11	130.70	133.31
2	425.00	408.50	416.42	225.50	216.50	220.81	66.00	63.75	64.71	135.90	131.74	133.83
3	421.00	408.50	414.83	223.50	216.00	219.65	66.00	63.00	64.49	134.65	131.30	133.12
4	420.50	409.50	415.63	223.00	217.00	220.02	65.50	64.00	64.69	135.69	130.49	133.68
5	423.50	402.50	413.50	223.50	215.50	219.70	66.00	63.00	64.68	136.10	130.49	133.13
6	412.50	404.00	408.58	221.00	216.00	218.53	65.30	63.15	64.40	134.44	131.12	132.87
7	413.50	404.00	408.04	222.00	215.00	218.83	66.00	63.00	64.71	134.86	130.08	132.82
8	414.50	403.00	408.50	222.00	211.50	218.21	65.25	63.00	64.18	134.23	130.29	132.58
9	414.50	403.50	408.50	223.50	215.50	219.13	66.00	63.95	64.82	134.25	130.80	132.76
10	413.50	403.00	408.54	223.00	215.00	219.13	66.00	63.00	64.48	134.56	130.20	132.63
11	413.00	404.50	409.19	222.50	215.50	219.08	65.50	63.00	64.28	136.31	131.50	134.27
12	414.00	404.00	408.29	222.50	214.50	218.46	65.50	63.00	64.28	135.84	131.95	133.35
13	414.00	403.50	408.06	221.50	215.00	218.15	65.00	63.00	63.86	135.90	130.91	133.51
14	413.50	404.00	407.94	222.50	214.50	217.81	65.50	63.00	63.96	135.48	131.12	133.59
15	415.00	403.00	408.48	222.50	213.00	218.08	65.25	62.00	64.09	135.69	130.91	133.48
16	414.00	404.00	408.13	222.70	215.50	218.31	65.50	63.00	64.44	134.65	130.50	132.72
17	410.50	402.00	407.08	221.50	214.00	217.88	65.50	62.00	64.18	134.86	130.70	132.73
18	411.00	404.00	407.50	221.50	216.00	218.42	65.50	64.00	64.56	135.48	130.91	133.73
19	411.00	403.00	407.25	221.50	214.50	217.65	65.00	62.50	63.94	134.86	131.00	133.33
20	411.00	401.06	406.65	221.00	214.20	217.80	65.00	63.00	64.08	134.65	130.49	132.69
21	412.00	403.00	406.53	220.50	215.00	217.23	65.00	62.85	63.86	135.00	130.49	132.75
22	411.00	401.00	407.21	222.00	212.00	217.70	65.00	62.70	63.99	135.07	130.28	132.73
23	410.00	402.00	407.04	221.50	214.00	217.71	64.50	62.00	63.94	135.90	128.21	132.38
24	411.00	404.50	407.58	221.00	215.00	218.08	65.00	64.00	64.40	134.65	129.87	132.78
25	412.00	403.50	408.19	221.50	214.50	219.03	66.00	62.75	64.49	134.52	130.29	132.70
26	414.00	401.50	407.40	221.50	214.00	217.78	65.00	63.00	63.84	135.10	130.90	133.44
27	413.00	403.00	407.56	221.00	213.50	217.69	65.00	62.00	63.98	134.03	129.80	132.41
28	410.50	403.00	407.42	220.00	215.50	217.75	65.00	63.00	64.01	134.65	130.98	132.75
29	411.00	405.50	408.94	221.00	216.00	218.69	65.00	63.50	64.35	134.23	130.91	132.67
30	413.50	403.00	408.73	221.00	213.50	217.38	65.00	62.50	63.91	134.86	130.32	132.74
31	413.50	403.50	409.81	220.50	214.00	217.85	65.50	63.00	64.02	135.27	130.49	133.70
Max	**425.00**			**225.50**			**66.00**			**136.31**		
Min		**401.00**			**211.50**			**62.00**			**128.21**	
Source: TD, BPC												

Graph: Daily maximum, minimum and average Voltage for the month of December, 2022



Annexure-V

Eastern Grid Outages

October 2022

MONTHLY OUTAGE REPORT FOR THE MONTH OF OCTOBER,2022 UNDER SMD DEOTHANG, TD, BPC.

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Nangkor Substation
Month:	Oct-22

BPC/SMD/132kV-NSS/2022/03/095

Date: 01.11.2022

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Tripping)	Shutdown/Tripping Time		Normalization Time		Duration of Outage (Hrs)	MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks
				Date	Time	Date	Time			Protecton Relay Optd	Fault Details (As recorded by relay)			
132kV Feeders														
1	Main Grid	132kV	Tripping	03-10-2022	06:24 hrs	03-10-2022	06:30 hrs	0	-	-	-	Tripped on fault	-	Supply failed from Tintibi & Motonga Substation
2	Nangkor-Deothang Line	132kV	Tripping	06-10-2022	04:30 hrs	06-10-2022	15:02 hrs	10	45.9	M&COMP40 Agile	Distance Relay Relay: Trip Ø B,start Ø BN. Start element-Distance, distance trip-Z1, fault duration-59.88ms, relay trip time-79.83ms ,Fault location=20.50KM towards Deothang. IA=139.5A, IB=1.909kA, IC=239.5A, VAN=70.61kV, VBN=35.25kV, VCN=66.51kV,fault resistance=3.050Ω.	Tripped on fault	-	Informed to BPSO & as instructed test charged at 04:44 hrs & 10:22 hrs & 14:48 hrs but couldn't stand with operation of distance relay.
3	Nangkor-Deothang Line	132kV	Tripping	10-10-2022	00:08 hrs	10-10-2022	16:49 hrs	16	47.43	M&COMP40 Agile	Distance Relay Relay: Trip Ø B,start Ø BN. Start element-Distance, TOC start, distance trip-Z1, fault duration-61.65ms,Fault location=20.43KM. IA=159.6A, IB=1.899kA, IC=241.0A, VAN=71.26kV, VBN=35.34kV, VCN=67.42kV,fault resistance=2.881Ω.	Tripped on fault	-	Informed to BPSO & as instructed test charged at 00:15 hrs & 00:22hrs but couldn't stand with operation of distance relay.
4	Nangkor-Deothang Line	132kV	Tripping	11-10-2022	04:41 hrs	12-10-2022	17:44	37	44.5	M&COMP40 Agile	Distance Relay Relay: Trip Ø B,start Ø BN. distance trip-Z1, fault duration-51.63ms, relay trip time-79.94ms,Fault location=20.33KM. IA=13.3A, IB=1.899kA, IC=217.9A, VAN=71.0kV, VBN=34.93kV, VCN=67.17kV,fault resistance=2.833Ω.	Tripped on fault	-	Informed to BPSO & as instructed test charged at 04:44hrs, 04:55hrs & 09:15 hrs but couldn't stand with operation of distance relay. Feeder CB kept opened there after & on 12/10/22, at 08:04 hrs all switch gear operated as per approved shut down taken by TMD, Nangkor & shut down code=083 from BPSO.
7	132/33kV Transformer-1 (5MVA)	132kV	Tripping	19-10-2022	14:11 hrs	19-10-2022	14:13 hrs	0	0.56	Non directional PROTN Relay operated	O/C relay- 50A & trip relay 86 optd.	Transient fault	-	Tripped at the instant of 33kV Yurung feeder tripping.

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Deothang Substation
Month:	Octobet 2022

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Tripping)	Shutdown/Tripping Time		Normalization Time		Duration of Outage (Hrs)	MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks
				Date	Time	Date	Time			Protecton Relay Optd	Fault Details (As recorded by relay)			
2	Nangkhor-Deothang line	132kV	Tripping	06.10.2022	4:30	06.10.2022	6:32	0	37.368	OC & EF	IA=139.0A,IB=219kA,IC=229.5IN=1.152kA,Test char val=4.684A,1.452kA,5.399A,1.456kA	Unknown	NA	Test charge was done as per the instruction of BPSO and found normal
3	Deothang-Motanga Line	132kV	Tripping	06.10.2022	4:30	06.10.2022	18:39	0	0.288	OC & EF	Fault Value=IA=42.68, IB=1.114KV, IC=324A,IN=807.4 Test charge value=IA=146.9A, IB=1.313KA, IC=132.7A, IN=1.035.	Unknown	NA	Test charge was done as per the instruction of BPSO and found normal
4	Deothang-Motanga Line	132kV	Tripped	06.10.2022	10:31	06.10.2022	10:35	0	43.85	OC	Fault Value=IA=151.8A, IB=1.323KA, IC=131.6A.	Unknown	NA	when Nangkor Deothang feeder was test charge feederr got tripped and test charge done withstand.
8	Nangkhor-Deothang line	132kV	Tripping	10.10.2022	0:05	10.10.2022	13:29	13	-48.384	OC & EF	IA=159.1A,IB=1.271kA,IC=241.4AIN=1.181kA Distance relay -34.72kM, Ia-157.3A,Ib-1.271kA, Ic-239.7A and zone 2 trip	Unknown	To open Jampering at ND 61	Test charge from Nangkor ss but line didn't stand.Test charge done with the closing code 1502 by Madam Kinley Wangmo(BPSO) after jumpering out from ND 61 at dead end and kept for IDLE charged found normal.
9	Deothang-Motanga Line	132kV	Tripping	10.10.2022	0:05	10.10.2022	1:13	1	47.196	OC & EF	IA=75.72A,IB=1.156kA,IC=343.6AIN=821.9A.	Unknown	NA	Supply back fed from Motanga ss as there was line fault between Nangkor to Deothang line
12	Nangkhor-Deothang line	132kV	Tripping	11.10.2022	2:56	11.10.2022	3:02	0	-46.116	O/C	IA=1.458kA,IB=1.492kA,IC=1.405kA(Distance relay)	Unknown	NA	After confirming from BPSO test charge done and found normal at 3:02hrs.
13	Nangkhor-Deothang line	132kV	Tripping	11.10.2022	4:41	12.10.2022	17:46	37	-46.08	E/F	IA=121.9A, IB=1.253KA, IC=219.1A,IN=1.173KA. Test charge value at 4:48hrs:IA=4.698A, IB=1.493KA, IC=5.520A, IN=1.497kA.	Unknown		Test charge from Nangkor ss but line didn't stand. Again test charged at 9:11from Deothang Ss Montonga fdr got trip from Montonga end and at our end breaker are in normal condition. Supply resumed from Montonga end after opening the nangkor Breaker with code 079 from BPSO(Madam Jangchub). Fdr charged after changing insulator in Y-phase from location 40 to 43 with the code 1516 from BPSO(Madam Kinley wangmo)
14	Deothang-Motanga Line	132kV	Tripping	11.10.2022	4:41	11.10.2022	5:06	0	44.892	E/F	IA=43.84A,IB=1.129A,IC=317A,IN=809.5A,Test charge value:IA=149.1A,IB=1.336kA,IC=138.6A,IN=1.049kA.	Unknown	NA	While doing test charge of Nangkhor-Deothang line, breaker got tripped at Motang end,Supply back fed from Motanga ss as there was line fault between Nangkor to Deothang line.

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Nganglam Substation
Month:	Octobet 2022

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Tripping)	Shutdown/Tripping Time		Normalization Time		Duration of Outages Hrs	MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks
				Date	Time	Date	Time			Protecton Relay Optd	Fault Details (As recorded by relay)			
132kV														
1	132kV Nganglam-Tintibi	132kV	Grid Fail	03-10-2022	06:25:00	03-10-2022	06:33:00	00:08:00	-15.16		Black out at Substation	Grid Fail		No CB is operated at our end
2	132kV Nganglam-Nangkhor	132kV	Grid Fail	03-10-2022	06:25:00	03-10-2022	06:29:00	00:04:00	-0.04		Black out at Substation	Grid Fail		No CB is operated at our end
3	132/33kV, 5MVA Transformer-1	132kV	Fault	08-10-2022	18:18:00	08-10-2022	18:19:00	00:01:00	0.82		Tripped LV side Only. Supply resteored from Transformer-II			
5	132/33kV, 5MVA Transformer-1	132kV	Fault	30-10-2022	13:09:00	30-10-2022	15:02:00	01:53:00	0.888		Dish Punctured at 33kV Man-Bus	Dish punctured		33kV Main Bus- Dish Insulator got punctured. All 33kV and 11kV customers are affected.

Division:	SMD-DEOTHANG
Substation:	132/33kV Motanga Substation
Month:	October 2022

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Tripping)	Shutdown/Tripping Time		Normalization Time		Duration of Outage (Hrs)	MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks
				Date	Time	Date	Time			Protecton Relay Optd	Fault Details (As recorded by relay)			
132kV Feeders and Transformer(HV)														
1	15MVA Transformer	132/33kV	Tripping	02-10-2022	07:47 hrs	02-10-2022	07:51 hrs	0	0.17	RET650, transformer differential relay	Tripping relay 86A & SEF operated, trip values not displayed by the relay.	Transient fault	-	BPSO Charging code: 1463.
2	15MVA Transformer	132/33kV	Tripping	02-10-2022	14:24 hrs	02-10-2022	14:27 hrs	0	0.23	DPHLPDOC1, REF615	Tripped on E/F & O/C : IL1= 0.91XIn, IL2= 0.454xIn, IL3= 0.46xIn, RET650 Relay Indication: Differential protection optd, R-phase trip, Y-phase trip, REC650 Indication: 86A operated.	Transient fault	-	Charged after receiving verbal instruction from BPSO.
3	Deothang Feeder	132kV	Tripping	03-10-2022	06:24 hrs	03-10-2022	06:29 hrs	0	-37.29	REL670, Distance Relay	***Directional -O/C & E/F Relay:*** Tripped on E/F & O/C : IL1= 179.98A, IL2= 98.16A, IL3= 945.39A, Frequency= 50.12Hz & tripping relay 86A, 86B operated.	Transient fault	-	BPSO Charging code: 1466.
4	15MVA Transformer	132/33kV	Tripping	05-10-2022	11:11 hrs	05-10-2022	11:13 hrs	0	0.17	RET650, transformer differential relay	Tripped on O/C and E/F. Trip values not displayed. Frequency= 50.10Hz & tripping relay REC670 Indication: 86A&B operated, R, Y & B trip.	Transient fault	-	BPSO Charging code: 1476.
5	15MVA Transformer	132/33kV	Tripping	05-10-2022	11:27 hrs	05-10-2022	11:30 hrs	0	0.17	DPHLPDOC1, REF615	***Directional -O/C & E/F Relay:*** Tripped on E/F & O/C : IL1= 0.250xIn, IL2= 0.175xIn, IL3= 0.123xIn, Frequency= 50.12Hz & tripping relay 86A operated at our end.	Tripped by transient fault.	-	BPSO Charging code: 1477.
6	15MVA Transformer	132/33kV	Tripping	05-10-2022	16:51 hrs	05-10-2022	16:53 hrs	0	0.17	RET650, transformer differential relay	Differential relay, RET650 Indication: IL1= 59.47A, IL2= 42.92A, IL3= 22.55A, Frequency= 50.10Hz & tripping relay 86A operated, R, Y & B trip at our end.	Transient fault	-	BPSO Charging code: 1478.
7	15MVA Transformer	132/33kV	Tripping	06-10-2022	14:22 hrs	06-10-2022	14:34 hrs	0	0.26		Fault values not recorded by the relay. Frequency= 50.10Hz & tripping relay 86A & SEF operated at our end.	-	-	Test charged at 14:26hrs but did not hold and tripped on same fault. At 14:34hrs charged with the instruction from BPSO, code: 1482
8	15MVA Transformer	132/33kV	Tripping	06-10-2022	14:39 hrs	06-10-2022	14:43 hrs	0	0.26	DPHLPDOC1, REF615	***Directional -O/C & E/F Relay:*** DPHLPDOC1, IL1= 0.242XIn, IL2= 0.154XIn, IL3= .130 XIn,Tripped on O/C , Frequency= 50.09Hz & tripping relay 86A operated at our end.	Transient fault	-	-
9	15MVA Transformer	132/33kV	Tripping	08-10-2022	10:42 hrs	08-10-2022	10:44 hrs	0	0.28	DPHLPDOC1, REF615	Fault values not recorded by the relay. Frequency= 50.08Hz & tripping relay 86A & SEF operated at our end.	Transient fault	-	-
10	Deothang Feeder	132kV	Tripping	11-10-2022	02:57 hrs	11-10-2022	03:04 hrs	0	-42.8	REL670, Distance Relay	***Directional -O/C & E/F Relay:*** Tripped on E/F & O/C : IL1= 1788.97A, IL2= 1922.53A, IL3= 1877.39A, Frequency= 50.11Hz & tripping relay 86A, 86B operated.	Transient fault	-	Charged with verbal instruction from BPSO.
11	Deothang Feeder	132kV	Tripping	11-10-2022	04:41 hrs	11-10-2022	04:48 hrs	0	-41.96	REL670, Distance Relay	***Directional -O/C & E/F Relay:*** Tripped on E/F & O/C : IL1= 41.41A, IL2= 1146.16A, IL3= 916.96A, Frequency= 50.11Hz & tripping relay 86A, 86B operated.	Transient fault	-	Charged with verbal instruction from BPSO.
12	Deothang Feeder	132kV	Tripping	11-10-2022	04:48 hrs	11-10-2022	05:07 hrs	0	-41.96	REL670, Distance Relay	***Directional -O/C & E/F Relay:*** Tripped on E/F & O/C and E/F : IL1= 150.33A, IL2= 1359.16A, IL3= 138.96A, Frequency= 50.11Hz & tripping relay 86A, 86B operated.	Transient fault	-	Charged with verbal instruction from BPSO.
13	15MVA Transformer	132/33kV	Tripping	11-10-2022	08:34 hrs	11-10-2022	08:56 hrs	0	0.32	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C & E/F : IL1= 1095.33A, IL2= 14.19A, IL3= 1108.27A, Frequency= 50.12Hz & tripping relay 86A, 86B operated.	-	-	At 8:36hrs charged transformer but didnot hold and tripped on same fault. Test charged again at 8:42hrs, HV side stood but tripped again while charging LV. At 8:52hrs Azista fdr handtripped. Charged X'mer at 8:56hrs with code, 1570. 33kV Azista kept under shutdown for line maintenance.
14	Deothang Feeder	132kV	Tripping	11-10-2022	09:11 hrs	11-10-2022	09:17 hrs	0	1.51	REL670, Distance Relay	RET650 Relay Indication: Tripped on O/C & E/F: IL1= 150.33A, IL2= 1359.66A, IL3= 138.62A, Frequency= 50.12Hz & tripping relay 86A, 86B operated.	Transient fault	-	BPSO Closing code: 1509
15	15MVA Transformer	132/33kV	Tripping	11-10-2022	09:15 hrs	11-10-2022	09:20 hrs	0	0.03	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C&E/F : IL1= 0.71.33A, IL2= 1.05A, IL3= 0.76A, Frequency= 50.05Hz & tripping relay 86A, 86B operated.	-	-	
16	15MVA Transformer	132/33kV	Tripping	12-10-2022	22:13 hrs	12-10-2022	22:16 hrs	0	0.15	RET650, transformer differential relay	Tripped on O/C & E/F. Trip values not displayed. Frequency= 50.03Hz & tripping relay REC670 Indication: 86A&B operated, R, Y & B trip.	-	-	
17	15MVA Transformer	132/33kV	Tripping	13-10-2022	10:48 hrs	13-10-2022	10:50 hrs	0	0.28	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C&E/F : IL1= 13.55A, IL2= 18.52A, IL3= 17.52A, Frequency= 50.05Hz & tripping relay 86A, 86B operated.	Transient fault	-	
18	15MVA Transformer	132/33kV	Tripping	14-10-2022	14:11 hrs	14-10-2022	14:13 hrs	0	0.35	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C?E/F : IL1= 33.97A, IL2= 23.70A, IL3= 49.58A, Frequency= 50.05Hz & tripping relay 86A, 86B operated.	Transient fault	-	Charging code: 1525
19	15MVA Transformer	132/33kV	Tripping	21-10-2022	15:46 hrs	21-10-2022	15:57 hrs	0	0.39	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C &E/F: IL1= 28.46A, IL2= 24.31A, IL3= 45.14A, Frequency= 50.05Hz & tripping relay 86A, 86B operated.	-	-	The X'mer was test charged at 15:49hrs but did not hold. It was charged at 15:57hrs with closing code: 1548.
20	15MVA Transformer	132/33kV	Tripping	22-10-2022	15:49 hrs	22-10-2022	15:52 hrs	0	0.03	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C&E/F : IL1= 18.99A, IL2= 25.60A, IL3= 42.65A, Frequency= 50.05Hz & tripping relay 86A, 86B operated.	Transient fault	-	Charged with verbal instruction from BPSO.
21	15MVA Transformer	132/33kV	Tripping	24-10-2022	12:19 hrs	24-10-2022	12:21 hrs	0	0.37	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C&E/F : IL1= 15.35A, IL2= 17.68A, IL3= 17.06A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	Charged with verbal instruction from BPSO.
22	15MVA Transformer	132/33kV	Tripping	24-10-2022	15:51 hrs	24-10-2022	15:53 hrs	0	0.36	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C &E/F: IL1= 14.75A, IL2= 17.11A, IL3= 19.38A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	Charged with verbal instruction from BPSO.
23	15MVA Transformer	132/33kV	Tripping	24-10-2022	16:00 hrs	24-10-2022	16:09 hrs	0	0	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C &E/F: IL1= 15.782A, IL2= 15.18A, IL3= 18.19A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	Test charged at 16:03hrs but did not hold and tripped on same fault. Charged at 16:09hrs with code, 1566.
24	15MVA Transformer	132/33kV	Tripping	24-10-2022	16:20 hrs	24-10-2022	16:28 hrs	0	0	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C &E/F: IL1= 15.41A, IL2= 16.14A, IL3= 18.59A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	BPSO Closing code: 1568
25	15MVA Transformer	132/33kV	Tripping	24-10-2022	16:37 hrs	24-10-2022	16:46 hrs	0	0	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C &E/F: IL1= 14.50A, IL2= 16.10A, IL3= 18.16A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	BPSO Closing code: 1569
26	15MVA Transformer	132/33kV	Tripping	24-10-2022	16:55 hrs	24-10-2022	17:04 hrs	0	0	RET650, transformer differential relay	RET650 Relay Indication: Tripped on O/C&E/F : IL1= 22.23A, IL2= 38.70A, IL3= 60.71A,Diff prof/n operated, R,Y &B trip and 86A, 86B operated.	-	-	Charged with verbal instruction from BPSO.

1. 400/220/132/33kV Jigmeling Substation

Sl. No.	Date of Tripping	Time of Outages/ Time of Tripping	Date of Normalization	Time of Fault was Cleared	Duration of Outages (Hrs)	MW before Outage (MW)	Name of feeder	Name of the Substation/lines Affected by the Fault	Reasons of Fault	Relay Operations	Fault Location(KM)	Type of outages	No. of Customers Affected	Remarks
i) 132kV Above														
1	09.10.2022	09:12 hrs	09.10.2022	09:12 hrs	0	196.91	400kV Alipurchar Line 1	Alipurchar SS	Fault loop:Yph-Ground	Main 1 and Main 2 optd: Fault loop:Yph- Ground trip. Zone 1 optd	Main 1 Fault current: IA = 2.27kA. Fault Distance 115.7km(21.1) and 114.7km(21.2)	Transient		
2	24.10.2022	22:55 hrs	24.10.2022	23:04 hrs	0	-145.44	400kV MHPA LINE 1	MHPA	Fault loop:Bph-Ground	Main 1 and Main 2. RYBph pickup, Zone 1 optd, Fault loop: Bph-Ground trip.	Main 1 Fault current: I3 = 5.64kA. Fault Distance 22.3km, Main 2 Fault current:I3=5.64kA and Fault Distance 22.2km			
3	20.10.2022	09:41 hrs	20.10.2022	09:47 hrs	0	10.330	220kV Tsirang	Dhajey SS	Relay General tripp	Main-2 Relay general tripp				**Line tripped while changing under voltage relay settings**
4	26.10.2022	10:08hrs	26.10.2022	10:15hrs	0	-15.06	80MVA ICT 2	Jigmeling ss	SEF(LV)	67/67N(LV)				
5	12.10.2022	01:40hrs	12.10.2022	1:45hrs	0	31.330	Gelephu Feeder	Gelephu substation	Phase Loop	main 1 - R,Y & B phase trip Z2 trip main 2 - R,Y & B phase trip Z2 trip	33.2km	transient		
2. 220/66/33kV Dhajay Substation														
i) 66kV and above														
1	26.10.2022	10:08hrs	26.10.2022	10:26hrs	0	67.99	220kv Dagachu feeder	Dhajay Subsation	over voltage	Distance relay main-2(21.2)- Ia=0.12A, Ib=0.03A, Ic=0.09A, In=0.02A, Va=124.53kV, Vb=145.93kV, Vc=105kV	Substation	Tripped		Feeder restored after got a confirmation from BPSO.
3. 132/66/33/11kV Gelephu Substation														
i) 66kV and above														
1	12.10.2022	01:40 hrs	12.10.2022	02:28 hrs		28.8	132 kV Salakati	132 kV Salakati	Line fault	Tripped on 3 phs ,zone 4, distance -2.671 km,fault current value: IA=1.811 ka,IB=2.035 ka,Ic=1.985 ka	Gelephu s/s	Teporary		Charging Code, NLDC BTN=1513, NLDC IND=1105 & NERLDC=8414. At the same time 132kv Gel-Jig line also tripped from Jigmeling end. (heavy lightning & rainfall)
4	19.10.2022	20:55hrs	19.10.2022	21:00hrs		-20	132kV Gel-Jel	132kV Gel-Jel	Line fault	shutdown	Jigmeling s/s			To change R-ph CT polarity at Jigmeling SS.
6	21.10.2022	17:38hrs	21.10.2022	17:47hrs		-16	132kV Gel-Jel	132kV Gel-Jel	Line fault	shutdown	Jigmeling s/s			Emmergency s/d taken by Jigmeling ss to check phase sequence.
4. 132/33kV Tintibi Substation														
i) 66kV & Above														
1	03.10.2022	06:25hrs	03.10.2022	06:33hrs	0	14.4	kV Tingtibi-nanglam	32kV Tingtibi-nanglam F	Tempoary Fault	Distance Relay:Start Phase:CN,Trip Phase:ABC,Fault zone-1 trip,Fault location:85.46 kM	85.46	Tempoary	Nil	
2	12.10.2022	01:39hrs	2.10.2022	02:00hrs	0	-10.44	kV Tingtibi-Jigmeling	2kV Tingtibi- JigmelingF	Tempoary Fault	Distance Relay:Start Phase:ABC,Trip Phase:ABC,Fault zone-1 trip,Fault location:52.57kM.	52.57	Tempoary	Nil	

MONTHLY OUTAGE REPORT FOR THE MONTH OF NOVEMBER, 2022 UNDER SMD DEOTHANG, TD, BPC.

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Nganglam Substation
Month:	Nov-22

SL.No	Substation Name (Select from list)	Feeder Name (Select from list)	Outage Reason (Select from list)	Fault Location (Select from list)	Tripping Date & Time (dd/mm/yyyy hh:mm:ss)	Normalization Date & Time (dd/mm/yyyy hh:mm:ss)	Customers affected (Yes/No)?	Remarks	Outage Duration(hh:mm:ss)	Outage in Minuts(ri)	No. of Customers Interrupted (Ni)		
132kV													
2	132/33kV, 5MVA Transformer-1	132kV	Fault	21-11-2022	11:34:00	21-11-2022	11:37:00	00:03:00	3	0.899	P442 Relay O/C & E/F relay	Tripped on Earth Fault	Fault

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Nganglam Substation
Month:	Nov-22

SL.No	Substation Name (Select from list)	Feeder Name (Select from list)	Outage Reason (Select from list)	Fault Location (Select from list)	Tripping Date & Time (dd/mm/yyyy hh:mm:ss)	Normalization Date & Time (dd/mm/yyyy hh:mm:ss)	Customers affected (Yes/No)?	Remarks	Outage Duration(hh:mm:ss)	Outage in Minuts(ri)	No. of Customers Interrupted (Ni)		Type/Cause of Fault	Reason for Shutdown	Remarks
132kV															
2	132/33kV, 5MVA Transformer-1	132kV	Fault	21-11-2022	11:34:00	21-11-2022	11:37:00	00:03:00	3	0.899	P442 Relay O/C & E/F relay	Tripped on Earth Fault	Fault		

Division:	SMD-DEOTHANG
Substation:	132/33kV Motanga Substation
Month:	Nov-22

03/BPC/SMD/MSS/2022/272

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Tripping)	Shutdown/Tripping Time		Normalization Time		Duration of Outage		MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks
				Date	Time	Date	Time	(Hrs)	(Min)		Protecton Relay Optd	Fault Details (As recorded by relay)			
132kV Feeders															
1	15MVA Transformer	132/33kV	Tripping	02-11-2022	19:33 hrs	02-11-2022	19:36 hrs	0	3	2.14	RET650, transformer differential relay	Tripping relay 86A & SEF operated. IL1= 0.04A/101.92deg, IL2= 0.02A/73.90deg, IL3= 0.01A/84.96deg, IN= 0.04A/94.00deg.	Transient fault	-	Charged feeder with the verbal instruction from BPSO.
2	15MVA Transformer	132/33kV	Tripping	06-11-2022	15:44 hrs	06-11-2022	15:47 hrs	0	3	2.08	-	Fault values not recorded by the relay.	-	-	Charged after receiving verbal instruction from BPSO.
3	15MVA Transformer	132/33kV	Tripping	12-11-2022	09:07 hrs	12-11-2022	09:13 hrs	0	6	0.23	-	Fault values not recorded by the relay.	-	-	BPSO Charging code: 1605.

1. 400/220/132/33kV Jigmeling Substation

Sl. No.	Date of Tripping	Time of Outages/ Time of Tripping	Date of Normalization	Time of Fault was Cleared	Duration of Outages (Hrs)	MW before Outage (MW)	Name of feeder	Name of the Substation/lines Affected by the Fault	Reasons of Fault	Relay Operations	Fault Location(KM)	Type of outages	Remarks
i) 132kV Above													
1	25.11.2022	1:38 hrs	25.11.2022	1:38 hrs	0	-130.9	400kV MHEP Line - 3	Jigmeling and Alipurduar		Main 1(21.1): Y & B pick up Main 2(21.2): Y and B phase pick up	Main 1: Fault current: 5.1kA, Fault distance 32.9km. Main 2: Fault current: 5.11kA, Fault distance: 25.2km		**Line auto reclosed**
2	29.11.2022	01:22 hrs	29.11.2022	20:06 hrs	18	0.070	132/33kV 15MVA Transformer 1	Jigmelingss	Tripped on 87T, differential relay	87T, differential relay, REF and SEF			
2. 220/66/33kV Dhajay Substation													
i) 66kV and above													
1	02.11.2022	4:04hrs	02.11.2022	4:53:27hrs	0	45.9	220kv Tsirang-Jigmeling	Dhajay Subsation	over voltage	Distance relay main-2(21.2)-Ia=0.09A, Ib=0.09A, Ic=0.06A, In=0.1A, Va=132.24kV, Vb=132.87kV, Vc=132.68kV	Substation	Tripped	Feeder restored after got a confirmation from BPSO.
2	10.11.2022	17:08hrs	10.11.2022	17:14hrs	0	4.24	220kv Tsirang-Jigmeling	Dhajay Subsation	over voltage	Distance relay main-2(21.2)-Ia=0.07A, Ib=0.09A, Ic=0.19A, In=0.17A, Va=141kV, Vb=145.93kV, Vc=132kV	Substation	Tripped	Feeder restored after got a confirmation from BPSO.

December 2022

MONTHLY OUTAGE REPORT FOR THE MONTH OF DECEMBER, 2022 UNDER SMD DEOTHANG, TD, BPC.

Division:	SMD-DEOTHANG
Substation:	132/33/11kV Nganglam Substation
Month:	#REF!

Sl. No.	Name of Feeder	Voltage Level	Type of Outage (Shutdown/Fault)	Shutdown/Tripping Tim		Normalization Time		Duration of Outage	MW before Outage (MW)	Tripping Details		Type/Cause of Fault	Reason for Shutdown	Remarks	
				Date	Time	Date	Time	(Hrs)		Protecton Relay Optd	Fault Details (As recorded by relay)				
132kV															Test charged was done and line stand.
1	132/33kV, 5MVA Transformer-1	132kV	Fault	########	09:34:00	########	09:39:00	00:05:00	0.516	O/C & E/F Relay	triped due to O/C 86 opt				Test charged was done and line stand.
4	132kV Nganglam-Tintibi	132kV	Fault	########	15:43:00	########	15:58:00	00:15:00	-19.33	O/C & E/F Relay	Triped due to earth fault ,IA66.02A,IB722.0A,IC:114.6A,IN:702.7A				Test charged was done and line stand.

1. 400/220/132/33kV Jigmeling Substation

Sl. No.	Date of Tripping	Time of Outages/ Time of Tripping	Date of Normalization	Time of Fault was Cleared	Duration of Outages (Hrs)	MW before Outage (MW)	Name of feeder	Name of the Substation/lines Affected by the Fault	Relay Operations	Fault Location(KM)	Type of outages	No. of Customers Affected	Customer * Hours Afftected	Remarks
i) 132kV Above														
1	17/12/2022	02:09 hrs	17/12/2022	02:16 hrs	0	75.86	400/220kV ICT	Jigmeling Substation	87T tripped				#REF!	

Annexure-VI

Western grid Outages
October 2022

Transmission System Performance Report Fourth Quarterly Report-2022

Sl No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affected by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages	Remarks
66kV & Above													
(A) 400/220/66/11 kV Malbase Substation													
1	07-10-2022	21:57	07-10-2022	22:53	0	9	220kV malbase-Samtse	Malbase Substation	Tripping	B/U Trip, 86optd			I1=3262A<294.5,I2=3150A<149.9,I3=90.7A<52.43,I4=1704A<223.1
2	08-10-2022	00:05	08-10-2022	01:32	1	6	220kV malbase-Samtse	Malbase Substation	Tripping	M1--trip,zone1 trip,86optd	L2-N, 27.3kM		I1=195A<347.1,I2=4273A<4273A<162.3,I3=159.3A<344.4,I4=3917A<162.1
(B)220/66/11 kV Singhigoan Substation													
1	7.10.22	22:26	8.10.22	00:18	1	6	220kVSinghgoen- Samtse	Singhigaon Ss	tripped	-	line		
2	9.10.22	19:37	9.10.22	21:21	1	3.49	220kVSinghgoen- Samtse	Singhigaon Ss	tripped	-	line		O/C,General trip,I1=2720A<284deg,I2=79.73A<101.7deg,I3=95.77A<114.7deg,I4=2543A<283.3deg.
3	11.10.22	23:04	11.10.22	23:09	0	0.56	220kVSinghgoen- Samtse	Singhigaon Ss	tripped	-	line		
(B)66/33/11 kV Phuntsholing Substation													
1	08.10.2022	00:20	08.10.2022	00:52	0	-3.51	66kV Chukha-Pling feeder	Black out at Pling ss			Tripped at chukha end		At 00:20hrs 66kV Chukha-Pling feeder got tripped from chukha end and 66kV Pling-Gomtu feeder got tripped at our end causing black out at Pling. At 00:52hrs normalised the 66kV Chukha-Pling from Chukha end. At 00:47hrs normlised the 66kV Gomtu feeder with charging code 1493 from BPSO.
2	08.10.2022	00:20	08.10.2022	00:47	0	0.20	66kV Pling-Gomtu fdr	Black out at Pling ss		DSTN OPTD, 186&86	Tripped at our end		
3			08.10.2022	00:30		idle	66kV Pling-Malbase fdr	66kV Pling-Malbase fdr					At 00:32hrs charged 66kV Pling-Malbase feeder which was under idle charge condition with closing code 1491 from BPSO. At 00:58hrs opened CB of above fdr with opening code 072 from BPSO and said feeder kept under idle charged conidition after nomalising 66kV Chukha and Gomtu feeder.
4	11.10.2022	00:50	11.10.2022	00:55	0	-5.86	66kV Chukha-Pling feeder	66kV Chukha-Pling feeder	Tripped at both end	186&86	Tripped at both end		The cause of tripping was due to transient fault. Test charged after getting clearance from BPSO with charging code 1506 and stood normal.
5	23.10.2022	05:36	23.10.2022	05:46	0	-0.81	66kV Pling-Gomtu fdr	Black out at Pling ss		DSTN OPTD, 186&86	Tripped at our end		At 05:36hrs charged 66kV Pling-Gomtu feeder got tripped at our end. At 05:46hrs normalised the feeder after getting clearance from BPSO.
6			26.10.2022			idle	66kV Pling-Malbase fdr	66kV Pling-Malbase fdr					At 14:25hrs as per instruction from BPSO charged 66kV Pling-Malbase feeder which was under idle charged condition with charging code 1585. Opened CB of 66kV Pling-Malbase feeder at 14:30hrs with opening code 0136 as per instruction from BPSO and feeder was put back to idle charged condition.
(D) 66/33/11 kV Gedu Substation													
1	08.10.2022	0:21	08.10.2022	0:30	0	1.03	66kv chukha-pling fdr	Gedu Black Out					Due to lightning & thunderig tripped both source
2	11.10.2022	0:51	11.10.2022	0:56	0	1.26	66kv chukha-pling fdr	Gedu Black Out					Due to lightning & thunderig tripped both source
(E) 66/33/11 kV Gomtu Substation													
1	02.10.2022	23:23	07.10.2022	14:06	110	0.01	66/33 kV 5 MVA Transformer	Nil	Punctured 33kV Bus PT	Nil	Gomtu SS	Hand Tripped	66/33kV 5 MVA Transformer manually hand trip due to 33 kV Y Phase Bus PT was punctured.Charged the transformer after changing the 33kV bus PT.
2	8.10.2022	0:20	8.10.2022	0:22	0	-3.354	66kV Dhamdhum feeder	Gomtu ss	Tripped	General tripped	Line segment	Transient Fault	General Tripped. Charged as per BPSO Instruction.
3	8.10.2022	0:29	8.10.2022	0:38	0	-3.354	66kV Dhamdhum feeder	Gomtu ss	Tripped	General tripped	Line segment	Transient Fault	General Tripped. Charged as per BPSO Instruction.
4	12.10.2022	11:05	12.10.2022	14:12	3	0	66/33kV 5MVA Transformer	33kv Samtse line	Shutdown	Nil	Gomtu SS	Shutdown	Availed shutdown against work permit No. 128 by maintenance team for inspection 33kV Samtse feeder breaker and trasnformer testing as Transformer is producing abnormalsound
5	23.10.2022	5:38	23.10.2022	5:55	0	-5.986	66kV Dhamdhum feeder	Gomtu ss	Grid failed	Nill	Line segment	Transient Fault	Grid failed from both the source
(F) 220/66/33 kV Dhamdum Substation													
1	07.10.2022	22:26	08.10.22	00:18	1	-6.01	220KV Sinngeygang Fdr.	-	Heavy rainfall, lightning & thunder	REL670	-	Trainsent fault	Tripped feeder due to Over current on YØ, Zone - I
2	08.10.2022	00:06	08.10.2022	01:32	1	-5.41	220KV Malabase Fdr.	Samtse Dzongkhang	Heavy rainfall, lightning & thunder	REL670	-	Trainsent fault	Supply tripped from Malabase end
3	09.10.2022	19:36	09.10.2022	20:00	0	-3.26	220KV Sinngeygang Fdr.	-	Heavy Raining	REL670	-	Trainsent fault	Feeder tripped due to Over Current on RØ (Zone I) 1) Fault Abs Dist. 6.95% 2) Fault Rel Dist. 17.37%
4	11.10.2022	22:04	11.10.2022	22:09	0	0.55	220KV Sinngeygang Fdr.	-	Heavy Raining	REL670	-	Trainsent fault	Feeder tripped due to Over Current on RØ (Zone I) General trip. value il1=FA 2189.52a,FM=76.69deg, IL2=FA 87.44A,FM=-71.46deg, IL3=FA96.28A,FM=75.89deg.
5	14.10.2022	11:08	14.10.2022	13:30	2	0.44	220KV Sinngeygang Fdr.	-	Shutdown	-	-	Shutdown	Shut down taken by Maintenance team Head (TMD) P/ling, Singyegoan. BPSO T/phu opening code word issued.090. Closing code No.1522

Sl. No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affacted by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages
	(A) 66kV Chumdu switching station											
2	19.10.2022	1817hrs	19.10.2022	1823hrs		4.99MW	66kV O/G Pangbasa Feeder	Pangbasa Subsattion	Tripped	O/C	Chumdo	Tripped
3		1830hrs		1839hrs								
	(B) 66/33kV Watsa Substation											
	(C) 66/33kV Olakha Substation											
1	07-10-2022	2:04	07-10-2022	2:25	0	3.11	66/33kV 20MVA, Transformer I	All the 33kV was effected as the 33kV Incomer I & II was tripped	Over current and earth fault	Earth Fault Over Current Operated	Distribution line	Transient fault
2	07-10-2022	2:04	07-10-2022	2:25	0	3.1	66/33kV 20MVA, Transformer II	All the 33kV was effected as the 33kV Incomer I & II was tripped	Over current and earth fault	Earth Fault Over Current Operated	Distribution line	Transient fault
	(F) 66/33/11kV Jemina Substation											
1	21.10.2022	18:41	21.10.2022	18:48	0	26.07 (Imp) Changedaphu & 22.53 (Exp) Chumdo	66 kV Line Changedaphu & Chumdo	Black out	Supply failed from Semtokha end due to failure of the Bus coupler on OC.	Nil	Semtokha Substation	_
2	24.10.2022	18:22	24.10.2022	18:25	0	27.45 (Imp) Changedaphu & 24.063 (Exp) Chumdo	66 kV Line Changedaphu & Chumdo	Black out	Supply failed from Semtokha end due to failure of the Bus coupler on OC.	Nil	Semtokha Substation	_
3	24.10.2022	18:46	24.10.2022	18:50	0	27.45 (Imp) Changedaphu & 24.063 (Exp) Chumdo	66 kV Line Changedaphu & Chumdo	Black out	Supply failed from Semtokha end due to failure of the Bus coupler on OC.	Nil	Semtokha Substation	_
4	26.10.2022	15:59	26.10.2022	16:20	0	-17.86	66 kV Line Changedaphu	Black out	Supply failed from Changedaphu end to upgrate the CTR of the line.	Nil	Changedaphu	_
5	26.10.2022	16:20	26.10.2022	16:34	0	-17.86	66 kV Line Changedaphu	Black out	SOTF operated	Nil	Changedaphu	
6	26.10.2022	16:20	26.10.2022	16:37	0	15.48	66 kV Line Chumdo	Black out	SOTF operated	Nil	Changedaphu	
	(H) 66/11kV Haa Substation											
1	18.10.2022	18:12	18.10.2022	18:20	0	-2.81	66kV incomer	All	grid fail	O/C	Chumdo switching station	
2	18.10.2022	18:29	18.10.2022	18:57	0	-2.81	66kV incomer	All	grid fail	O/C	Chumdo switching station	
3	21.10.2022	18:41	21.10.2022	18:48	0	-3.04	66kV incomer	All	grid fail	O/C	Chumdo switching station	
4	22.10.2022	14:35	22.10.2022	14:40	0	-1.83	66kV incomer	All	Emergency shutdown	Nil	Chumdo switching station	
5	24.10.2022	18:22	24.10.2022	18:25	0	-2.83	66kV incomer	All	Buscoupler tripped	O/C	Changedaphu ss	
6	24.10.2022	18:45	24.10.2022	18:48	0	-2.83	66kV incomer	All	Buscoupler tripped	O/C	Chukha power house	
7	26.10.2022	15:58	26.10.2022	16:36	0	-1.7	66kV incomer	All	To upgrade CT ratio	Nil	Changedaphu ss	
8	28.10.2022	13:09	28.10.2022	14:33	1	-1.94	66kV incomer	All	To upgrade CT ratio	Nil	Pangbesa	

	(I) 220kV Substation Semtokha												
1	07.10.2022	02:05hrs	07.10.2022	02:10hrs			66kv Semtokha-Dochula Line	Dochula s/s	Directional EF trip	Backup OC/EF relay optd., Y&Bph I> Trip..IA=615.8A,IB=520.1A,IC=297.2A		Trasient	
2	01-10-2022	13:23 hrs	01-10-2022	14:01 hrs	0 hrs	4.42	66/11kV 20MVA-1 Transformer	Semtokha s/s	Grid Failed	Chukha black-out R-PH A-288.6A.Y-PHA-70.39A.B-PH-676.7A.		Trasient	
	66/33/11kV Pangbesa substation												
1	tripping data in the google sheet												
	66/33kV Changedaphu Substation												
	18:22 hrs	#######	18:26 hrs	0 hrs	4 mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:46 hrs	#######	18:50 hrs	0 hrs	4 mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:14 hrs	#######	18:15 hrs	0 hrs	1mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:38hrs	#######	18:39 hrs	0 hrs	1 mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18.45hrs	#######	18:48hrs	0	3mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:22 hrs	#######	18:26	0 hrs	4 mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:46 hrs	#######	18:51 hrs	0 hrs	5 mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:14 hrs	#######	18:16hrs	0hrs	2mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	18:38hrs	#######	18:40hrs	0hrs	2mins		66kV Cangidaphu substation	Over Current	OC/EF Relay optd., Over current trip		Trasient		
	02:05 hrs	#######	02:25hrs	0	15mins		66kV Cangidaphu substation		Distance relay optd., Y&Bph Zone 2 trip		Trasient		

November 2022

Sl No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affected by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages	Remarks
(F) 220/66/33 kV Dhamdum Substation													
1	19.11.2022	15:13	19.11.2022	15:17	0	1.46	5MVA TRF. I	Damdum	O/C	REF615 67TRIP		Trainsent fault	Trip along with Dorokha feeder.

Tripping Report for the month of NOVEMBER 2022

Sl. No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affacted by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages	Remarks
	(A) 66kV Chumdu switching station												
	(B) 66/33kV Watsa Substation												
	(C) 66/33kV Olakha Substation												
1	25-11-2022	10:02	25-11-2022	10:08	0	11.45	66kV Olakha-Changidaphu	Only 66kV Olakha-Changidaphu was effected	Under Voltage	Distance protection operated	Transmission line	Transient fault	Tripped due to distance portn, under voltage and trip relay 86 indicated.
	(H) 66/11kV Haa Substation												
1	29.11.2022	11:53	29.11.2022	13:55	2	1.18	5MVA Transformer - I	5MVA Transformer - I	Tan Delta testing	Nil	Haa substation	Shutdown availed by Mr. Ugyen Phuntsho, SMD, Semtokha to carryout Tan Delta testion of 5mva transformer - I vide work permit no. 2282, dated 29.11.2022. The same was normalised after completing the work.	Supply tripped from the source
2	29.11.2022	14:01	29.11.2022	15:50	1	2.23	5MVA Transformer - II	5MVA Transformer -II	Tan Delta testing	Nil	Haa substation	Shutdown availed by Mr. Ugyen Phuntsho, SMD, Semtokha to carryout Tan Delta testion of 5mva transformer - II vide work permit no. 2283, dated 29.11.2022. The same was normalised after completing the work.	Supply tripped from the source
3	29.11.2022	15:52	29.11.2022	16:47	0	2.44	5MVA Transformer - I	5MVA Transformer - I	Tan Delta testing	Nil	Haa substation	Shutdown availed by Mr. Ugyen Phuntsho, SMD, Semtokha to carryout Tan Delta testion of 5mva transformer - I vide work permit no. 2284, dated 29.11.2022. The same was normalised after completing the work.	Supply tripped from the source
	(I) 220kV Substation Semtokha												
1	24-11-2022	10:02hrs	24-11-2022	10:07hrs	0	50.54mw	66kv Semtokha-Dochula Line	Dochula s/s	Over Current	Backup OC/EF relay optd., Y&Bph I> Trip.A=295.8A IB=5.728kA IC=5.522kA IN=17.78A		Trasient	
2	24-11-2022	10.02hrs	24-11-2022	10:26hrs	0	-57.01	220kV Semtokha-BHP Line	220kV Semtokha-BHP Line		Distance relay Main-2 Optd, RYBph trip			
3	30-11-2022	10:36hrs	30-11-2022	11:31hrs	0 hrs	-75.04	220kV Semtokha-CHP Line	Shutdown avialed by CHP, DGPC, to attend spark on Bph CT at CHP end.		Backup OC/EF relay optd., Y&Bph I> Trip,IA=263.24,IB=5.799KA,IC=5.605KA,IN=17.26A		Trasient	
(J)66/33/11kV Pangbesa substation													
	Updated in the google sheet												
	(M) 66/11kV Dochula Substation												
1	25-11-2022	10:02	25-11-2022	10:19		-32.22	66kV Semtokha	Semtokha - Dochula	Transit fault	Under voltage and 86 relay	Semtokha	Temporary	DHI
2	25-11-2022	10:02	25-11-2022	10:21		-30.25	66kV Lobeysa	Lobeysa - Dochula	Transit fault	Under voltage and 86 relay	Lobeysa	Temporary	DHI

December 2022

Sl No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affected by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages	Remarks
66kV & Above													
(A) 400/220/66/11 kV Malbase Substation													
##	03-12-2022	10:14	03-12-2022	13:12	2	0.08	10MVA Transformer I	Malbase Ss	Tripped		substation		Transfromer was kept under triped condition since it indicattes Drefferent triped and inspection was carried out physicaly and rellay setting checked & found normal
(B)220/66/11 kV Singhigoan Substation													
1													
2													
(B)66/33/11 kV Phuntsholing Substation													
1	06.12.2022	12:08				-12.54	66kV Pling-Malbase fdr	66kV Pling-Malbase fdr					At 12:08hrs Opened CB of 66kV Pling-Malbase feeder with opening code 0264 from BPSO and said feeder was kept under idle charged conidition.
2			06.12.2022	17:12		idle	66kV Pling-Malbase fdr	66kV Pling-Malbase fdr					At 17:12hrs charged 66kV pling-Malbase feeder with closing code 1694 which was under idle charged, since at 17:17hrs CB of 66kV Chukha-Pling fdr was kept opened at chukha end inorder to avoid overloading at Chukha end. (i.e because of increased DHI load at Gedu end)
##	26.12.2022	23:18	26.12.2022	23:34	0	-8.64	66kV Pling-Gomtu fdr	66kV Pling-Gomtu fdr	Tripped	Dist Prot optd, 186 & 86	Line	Tripped on fault	At 23:25hrs test charged after getting clearance from BPSO but got tripped on same fault. Normalised the feeder after opening CB from Gomtu end.
(D) 66/33/11 kV Gedu Substation													
1	07.12.2022	8:55	07.12.2022	9:37	0	16	8MVA 66/33kV TR-II	33kV DHI feeder-III	OTI trip	OTI trip	Substation		Transformer tripped on OTI, charged after checking the OTI and WTI setting for transformer.
2	09.12.2022	11:00	09.12.2022	17:41	6	15.1	8MVA 66/33kV TR-II	33kV DHI feeder-III	OTI trip	OTI trip	Substation		Work permit no. 42 issued to Mr. Parsu Ram JE, maintenance team for installation of radiator cooling fan.
3	10.12.2022	12:05	10.12.2022	14:19	2	6.58	8MVA 66/33kV TR-I	33kV DHI feeder-III	OTI trip	OTI trip	Substation		Work permit no. 44 issued to Mr. Parsu Ram JE, maintenance team for installation of radiator cooling fan.
4													
(E) 66/33/11 kV Gomtu Substation													
1	15.12.2022	13:03	15.12.2022	18:20	5	2.76	66/11kV 10MVA transformer	Gomtu ss	OLTC problem	Nil			Maintenance of OLTC
2	26.12.2022	23:19	26.12.2022	23:30	0	-15.201	66kV Damdum feeder	Gomtu ss	Y Phase & B phase fault	General Tripped. Zone-4 Trip,Rph Trip, Yph Trip, Bph Trip	Gomtu SS	Transient fault	66 KV Damdum Tripped on distance Protn. Zone-4 Rph Fault Yph Fault Bph Fault
3	26.12.2022	23:33	26.12.2022	23:36	0	10.69	66kV Phuentsholing feeder	Nil	Hand tripped	Nil	Gomtu SS		Breaker opened as per BPSO instruction , as P/Ling SS could not charge Line.
(F) 220/66/33 kV Dhamdum Substation													
1	26.12.2022	23:24	26.12.2022	23:28	0	15.16	66Kv Gomtu Feeder	Gomtu s/s	O/C	General tripZone 3 trip RYB faulty		O/C	Tripped on O/C, General trip, Zone 3 trip, RY&B phase fault.IL1: Fault mag. 0.18A,Fault Ang. -141.99 IL2: Fault mag. 0.35A, Fault Ang. -77.27 IL3: Fault mag. 0.11A, Fault Ang. -21.50A

Tripping Report for the month of DECEMBER 2022

Sl. No.	Date of Tripping	Time of outages	Date of Normalization	Time of fault was cleared	Duration of Outages (Hrs)	Duration of Outages (Min)	MW before outage (MW)	Feeder Name	Name of the Substation/lines affacted by the fault	Reasons of fault	Relay operations	Exact location of fault [Line segment/ Substation]	Type of outages	Remarks	
	(D) 66/33/11kV Lobeysa Substation														
	Updated in the google sheet														
	(E) 66/33/11 kV Paro Substation														
	Updated in the google sheet														
	(I) 220kV Substation Semtokha														
2	23.12.2022	09:55hrs	23.12.2022	10:12hrs	0	17		220kV Semtokha-BHP Line	220kV Semtokha-BHP Line	Direct Trip Received	No relay operation		Trasient		
I)66/33/11kV Pangbesa substation															
	Updated in the google sheet														