भारत सरकार Government of India
विद्युत मंत्रालय Ministry of Power
उत्तर पूर्वी क्षेत्रीय विद्युत समिति
North Eastern Regional Power Committee
एन ई आर पी सी कॉम्प्लेक्स, डोंग पारमाओ, लापालाङ, शिल्लोंग-७९३००६, मेघालय
NERPC Complex, Dong Parmaw, Lapalang, Shillong - 793006, Meghalaya

Ph. No: 0364 - 2534039
Fax No: 0364 - 2534040
Website: www.nerpc.nic.in

No. NERPC/SE (O)/OCC/2020/***232-269*** Dated: 04th August, 2020

To,

1. Managing Director, AEGCL, Bijuli Bhawan, Guwahati – 781 001
2. Managing Director, APDCL, Bijuli Bhawan, Guwahati – 781 001
3. Managing Director, APGCL, Bijuli Bhawan, Guwahati – 781 001
4. Director (Generation), Me. PGCL, Lumjingshai, Short Round Road, Shillong – 793 001
5. Director (Distribution), Me. ECL, Lumjingshai, Short Round Road, Shillong – 793 001
6. Director(Transmission), Me. PTCL, Lumjingshai, Short Round Road, Shillong – 793 001
7. Managing Director, MSPDCL, Secure Office Bldg. Complex, South Block, Imphal – 795 001
8. Managing Director, MSPCL, Electricity Complex, Keishampat, Imphal – 795 001
9. Director (Tech.), TSECL, Banamalipur, Agartala -799 001.
10. Director (Generation), TPGCL, Banamalipur, Agartala -799 001.
11. Chief Engineer (WE Zone),Department of Power ,Govt. of Arunachal Pradesh, Itanagar- 791111
12. Chief Engineer (EE Zone),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
13. Chief Engineer (TP&MZ),Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791111
14. Engineer-in-Chief (P&E), Department of Power, Govt. of Mizoram, Aizawl – 796 001
15. Chief Engineer (P), Department of Power, Govt. of Nagaland, Kohima – 797 001
16. CGM, (LDC), SLDC Complex, AEGCL, Kahilipara, Guwahati-781 019
17. Group General Manager, NTPC, Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
18. ED, NERTS, PGCIL, Dongtieh-Lower Nongrah, Lapalang, Shillong -793 006
19. ED (O&M), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
20. ED (Commercial), NEEPCO Ltd., Brookland Compound, Lower New Colony, Shillong-793003
21. ED (O&M), NHPC, NHPC Office Complex, Sector-33, Faridabad,Haryana-121003
22. Vice President (Plant), OTPC, Badarghat Complex, Agartala, Tripura - 799014
23. GM, NERLDC, Dongtieh, Lower Nongrah, Lapalang, Shillong -793 006
24. Member Secretary, ERPC, 14 Golf Club Road, Tollygunge, Kolkata-700033
25. Chief Engineer, GM Division, Central Electricity Authority, New Delhi – 110066
26. Chief Engineer (NPC), NRPC Complex, Katwaria Sarai, SJSS Marg., New Delhi - 110016

Sub: Minutes of 168th OCC Meeting.

Sir/Madam,

Please find enclosed herewith the minutes of 168th OCC Meeting held at "NERPC Conference Hall", Shillong on the **20th July, 2020** for your kind information and necessary action. The minute is also available on the website of NERPC, **www.nerpc.nic.in**.

Any comments/observations may kindly be communicated to NERPC Secretariat at the earliest.

Encl: As above

भवदीय / Yours faithfully,

B. Lyngkhoi
Director/ SE

Copy to:

1. CGM, AEGCL, Bijuli Bhavan, Guwahati - 781001
2. CGM, APGCL, Bijuli Bhavan, Guwahati - 781001
3. CGM, DISCOM, Bijuli Bhavan, Guwahati - 781001
4. Head of SLDC, Me.ECL, Lumjingshai, Short Round Road, Umjarain, Shillong – 793 022
5. Head of SLDC, Department of Power, Govt. of Arunachal Pradesh, Itanagar- 791 111
6. Head of SLDC, Department of Power, Dimapur, Nagaland
7. Head of SLDC, Electricity Department, Govt. of Manipur, Keishampat, Imphal – 795 001
8. Head of SLDC, Department of Power, Govt. of Mizoram, Aizawl – 796 001
9. Head of SLDC, TSECL, Agartala – 799 001
10. Chief Engineer(Elect), Loktak HEP,Vidyut Vihar, Kom Keirap, Manipur- 795124
11. Addl. GM (EED), NTPC Ltd., Bongaigoan Thermal Power Project, P.O. Salakati, Kokrajhar- 783369
12. DGM (C&M), OTPC, 6th Floor, A-Wing, IFCI Tower -61, Nehru Place, New Delhi – 110019.

Director/ SE

North Eastern Regional Power Committee

MINUTES OF THE 168th OPERATION COORDINATION SUB-COMMITTEE MEETING OF NERPC

Date : 20/07/2020 (Monday)

Time : 10:30 hrs

Venue : "NERPC Conference Hall", Shillong.

The List of Participants in the 168th OCC Meeting is attached at **Annexure – I**

Shri A.K. Thakur, Member Secretary, NERPC welcomed the participants to the 168th OCC meeting. In view of the pandemic situation, he requested the participants from all utilities to attend over Video-Conferencing/Microsoft Teams regularly to resolve important issues pertaining to the region. He then requested Shri B. Lyngkhoi, Director(O&P), NERPC to take up the agenda items for discussion.

A. CONFIRMATION OF MINUTES

CONFIRMATION OF MINUTES OF 167th MEETING OF OPERATION COORDINATION SUB-COMMITTEE OF NERPC.

The minutes of 167th meeting of Operation Sub-committee held on 19th June, 2020 at Shillong were circulated vide letter No. NERPC/SE (O)/OCC/2019/2674-2711 dated 03rd July, 2020.

The Sub-committee confirmed the minutes of 167th OCCM of NERPC with amendments to NERLDC's letter no.: उपूक्षेभाप्रेके/एस.ओ-I/208 dated 17th July, 2020.

ITEMS FOR DISCUSSION

B.1. ACTION TAKEN:

1. IMPLEMENTATION OF PROJECTS FUNDED FROM PSDF:

The status as informed in 168th OCC:

State	R&U scheme	ADMS	Capacitor Installation	SAMAST**	Line Differential Protection
Ar. Pradesh	Package-I (Diagnostic tools) Materials supplied.	Requisition for second tranche of 60%	-	TESG approval awaited	-

	P-II (for PLCC & communication) LOA issued. P-III (Substation equipment) Under tendering stage Work delayed due to COVID situation. Station-wise status to be updated	submitted in June'20.			
Nagaland	All completed except for PLCC package. Delayed due to COVID situation Station-wise status to be updated.	Requisition for second tranche of 60% submitted. Associated documents like CA certificate to be sent.	-	Reply against TESG queries sent except BoD approval.	Lines identified. Under DPR preparation stage.
Mizoram	Completed. 10% remaining claim to be submitted ASAP.	Requisition for second tranche of 60% submitted alongwith CA certificate on 07th July,2020.	To reply to TESG queries.	TESG approval awaited.	Lines identified for installation of DPR viz. 132kV Aizawl - Luangmual and 132kV Kawmzawl - Khawiva.
Manipur	Package-II: completed Package-I: WIP Delayed due to COVID situation Station-wise status to be updated.	Amount corresponding second tranche of 60% received. To be disbursed.	PSDF approved. NIT to be floated.	TESG approval awaited.	Lines identified. LDP for 132kV Imphal-Imphal and 132kV Jiribm-Jiribam proposed. Under DPR preparation stage.
	33kV System Integration with SLDC	In tendering stage			
	Reliable Communications for grid connectivity	In tendering stage			

Tripura	Work completed. 10% remaining claim to be sent ASAP. Station wise status to be updated.	New a/c to be opened by 18th July,2020. Requisition for first tranche of funds to be sent immediately.	Study results to be submitted alongwith DPR	TESG approval awaited.	Only single line 132kV 79Tilla to Budhjangn agar. DPR to be prepared.
Assam	LOA issued. WIP, delayed due to COVID situation Station-wise status to be submitted.	Bank a/c to be opened. Requisition for 30% to be submitted ASAP.	-	Under finalization stage for LOA.	Lines identified. Under DPR preparation stage.
Meghalaya	MePTCL Completed in all respects** MePGCL – 10% claim to be submitted ASAP. Station-wise status to be updated.	Final tranche of 10% received.	-	Under finalization stage for LOA.	WIP. Delayed due to COVID situation

Deliberation of the sub-Committee:

ED, NERLDC informed the forum that DoP Ar. Pradesh has been extremely lax in PSDF funded works particularly i.r.o. R&U works. For e.g. It took 3 years to sign TPA, then only 17% funds were availed since 2017. After detailed deliberation it was decided that NERPC would write to Govt. of Arunachal Pradesh requesting to submit detailed timeline i.r.o. R&U works in the state.

Forum requested all constituents to submit substation wise status update report prior to all forthcoming OCC meetings.

The Sub-Committee noted as above.
Action: All state utilities/NERPC.

B.2. OPERATIONAL PERFORMANCE AND GRID DISCIPLINE DURING JUNE, 2020

As per the data made available by NERLDC, the grid performance parameters for June, 2020 are given below:

NER PERFORMANCE DURING JUNE, 2020

States	Energy Met (MU)		w.r.t. May,20 % inc (+) /dec (-)	Energy Reqr. (MU)		w.r.t. May,20 % inc (+) /dec (-)	% surplus (+) /shortfall (-) of energy In Jun,20
	Jun-20	May-20		Jun-20	May-20		
Ar. Pradesh	59.77	53.95	10.79	60.03	54.16	10.84	-0.43
Assam	873.48	682.32	28.02	896.04	732.58	22.31	-2.52
Manipur	77.27	70	10.39	77.67	70.27	10.53	-0.51
Meghalaya	176.46	143.93	22.60	176.46	147.14	19.93	0.00
Mizoram	54.58	50.73	7.59	54.97	50.97	7.85	-0.71
Nagaland	67.76	63.22	7.18	68.13	63.45	7.38	-0.54
Tripura	226.5	210.03	7.84	226.56	210.72	7.52	-0.03
Region	**1535.82**	**1274.18**	**20.53**	**1559.86**	**1329.29**	**17.35**	**-1.54**

States	Demand Met (MW)		w.r.t. May,20 % inc (+) /dec (-)	Demand in (MW)		w.r.t. May'20 % inc (+) /dec (-)	% surplus (+) /shortfall (-) of demand In Jun,20
	Jun-20	May-20		Jun-20	May-20		
Ar. Pradesh	119	108	10.19	145	108	34.26	-17.93
Assam	1798	1663	8.12	1798	1720	4.53	0.00
Manipur	201	189	6.35	220	208	5.77	-8.64
Meghalaya	335	322	4.04	335	322	4.04	0.00
Mizoram	101	106	-4.72	101	106	-4.72	0.00
Nagaland	143	133	7.52	151	136	11.03	-5.30
Tripura	287	284	1.06	287	284	1.06	0.00
Region	**2884**	**2676**	**7.77**	**2937**	**2755**	**6.61**	**-1.80**

REGIONAL GENERATION & INTER-REGIONAL EXCHANGE IN MU

Month---->	Jun-20	May-20
Total Generation in NER (Gross)	1739.31	1378.30
Total Central Sector Generation (Gross)	1387.42	1086.79
Total State Sector Generation (Gross)	351.894	232.562
Inter-Regional Energy Exchange		
(a) NER-ER	0.00	117.27
(b) ER-NER	311.06	125.05
(c)NER-NR	470.80	204.02
(d)NR-NER	0.00	131.13
© Net Import	-159.74	-65.11

AVERAGE FREQUENCY (Hz)

Month---->	Jun-20	May-20
	% of Time	% of Time
Below 49.9 Hz	3.50	4.23
Between 49.9 to 50.05 Hz	75.40	76.68
Above 50.05 Hz	21.10	19.10
Average	50.01	50.01
Maximum	50.20	50.30
Minimum	49.72	49.61

Deliberation of the sub-Committee:

NER grid performance for the month of June'20 was presented by NERLDC. (Attached at **Annexure-B.2**)

NERLDC informed the forum that Reactive power capability testing at Loktak completed on 17th July, 2020 remotely from NERLDC control room in close

coordination with Loktak, NHPC. Recommendations recorded in the minutes should be completed by NHPC at the earliest.

The Sub-Committee noted as above.

C. ITEMS- STATUS REVIEW

C.1 Auto-reclosure issues at Azara:

In 167th OCCM, it was decided that signal mismatch between Silchar & Azara would be resolved in June'20 by availing shutdown.

Deliberation of the sub-Committee:

AEGCL informed that the communication channel mismatch issues still persist. It was decided that shutdown would be availed by AEGCL & NERTS in July'20.

The Sub-Committee noted as above.

Action: AEGCL, NERTS

C.2 Implementation of SPS-2&4 related to Bangladesh

It was agreed during the special meeting held on 20.02.20 that for SPS 2 and SPS 4 related to Bangladesh, the tripping can be done at Indian side. The issue was also discussed during the outage coordination meeting held on 22.05.20 via VC.

It was expected that these two schemes out of the four schemes can be implemented on immediate basis. This would also facilitate in availing the shutdowns of 400 kV Silchar – Palatana I or II without reduction in generation of Palatana by keeping SPS-2 (India) in operation.

In 167th OCCM, Sr.DGM(AM), NERTS informed that cabling for SPS-2 & 4 has been completed at Surjamaninagar and Palatana. The final connection and testing shall be done during Shutdown proposed by Bangladesh on 22.06.2020/23.06.2020.

Deliberation of the sub-Committee:

Sr.DGM(AM), NERTS informed that testing personnel were deputed from Kumarghat to Agartala but testing could not be done as scheduled on 22.06.20 / 23.06.20 due to some labour strike at Palatana. Testing engineer shall again be deputed on 20.07.20.

The Sub-Committee noted as above.

Action: NERTS.

D. I T E M S FOR DISCUSSION

D.1 Generation Planning (ongoing and planned outages)

a. Present per day MU and projected number of days of operation.

Plants	Reservoirs level in meter	MU content	Present DC (in MU)	No of days as per current generation
Khandong + Kopili stg II	720.85	27.61	**0**	-
Kopili			**0**	Will be "0" until further intimation.
Doyang	314.80	11.8	**1.14**	10
Loktak	767.34	93	**1.80**	52

The outage of other generating stations may be approved considering the present water levels in reservoirs.

Deliberation of the sub-Committee:

NERLDC highlighted that due to unavailability of Kopili HEP and Khandong HEP, constituents should plan for procurement of power for proper portfolio management.

NERLDC also highlighted that proper planning of Hydro Generation needs to be done as water available for generation is only for upcoming 2 months.

The Sub-Committee discussed and approved the proposed shutdown by Generating Stations as given in Annexure – D.2 which is available in NERPC website.

D.2 Outage Planning Transmission elements

It was agreed in the 99th OCC meeting that shutdown will be availed only after approval is given by the OCC forum. It was also agreed that deferment/revision of outages elements other than already approved in OCC will be henceforth put/displayed in the website of NERPC (**under Operational Activities/OCC Approved shutdown**) as per CERC regulations/ CEA guidelines etc for ensuring smooth & secure grid operation.

Furnishing request of shut down of the element, which was approved by NERPC, by Indenting Agency (ISTS licensees/STUs/Generating Companies) to NERLDC:

In 160th OCCM NERLDC presented a report on the shutdown approval timeline(s) followed in OCC of other regions. It was observed that M+2 month's shutdown was

approved in Mth month. For eg. shutdowns from 01.11.2019 to 30.11.2019 is approved in the OCC of September, for which requisition has to be submitted by 5th of September,2019 i.e. 5th day of the Mth Month, M being the month in which OCC Meeting is held. By following this practice there will be no overlapping of shutdown dates as happening at present. Members unanimously agreed to the practice in other RPCs. In order to further ease the process of shutdown planning by the constituents, it was agreed in subsequent OCC meetings that shutdown should be discussed and approved for month of M+1 (instead of M+2) in Mth Month OCC meeting.

Deliberation of the sub-Committee:

The sub-Committee discussed and approved the transmission line outages proposed by Constituents for August, 2020 which is available in the website of NERPC.

The Sub-Committee noted as above.
Action: All utilities.

D.3 Estimated Transmission Availability Certificate (TAC) for the month of March,2020 – May,2020:

NETC and POWERGRID have submitted the outage data for the month of March,2020 – May,2020. So the attributability of outage of the said elements may please be finalized.

Deliberation of the sub-Committee:

AD, NERPC enquired about the documents (besides DR/EL, patrolling report) required by NERLDC to verify tripping(s) due to lightning (LNCC). It was clarified by NERLDC that as per regulation, all data are being submitted by the transmission utilities viz. NERTS, NETC. However, the submitted data is insufficient for NERLDC to verify accurately lightning induced tripping(s). The forum decided that as per regulations NERPC would continue to attribute trippings due to lightning as per discretion. The sub-Committee discussed and approved the transmission line outages proposed by Constituents for August, 2020 which is available in the website of NERPC.

The Sub-Committee noted as above.
Action: All utilities.

D.4 Restoration of Assets damaged at Kopili HEP due to failure of Penstock:

220kV Misa-Kopili ckt I, II, III and 132kV Kopili-Khandong D/C are under outage since 07.10.2019. This is considerably reducing reliability of NER grid.

To finalise action plan for early restoration of the said connectivity a senior level task force consisting of members from NERPC, NERLDC, NEEPCO & NERTS was constituted.

Decisions/status as per deliberation in the previous meeting(s):

a. Individual bay wise/element wise ownership determination, kiosk location, cable routing etc., at site level is to be done jointly by NEEPCO & NERTS and a consolidated report would be submitted to the task force committee. Subsequently based on that estimate is to be prepared.

b. The Task Force Committee shall decide the mechanism of handing over of NEEPCO switchyard except Units bays and 132KV/33KV bays of 5 MVA transformer to NERTS and treat the entire elements as transmission assents.

c. The damaged assets of NEEPCO/ renovation works against the same will be executed by NERTS. After handing over of NEEPCO' switchyard assets portion to NERTS and assets under NERSS-III shall be restored by NERTS under PoC mechanism. It was also decided that NERTS may explore the amount to be recovered from Insurance agency.

d. Detailed estimate to be presented in the next OCC meeting by NERTS.

Deliberation of the sub-Committee:

Sr.DGM(AM), NERTS informed the following:-

(i) Ownership confirmed and agreed with NEEPCO as follows-

I. POWERGRID Ownership -

1. 220kV ICT-II (existing) Bay incl. 160MVA 220/132kV Transformer
2. 132kV ICT-II (existing) Bay
3. 132kV Khandong-I Bay
4. 132kV Khandong-II Bay

II. NEEPCO Ownership

1. 220kV Generator-I Bay
2. 220kV Generator-II Bay
3. 220kV Generator-III Bay
4. 220kV Generator-IV Bay
5. 220kV Misa-I Bay*
6. 220kV Misa-II Bay*
7. 220kV Misa-III Bay*
8. 220kV Bus Coupler Bay
9. 132kV Station Service Transformer Bay (to be converted to GIS) incl 5MVA, 132/33kV Transformer

* Ownership of PLCC Panels of these feeders are with POWERGRID.

Apart from the above, ownership of following bays, ownership of which was with NEEPCO earlier shall now be with POWERGRID after replacing of equipment and commissioning (under NERSS-III scheme):

1. 220kV ICT-I (new) Bay incl. 160MVA 220/132/33kV Transformer
2. 220kV ICT-I (new) Bay

Further, ownership of all 132kV GIS Bays being installed under NERSS-III scheme shall be with POWERGRID.

(ii) Detailed estimate for permanent restoration –

- Electrical equipment and associated works: INR 674.52 lakhs
- Civil works: INR 104.094 lakhs

(iii) A plan for restoration of at least one 220 kV Line, one 132 kV Line and one 160 MVA ICT is prepared and attached as **Annexure-D.4**

(iv) Alternatively, POWERGRID is also exploring possibility of hiring one Mobile 220 kV GIS Bay and one Mobile 132 kV GIS Bay for temporary restoration.

Sr. DGM(AM), NERTS informed that with normal AIS one 220kV line, one 132kV line and one 160MVA ICT can be restored within 90 days i.e.3 months period. This would be tentatively completed by Nov'20. However, the modular GIS would entail an expenditure of INR 8.04 Cr and would be completed in a timeframe of 6months including supply and installation.

After detailed deliberation the forum considering the importance from grid perspective and urgency of the restoration, approved in-principle restoration via AIS.

The Sub-Committee noted as above.

Action: NERTS, NEEPCO.

D.5 <u>RGMO analysis for events dated 17th May, 2020 and 28th May 2020</u>

In 167th OCC meeting, regarding the RGMO analysis for events dated 17th May 2020 and 28th May 2020, NERLDC informed the following:

- On 17th May, 2020 response from all the units were negligible.
- For Palatana GTG-I, GTG-2 gave positive response but could not sustain the same for 1 minutes. In STG-I & II oscillation was observed during response and not it did not sustain.
- BgTPP Unit#I negative response, BgTPP Unit#III response not sustained.

- Pare HEP response not sustained.
- On 28th May,2020 response from RHEP, Pare, Loktak, DHEP & BgTPP were either zero/negative.
- Palatana GTG#I & II response sustained for around 2 minutes. In STG-I & II oscillation was observed during response and not it did not sustain.
- Pare Unit 2 did not provide any response whereas RHEP Unit I, II & III gave a positive response but could not sustain.

Concerned utilities were requested to intimate the reasons for the above deviations.

Deliberation of the sub-Committee:

DGM, NEEPCO informed that on 17.05.2020 Pare HEP was generating at 110% so no scope for positive response. Regarding response of RHEP he informed the following:

- On 17/05/2020, the frequency deviation was very small i.e. 0.07 Hz (0.14 %). As the frequency deviation was pretty less that RGMO response might not adequate.
- On 28/05/2020, the reservoir level was 567.02 meter and above FRL. In this condition all three unit's GV was full open. Under these circumstances, usually RGMO is switched off.

NERLDC informed NEEPCO that IEGC Regulation 2010 mandates RGMO response for any change in frequency above 0.03 Hz. As during events dated 17th and 28th May, 2020, change in frequency was above 0.03 Hz, RGMO response is expected from all units on bar.

AGM, NTPC informed that RGMO settings have been revised for Unit 1&3 subsequent to the said events. NERLDC presented the RGMO Analysis for event dated 11th June 2020 (attached as **Annexure-D5**), which was shared by NERLDC to the generating stations via email prior to OCC meeting. The following was highlighted by NERLDC:

- Palatana GTGs gave positive response initially but could not sustain the same
- Palatana STGs response reduced immediately after oscillation
- BgTPP Unit 2 response immediately reduced after initial positive response
- RHEP unit -1 gave a negative response
- Very less or negligible response from all generators except Loktak Unit-2 which provided response equal to desired response

All generating stations were requested to take necessary actions in order to ensure adequate response during the upcoming events.

The Sub-Committee noted as above.

Action: OTPC.

D.6 Scheduling of additional power from BgTPP on daily basis:

BgTPP is running continuously at technical minimum load for last 4 months. During the operation of thermal power plants the ash getting accumulated on the water walls. Ash accumulation at water walls reduce the heat transfer capacity and uneven heat transfer. Accumulated ash at water walls to be dislodged on daily basis by steam soot blowing to increase the heat pickup. Soot blowing activity at lower loads may disturb the flame stability in the furnace and may lead to subsequent tripping of the unit. Hence an additional load of 40-50MW for continuous 4hrs (16 blocks) may be provided everyday so that soot blowing can be carried out.

Deliberation of the sub-Committee:

AGM, NTPC explained in detail the difficulties arising due to running BgTPP units at technical minimum load continuously. He requested beneficiaries to requisition cumulatively additional 40-50MW generation for 4 hours continuously from each of the units. Members took cognizance of the same, however it was clarified that presently power is requisitioned as per merit order and surrendering of power from ISGS is the last recourse. The forum in view of the above declined the request of NTPC at present and decided to take up the matter later on.

The Sub-Committee noted as above.

D.7 Shutdown of OTPC Module-I:

It is proposed to have shutdown of OTPC Palatana Unit-1 in the first week of Oct'20 for 8 days for HRSG-1 license renewal.

Deliberation of the sub-Committee:

Sr. Manager, TSECL requested that the shutdown be deferred by one month in view of Puja. Sr. Manager, OTPC informed that since license renewal is a periodic activity and is completed in a short time frame, the shutdown may be allowed in the proposed time frame so that uninterrupted power supply can be ensured in the Puja period. The forum deferred the item for detailed discussion in the next meeting.

The Sub-Committee noted as above.

Action: OTPC

D.8 Issuance of SEMs against STERLITE projects:

Transmission projects of national importance is being implemented by **M/s NER II Transmission Limited.** The Project will strengthen the transmission and distribution system in NER & Sikkim.

M/s NER II Transmission Limited is constructing the project which is in advance stage of commissioning the details of elements are as below for your reference.

Si No	Name of the Line/ICT/BR/LR
1.	400kV Silchar(PG) - Misa(PG) Ckt-1
2.	400kV Silchar(PG) - Misa(PG) Ckt-2
3.	132kV Biswanath chariyalli(PG) - Itanagar Ckt-1
4.	132kV Biswanath chariyalli(PG) - Gohpur(AEGCL)
5.	132kV Itanagar - Gohpur(AEGCL)
6.	400/220kV at Surajmaninagar (2X315MVA ICT)
7.	400/220kV at P.K.Bari (2X315MVA ICT)
8.	400kV Surajmaninagar(NER II) - P.K.Bari(NER II) Ckt-1
9.	400kV Surajmaninagar (NER II) - P.K. Bari(NER II) Ckt-2
10.	132kV AGTPP(NEEPCO) - P.K.Bari(TSECL) Ckt-1
11.	132kV AGTPP(NEEPCO) - P.K.Bari(TSECL) Ckt-2
12.	2 Nos 132kV Line Bays at ITANAGAR
13.	2 Nos 132kV Line Bays at AGTPP (NEEPCO)
14.	2 Nos 132kV Line Bays at P K BARI (TSECL)
15.	2 Nos 400kV Line Bays at PALATANA (OTPC)

Requested to guide us for the issuance of getting the SEM meter as per the attached Meter scheme drawing for the above-mentioned project, also kindly accord your approval for the Meter Scheme Drawing (attached at **Annexure-D.8**) for the NER-II Project.

Deliberation of the sub-Committee:

After detailed deliberation it was decided:

(i) NERTS to provide the required SEMs from the existing stock.

(ii) After delivery of new SEMs, the stock is to be replenished.

(iii) DCD/laptop quantity to be finalized based on site location and requirement.

(iv) Cost to be booked under existing mechanism by NERTS

The Sub-Committee noted as above.

Action: NERTS, M/s STERLITE.

D.9 Phase shift errors in PMU:

Voltage correction is done for all substations except 132 kV Dimapur (PG).

Two issues that needs discussion:

a. Current sequence is also to be corrected to avoid the discrepancy in fault phase observed from voltage and current waveform. But, if current sequence is changed it will not match with DR.

b. To match phase sequence with DR, voltage sequence is needed to be reverted to old sequence. But this shall cause error in PMU phase angle as before.

It is recommended that for protection analysis, DR and PMU phase sequence is to be matched and for solving phase angle error, primary side connections should be changed.

Deliberation of the sub-Committee:

After detailed deliberation the forum referred the matter for discussion in the next Sub-group meeting.

The Sub-Committee noted as above.

Action: NERPC.

D.10 Reserve Shutdown guidelines for NER constituents:

In order to have an organized approach regarding decisions of sending units under RSD in real time, a guideline document has been prepared for NER constituents in line with Detailed Operating Procedure for RSD prepared by POSOCO and approved by hon'ble CERC vide order no. L-1/219/2017-CERC dated 5th May, 2017. Following are the new inclusions w.r.t the CERC procedure:

1) Real time timelines for RSD
2) Methodologies for swapping of units under RSD

The guideline document was sent to all constituents via email dated 06/07/2020 and the same is open for comments till 10/07/2020. The guideline document is attached as **Annexure –D.10**. Forum is requested to approve the same for implementation in NER.

Deliberation of the sub-Committee:

NERLDC presented the draft DoP for RSD (attached at **Annexure-D.10**). Relevant clause pertaining to swapping of units was highlighted:

Swapping of unit under RSD with on-bar unit:

a. A unit under continuous RSD shall be swapped with an on-bar unit of the same ISGS either after 7 days from taking the unit under RSD or as and when decided by RLDC.
b. The methodologies mentioned in the CERC approved DoP for RSD shall be followed while reviving the unit under RSD during the process of swapping.

c. The generating station shall ensure that the unit which is to be taken under RSD after swapping shall be kept on bar for not more than 2 time blocks from the time block in which the revived unit achieves its technical minimum generation.

For e.g., say, unit A of an ISGS is under RSD for more than 7 days and unit B of the same ISGS is on bar. On the 8th day, unit A shall be revived from RSD and unit B shall be put on RSD, considering the requisition pattern on the 8th day from the ISGS remains similar to requisition in past 7 days. While revival of the unit A, ISGS shall ensure that unit B shall be taken under RSD by the end of B+2 block, B being the block in which unit A achieves its technical minimum generation.

AGM, NTPC informed that a unit requires at least 2-3 hours to come to Technical Minimum after synchronization. So considering that fact and the commercial implications he implored the forum to consider swapping of units as separate RSDs. He suggested that the schedule during the swapping of RSD unit with on-bar unit may be provided as per their actual generation. Forum approved that the schedule during such swapping shall be replaced by actual generation of the generating station for the period of around 2 hours (for NTPC BGTPP) during the parallel operation of both units, i.e from the time of synchronization of the RSD unit till the time of desynchronization of the previously on-bar unit.

The forum approved the DoP with the above modifications as requested by NTPC.

The Sub-Committee noted as above.

Action: NERLDC.

D.11 <u>Charging of elements at Sihhmui S/S of Mizoram without prior intimation to NERLDC and without following FTC procedure</u>

In reference to Letter with no: 11015/01/16-EC(P)/Com/52 dated 26/06/2020 received from P&ED, Mizoram vide email dated 07/07/2020, it was informed that 02 nos of 132 kV Bays of Melriat – Sihmui D/C at Sihhmui Substation, 132 kV Sihhmui Bus and 132/33 KV, 12.5 MVA Transformer at Sihhmui Substation has been charged and technically commissioned on 28.05.2020. It may be mentioned that charging of 132 kV Melriat(PG) – Sihhmui(P&ED, Mizoram) D/C was accorded to POWERGRID, NERTS only till the Gantry of Sihhmui (P&ED, Mizoram) Substation vide approval no: NERLDC/SOII/Trial Oprn/0365 dated 26.10.17.

The charging of the said elements was done without prior intimation to NERLDC and without following the First Time Charging Procedure of NERLDC which is a violation of

the guidelines as per Clause no 1(c) and Clause no 1(e) of Annexure 17.2 a of NER Operating Procedure 2019 , Clause no. 6 of CEA (Grid Standards) Regulations, 2010.Clause no 5.2(c) and Clause no. 4.6.2 of CERC (Indian Electricity Grid Code) Regulations, 2010.

P&ED, Mizoram is requested to abide by the procedure strictly during first time charging of any upcoming elements for ensuring safe and secure operating of the NER grid. Also, it is requested to submit relevant documents/annexures and clearances in view of charging of above-mentioned elements at Sihhmui Substation in FTC portal at the earliest.

Deliberation of the sub-Committee:

After detailed deliberation the matter was deferred for discussion in the Special Meeting for Sihhmui to be convened by NERPC.

The Sub-Committee noted as above.

Action: NERPC.

D.12 Difficulties faced in management of high voltage scenario in Upper Assam System

Decisions regarding measures to control over voltage in Upper Assam System is difficult due to non-availability of real time MVAR support from Namrup and Lakwa. This causes opening of 220 kV AGBPP-Mariani (AS) and 220 kV Mariani- Namrup lines as a precautionary measure. SLDC Assam is requested to take necessary actions regarding the following:

a. Real time SCADA data availability from state owned generating stations
b. Namrup and Lakwa should deliver maximum MVAR support as per capability curve limit

Deliberation of the sub-Committee:

AGM, SLDC, AEGCL informed that Old LTPS and NTPS generating station data will be reporting through old RTUs as they are not part of SAS upgradation project. Also for additional analog/digital data integration as demanded by NERLDC additional MFM and RTU installation at Generating station control room (both LTPS and NTPS) is required and also to bring the RTU data to PLCC room located at switchyard control room RS232 to RS485 converters will be required(zpc proposal already submitted for procurement of the converters). Communication Division Jorhat shall carry out the works with assistance from APGCL authority. The above works are hindered due to prevailing lockdown.

For LRPP and NRPP the commissioning of Remote SAS gateway is pending which is under the scope of APGCL. These works are also hindered by lockdown due to virus outbreak as per APGCL. He assured that both the works are being expedited and tentative completion is Aug'20.

The Sub-Committee noted as above.

Action: AEGCL, APGCL.

D.13 SEMs to be Procured

In 167th OCCM NERTS informed that work order has been placed to M/s L&T. The party informed that production is in advanced stage of completion. With testing and inspection, the same shall be ready for dispatch by 30.06.20. Delivery of meters is expected by first week of July'20.

Deliberation of the sub-Committee:

Sr.DGM(AM), NERTS informed that M/s L&T has confirmed completion of manufacturing of all the SEMs and has submitted the test reports. Based on the test reports, POWERGRID is proposing waiver of pre-dispatch inspection.

The Sub-Committee noted as above.

Action: NERTS.

D.14 SEM time drift:

In 167th OCCM NERTS informed that the time drift reports shall be furnished by 19.06.20. NERLDC requested Nagaland to send the time drift report on weekly basis.

Deliberation of the sub-Committee:

NERLDC presented the time drift report and requested all utilities to take necessary action for time drift correction.

The Sub-Committee noted as above.

Action: all utilities.

ADDITIONAL AGENDA ITEMS:

ADDITIONAL AGENDA FROM NERLDC:

D.15 Shutdown of Bay/bay elements prior to CoD:

Presently many lines/stations are being constructed under TBCB mechanism. In some cases where bay owner is a different utility and line owner is different utility, in case of bay readiness NERLDC is providing FTC clearance. However, prior to CoD of bay(s),

testing is being carried out. Since such testing activities might be detrimental to grid stability, NERLDC proposes that such activities may be approved as per shutdown approval procedures decided in OCC.

Deliberation of the sub-Committee:

Director(O&P), NERPC clarified that as per prevalent decisions of OCC, approved shutdown is being given only for CoD elements. However, considering the grid stability perspective such bay/bay elements outage (whose FTC clearance has been issued but CoD is pending) is to be processed by NERLDC.

The Sub-Committee noted as above.

Action: NERLDC.

D.16 Delay in submission of compliance status of recommendations of Third Party Protection Audit:

In compliance to recommendations of Enquiry Committee on 2012 Grid Disturbance, last third-party protection audit was conducted in the year 2017. As per the 54th PCC meeting held on 22nd January, 2020, time line for submission of compliance status was recorded as Feb'20. In order to reduce frequent disturbances, the recommendations of protection audit should be expedited.

Deliberation of the sub-Committee:

Director(O&P), NERPC stated that DoP Ar. Pradesh and DoP Nagaland are yet to submit the status for compliance against third party protection audit recommendations. He requested the concerned utilities to submit at the earliest.

The Sub-Committee noted as above.

Action: DoP Ar. Pradesh, DoP Nagaland.

D.17 Status of NERPSIP, Comprehensive Scheme of Transmission & Distribution System in Arunachal Pradesh & Sikkim and TBCB projects

The disturbances due to weak connectivity and radial transmission systems of NER grid may be avoided with the completion of various transmission projects which are being implemented in NER under NERPSIP, Comprehensive Scheme of Transmission & Distribution System in Arunachal Pradesh & Sikkim and TBCB projects. Implementation of these projects may be expedited in order to reduce occurrences of these disturbances.

Deliberation of the sub-Committee:

ED, NERLDC stated that under NERPSIP and Comprehensive Scheme many transmission elements shall be integrated into the grid, so monitoring the status of

such projects are essential. He requested POWERGRID-NERPSIP to submit the quarterly status report to NERLDC/NERPC. It was decided that representative(s) from NERPSIP-POWEGRID and respective state utilities (dealing with the project) shall be invited henceforth to OCC meeting for updating the forum about progress of works.

The Sub-Committee noted as above.

Action: POWERGRID, NERPC.

D.18 Status of Renovation and Upgradation works under PSDF funded projects:

The PSDF funds have been availed by all constituents except Arunachal Pradesh. In order to ensure effective utilization of these funds, substation wise status of works should be monitored

Deliberation of the sub-Committee:

Pls refer to discussion in item **B.1**.

The Sub-Committee noted as above.

Action: DoP Ar. Pradesh

D.19 Restoration of Khandong- Kopli- Misa link:

The Khandong- Kopli- Misa link is under long outage since 7th October 2019 after bursting of penstock at Kopili HEP. This link is a vital connectivity between Northern and Southern part of NER grid. Early restoration of the link is required for the reliable and secure operation of NER Grid.

Deliberation of the sub-Committee:

Pls refer to discussion in item **D.4**.

The Sub-Committee noted as above.

Action: NERTS

D.20 Effect of COVID-19 pandemic on planned shutdown management:

As many as 111 numbers of shutdowns approved for the period of 25th March 2020 to 30th April 2020 out of total 128 numbers could not be availed by the constituents of NER. This has caused hindrance in proper maintenance of transmission elements by the constitutes and so is a major concern in view of the upcoming high demand season. A proper coordinated planning is required in order to facilitate the constituents in carrying out these pending maintenance activities.

The Sub-Committee noted as above.

D.21 Improving SCADA data availability & expediting communication network projects

The present SCADA data availability in NER is around 52%. Although, as per Minutes of 18th TCC meeting, the target date for completion of NER FO expansion and Micro-Wave vacation projects was November 2018, the projects are still under implementation. This has further caused poor availability of SCADA data. The limited availability of SCADA data not only causes great difficulty for the system operator in visualization of the grid conditions and managing the grid in real time but also for performing offline system studies.

Deliberation of the sub-Committee:

Pls refer to discussion in 18th NETeST meeting of NERPC.

ED, NERLDC informed the forum that huge amount of money is being paid by the constituents pertaining to additional DSM. This is mainly because of the unavailability of real time SCADA data to properly visualize their drawal.

The Sub-Committee noted as above.

D.22 Installation of 400kV TLSA

ED, NERLDC enquired about the status of installation of 400kV TLSA for 400kV Silchar-Azara & 400kV Silchar-Byrnihat.

Deliberation of the sub-Committee:

Manager, NETC informed that line location and other relevant details for 400kV TLSA installation has already been submitted to NERTS. After relaxation of lockdown measures work will be accelerated. Further he informed that chemical earthing for identified locations would start after monsoon with tentative completion by February,2021

The Sub-Committee noted as above.

Action: NETC

ADDITIONAL AGENDA FROM P&ED MIZORAM:

D.23 Non-Acceptance and Review thereof of COD dated 01.12.2018 for 132kV D/C Melriat(New) – Sihhmui Transmission line alongwith associated bays at Melriat(PG) & Sihhmui (Mizoram) S/S in place of 132kV D/C Melriat(New) – Melriat(Mizoram)

The stated asset is the ISTS elements implemented by PGCIL under the project 'Transmission sytem associated with Palatana GBPP and Bongaigaon TPS' in North Eastern Region. The project is one out of many listed under Transmission Line and was agreed upon in the 2nd SCM of North Eastern Region held on 25.06.2008 at Guwahati and 6th TCC and NERPC meeting held on 07.08.2008 and 08.08.2008 respectively at Gurgaon. As the name indicates, the project was further revised in 3rdSCM of NER on 21.12.2011 and 14th NERPC meeting on 04.09.2013 from Melriat(New) – Melriat(Mizoram) interconnecting 132kV D/C line to Melriat(New) – Sihhmui (Mizoram) 132kV D/C line. This D/C line connects 132kV Melriat(PG) sub-station with 132kV Sihhmui(Mizoram) sub-station.

Deliberation of the sub-Committee:

P&ED Mizoram highlighted in detail about the background of the project and also the bills raised by POWERGRID subsequent to CERC tariff order. EE, SLDC, P&ED Mizoram informed the forum that 132kV Melriat-Sihhmui D/C has been charged upto gantry at Sihhmui and as such is unusable by P&ED Mizoram. Considering the gravity of the situation the forum decided that the matter be discussed in detail in a Special Meeting to be convened by NERPC.

The Sub-Committee noted as above.

Action: NERPC

ADDITIONAL AGENDA FROM NERTS:

D.24 Payment against "Supply and installation of SEMs, DCDs & Laptops to POWERGRID by NER states as decided in various forum of NERPC."

It had been decided in various forum of NERPC during the period from 2012 to 2017 that POWERGRID, NERTS would carry out the supply & installation of Special Energy Meters (SEMs), Data Collection Devices (DCDs) & Laptops for the ISGS constituents of NER, and subsequently, billing would be done for the same. The modalities of billing against the same was decided in the 145th OCC meeting dated 19.06.2018, viz. for the purpose of billing against procurement during a particular year, weighted average entitlement as on 31st March of the year, i.e. weighted average entitlement as indicated in the REA of March of that year would be considered for billing.

Accordingly, invoices were raised on NER states on **12.03.2020** (for procurement upto FY 2016-17) and the billed amounts are as below:

Sl.No.	*Name of ISGS constituent/beneficiary*	*Billing amount (including GST)*
1	Deptt. of Power, Arunachal Pradesh	**12,84,932**
2	AEGCL, Assam	**84,13,723**
3	MSPCL, Manipur	**14,28,809**
4	MePTCL, Meghalaya	**20,17,328**
5	P&E Deptt., Mizoram	**7,93,520**
6	Deptt. of Power, Nagaland	**10,28,130**
7	TSECL, Tripura	**19,64,014**
Total billing amount		**1,69,30,456**

However, till date, no payment has been received from any state. It is requested that the forum may deliberate on the matter for early release of payment.

Deliberation of the sub-Committee:

SE, SLDC, Meghalaya informed that for the following locations i.e. Lumshnong, Khliehriat, Mendipathar, Umtru there is no provision of SEM data collection as optical cable/DCD is defective. Also, laptop/laptop software is not functional.

The forum requested NERTS to immediately resolve the issues as a one time measure prior to commercial settlement.

Sr. Manager, TSECL requested a break up of the bills with item wise amounts for each corresponding utility. In response it was clarified by NERTS that the bills have been raised utility wise as per weighted average share (as decided in 145th OCC). So the bills for a particular utility would not match the cost of the items supplied against that utility.

CGM, NERLDC opined that the billing practice varies from region to region. In order to make the process simplistic the break up based on weighted average share of power allocation was adopted in NER contrary to PoC billing adopted in SR/WR.

After detailed deliberation it was decided that:

a. Present bill (raised as per mechanism already decided) to be cleared by all the state utilities.
b. NERTS to immediately resolve any SEM data collection issues i.e. faulty DCD, optical cable, laptop issues.
c. In foreseeable future the entire cost of SEMs, laptop, DCDs and associated items alongwith O&M costs to be booked under PoC mechanism.

The Sub-Committee noted as above.

Action: all state utilities, NERTS.

D.25 Enhancement of Letter of Credit by MSPDCL.

As per Cl.No.19 of CERC (Sharing of Inter-State Transmission Charges and Losses) Regulations, 2020, DICs are to maintain an irrevocable, unconditional and revolving Letter of Credit through a scheduled banker any other acceptable instrument of payment security mechanism in favour of CTU. In case of MSPDCL, although LC has been maintained with validity of one year (upto 27.03.2021), LC of only `2.37Cr exists in place of requisite value of Rs.5.02Cr, i.e. there is a shortfall of Rs. 2.65Cr.

Numerous correspondences have been held on the matter but to no avail. The forum may kindly impress upon MSPDCL to enhance LC at the earliest.

Deliberation of the sub-Committee:

NERTS requested MSPDCL to enhance the LoC. DGM, SLDC, MSPCL assured that the matter is being followed up with MSPDCL and is expected to be resolved at the earliest.

The Sub-Committee noted as above.

Acion: MSPDCL

D.26 Vulnerability of 132kV Pasighat-Roing line.

A report on vulnerability of 132 kV Pasighat – Roing line due to un-precedent rise of water level in River Dotung in Arunachal Pradesh and resulting massive land slide near Loc 213, collapse of the tower at that location, erection of ERS, shifting of the ERS twice and plan for a permanent restoration is attached for kind information of the honorable forum as **Annexure-D.26**.

The Sub-Committee noted as above.

D.27 Capitalization of 80MVAR Bus Reactor at Misa.

CGM(AM), NERTS informed that 420kV 80MVAR Bus Reactor has been installed and charged at 400kV Misa S/Sn as part of Misa-Mariani line upgradation. However, the 220kV line is yet to be upgraded. He stated that the reactor may be capitalized if there is grid requirement. After detailed deliberation the forum requested NERLDC to assess the present requirement of the Bus Reactor.

The Sub-Committee noted as above.

Action: NERLDC

ADDITIONAL AGENDA FROM NEEPCO

D.28 ABT based tariff calculation in Power Plants

DGM, NEEPCO enquired about the mechanism for ABT based tariff calculation at plant level and the associated hardware/software requirements. It was clarified that SEMs are already present at plant level which can be accessed for this purpose. Only IT Hardware/software require to be procured. Director(O&P), NERPC intimated that presently ABT based Accounting software is functional at NERPC, so any support in this regard may be extended.

The Sub-Committee noted as above.

Action: NERLDC/NERPC

PRESENTATION BY CTC GLOBAL:

M/s CTC GLOBAL gave a presentation (attached at **Annexure-II**) on ACCC conductor (HTLS) in the context of NER Power System. The forum appreciated the detailed presentation and thanked M/s CTC Global for the same.

Date & Venue of next OCC meeting:

It is proposed to hold the 169th OCC meeting of NERPC on second week of August 2020. However, exact date and venue will be intimated in due course.

*****

Annexure-I

List of Participants in the 168th OCC Meeting held on 20.07.2020

SN	Name & Designation	Organization	Contact No.
1.	Sh. P.Buchi, AE	Ar. Pradesh (VC)	-
2	Sh. G.Yinyo, JE	Ar. Pradesh (VC)	-
3	Sh. R. Goswami, AGM (SLDC)	Assam (VC)	09435119248
4	Smti.Toushita Jindung, AGM	Assam (VC)	-
5	Sh. Abhishek Kalita, AM, MRT	Assam (VC)	-
6	Sh. I. Tahbildar, DM, APDCL	Assam (MS Team)	-
7	Sh. N.Romeo Singh, DM(IT),(SLDC),	Manipur (VC)	-
8	Smti. H. S. Rangnamei, Manager (E) (SLDC)	Manipur (VC)	-
9	Sh. Roshan Oinam, Manager (SLDC)	Manipur (VC)	-
10	Smti. Steffi Okram, Manager (E) (SLDC)	Manipur (VC)	-
11	Sh. TH. Sushanta Singh, Manager (E), (SLDC)	Manipur (VC)	-
12	Sh. Haobam M. Chanu, Manager (IT), (SLDC)	Manipur (VC)	-
13	Sh. B. Saibon, SE	Meghalaya (VC)	
14	Sh. T. Gidon, EE (SLDC)	Meghalaya (VC)	-
15	Sh. D.J. Lyngdoh, EE	Meghalaya (VC)	-
16	Sh. B. Nikhla, EE, SP, MePTCL	Meghalaya	-
17	Sh. Lalbiaksanga, SE, SLDC	Mizoram (VC)	-
18	Sh. Benjamin L. Tlumtea, Sr. EE (SLDC)	Mizoram (VC)	-
19	Smti. Kristine Sailo, AE	Mizoram (VC)	-
20	Sh. L. Sailo, JE	Mizoram (VC)	-
21	Sh. Rokobeito Iralu, SDO	Nagaland (VC)	09436837020
22	Sh. Tia Kava, JE	Nagaland (VC)	-
23	Sh. Nitovi Wotsa, EE	Nagaland (VC)	-
24	Sh. Shuwato Katiry, AE	Nagaland (VC)	
25	Sh. Anil Debbarma, DGM (SLDC)	Tripura (MS Team)	09612589250
26	Sh. Debabrata Paul, Sr. Manager	Tripura (MS Team)	-
27	Sh. Mrinal Paul, Manager	Tripura (MS Team)	-
28	Sh. Joypal Roy, DGM	NEEPCO	-

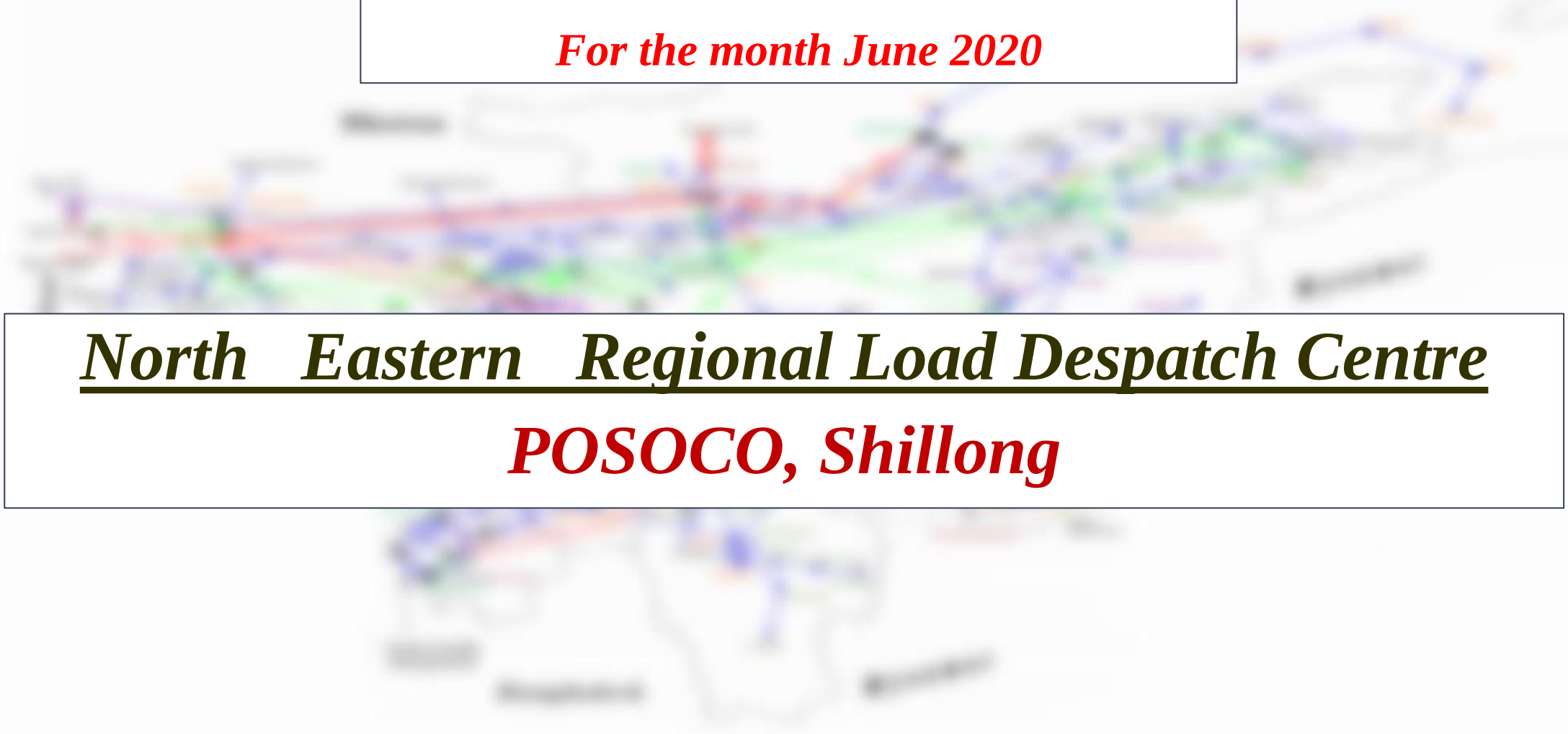
29	Sh. V. Suresh, ED	NERLDC (VC)	09449599156
30	Sh. R. Sutradhar, CGM	NERLDC (VC)	
31	Sh. S.C. De, Sr.GM	NERLDC (VC)	09436335369
32	Sh. Sourav Mandal, Dy. Mgr. (SO-I)	NERLDC (VC)	09402102354
33	Sh. M.P. Nath, CM	NERLDC (MS Team)	-
34	Sh. Kritika Debnath, Engineer	NERLDC (VC)	09436930830
35	Sh. Palash Jyoti Borah, Dy. Manager	NERLDC (VC)	08761093397
36	Sh. U. Kataki, CGM	PGCIL	09435505418
37	Sh. H. Talukdar, Sr. DGM (AM)	PGCIL	09436335237
38	Sh. Abhijit Daimari, Manager (Comml.)	PGCIL	-
39	Sh. Narendra Kumar Gupta, Sr. Manager (O)	OTPC (MS Team))	09774233426
40	Sh. Susoban Das, AGM (EEMG)	NTPC (MS Team)	-
41	Sh. S. Pait, AGM	NTPC (MS Team)	-
42	Sh. Sajiv Mohan Das, AGM	NTPC (MS Team)	-
43	Sh. Kangkan Paul, DM (EEMG)	NTPC (MS Team)	-
44	Sh. C.L. Khayuingam, Sr. Mgr. (Elect)	NHPC (MS Team)	-
45	Sh. Anil Sah, DGM	NETC (MS Team)	-
46	Sh. Ratan Singh Basnet, Sr. Mgr.	NETC (MS Team)	-
47	Sh. Vivek Karthikeyan, Manager	STERLITE (MS Team)	08966903034
48	Sh. Mayank Jaggi	CTC Global (MS Team)	-
49	Sh. Bhavik Solanki	CTC Global (MS Team)	-
50	Sh. Mayur Patil	CTC Global (MS Team)	-
51	Sh. Hitesh Mundhada	CTC Global (MS Team)	-
52	Sh. A.K. Thakur, Member secretary	NERPC	-
53	Sh. B. Lyngkhoi, Director (O&P)	NERPC	09436163419
54	Sh. S.M. Aimol, Director (Comml.)	NERPC	08974002106
55	Sh. S. Mukherjee, Dy. Director	NERPC	08794277306
56	Sh. Abhijeet Agrawal, AEE	NERPC	09871266951
57	Sh. Rajib Das, AE	NERPC	-
58	Sh. S. Chatturvedi, AE	NERPC	-

Annexure-B.2(I)

उ.पू.क्षे ग्रिड प्रदर्शन

NER GRID PERFORMANCE

For the month June 2020



North Eastern Regional Load Despatch Centre

POSOCO, Shillong

Highlights of the Month

Frequency Profile

Voltage Related Issues

Transmission Element Issues

Operational Issues

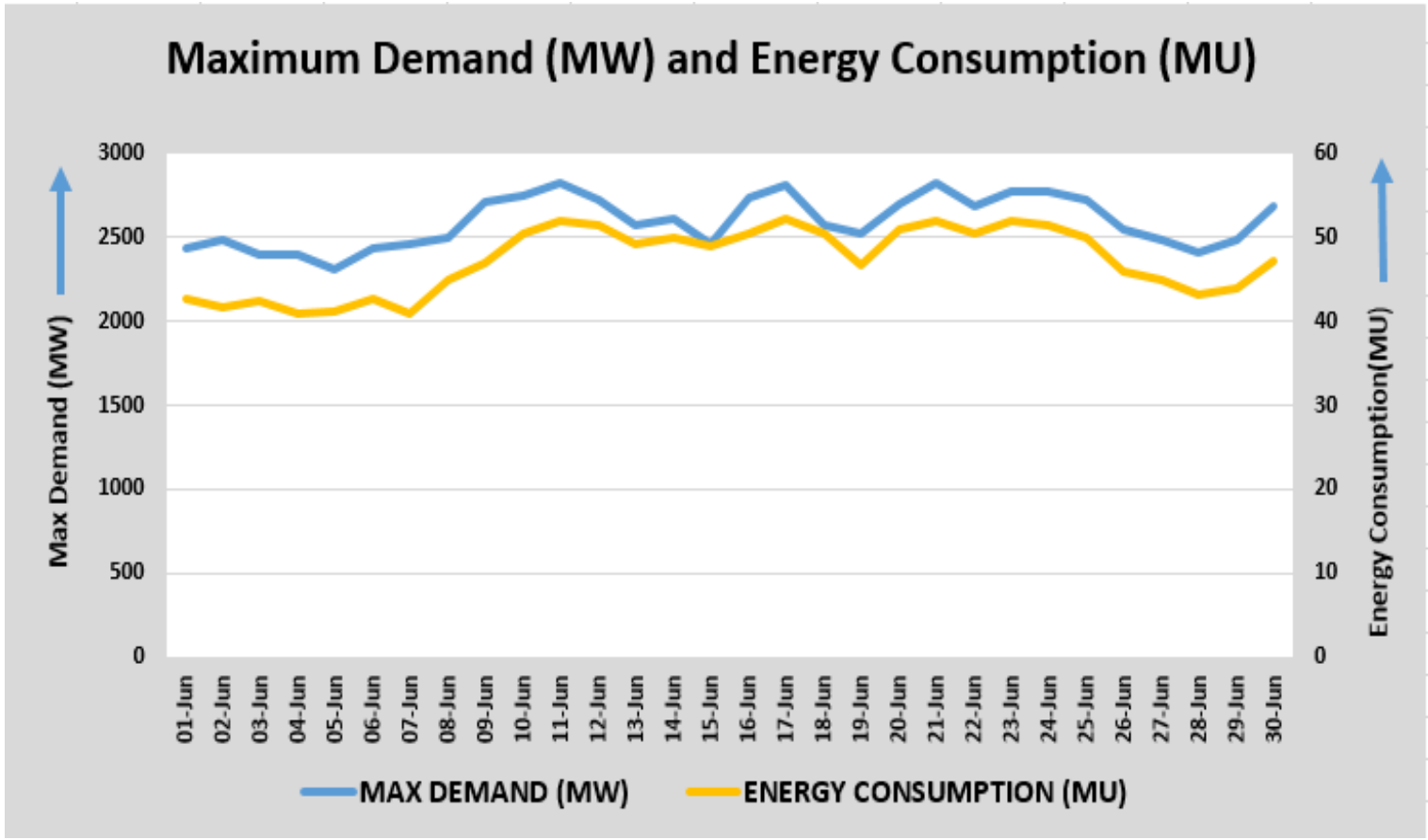
Network Issues

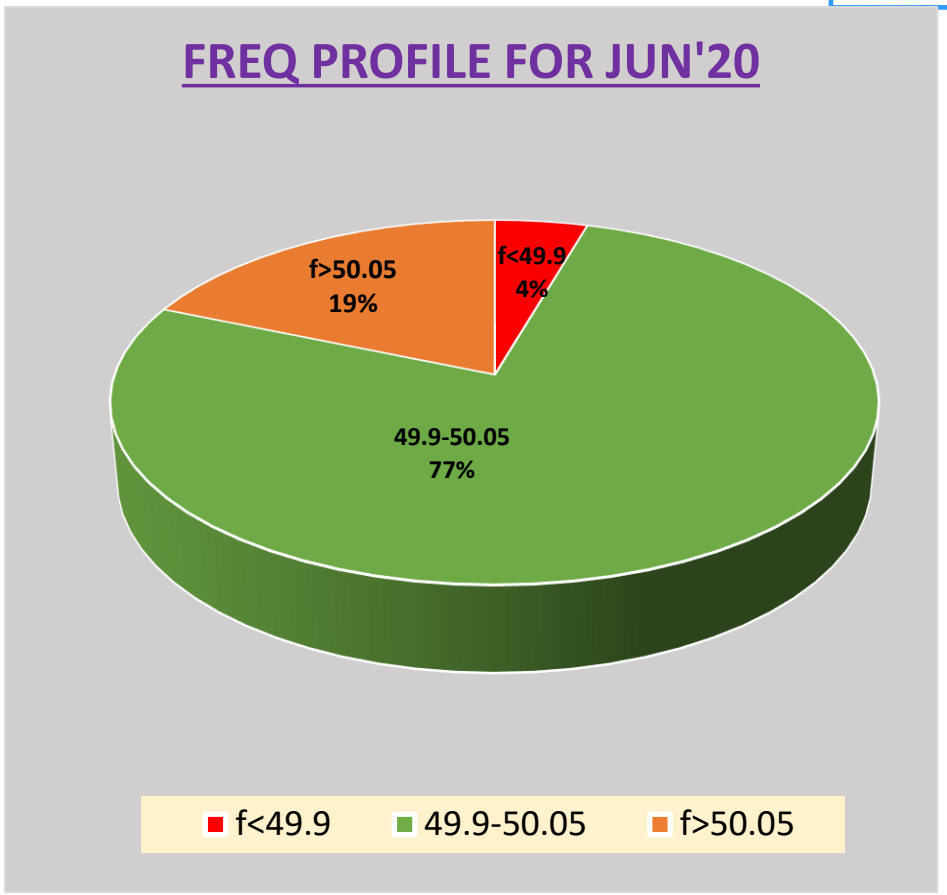
Hydro Reservoir Levels

Telemetry Availability Status

Additional Agenda items

Maximum MW and MU in NER: June 2020

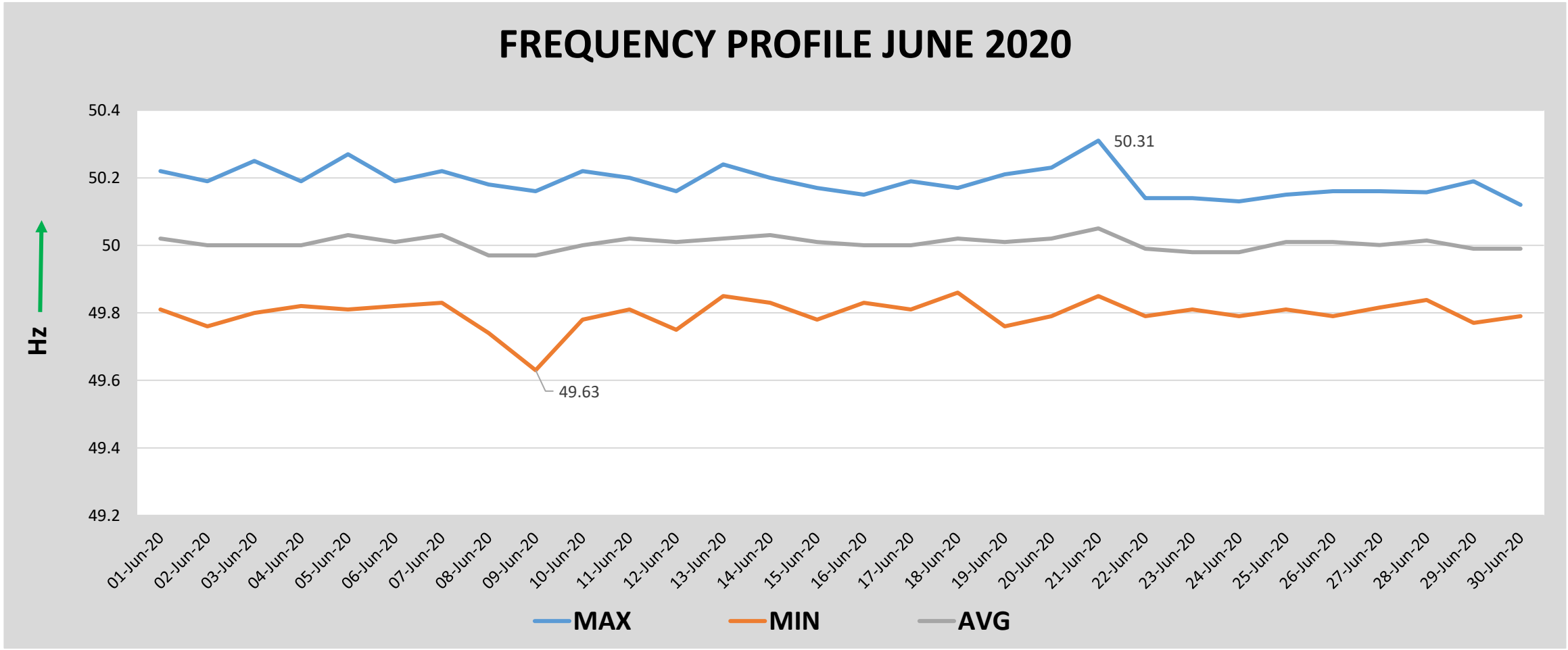




No. of GD	20
No. of GI	11

Return to Index

Frequency Profile



D.6. RGMO Analysis for events dated 17th May, 2020 and 28th May, 2020

- Concerned utilities are requested to intimate the reasons for non-performance during the events

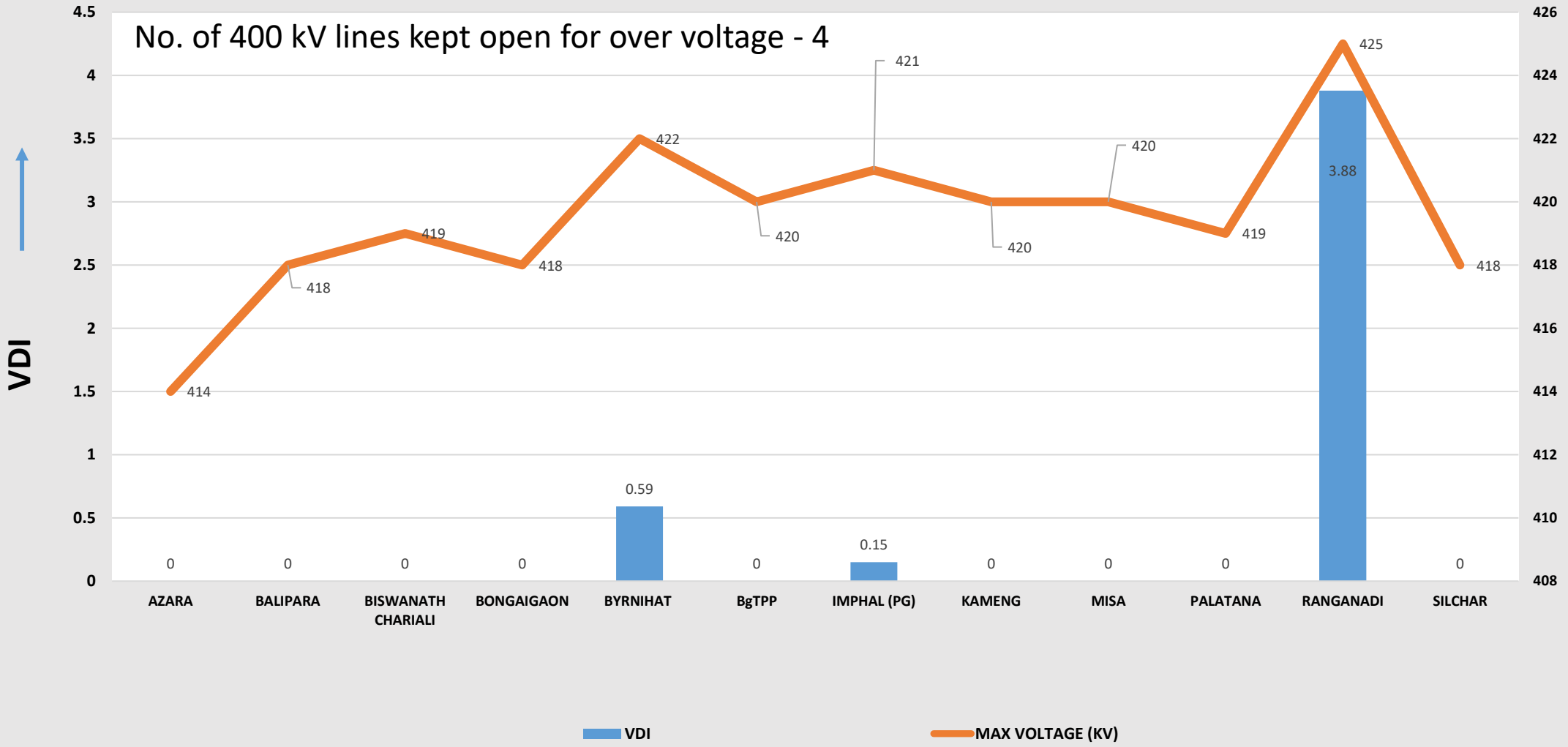
RGMO Analysis for event dated 11th June 2020

Analysis

- Palatana GTGs gave positive response but could not sustain the same
- Palatana STGs response reduced immediately after oscillation
- BgTPP Unit 2 response immediately reduced after initial positive response
- RHEP unit -1 gave a negative response
- Very less or negligible response from all generators except Loktak Unit-2 which provided response equal to desired response

Return to Index

VDI (400 KV) FOR JUNE 2020



Voltage Issues

D.12.Difficulties faced in management of high voltage scenario in Upper Assam System :

- High Voltage management in Upper Assam is difficult to manage without observability of real time MVAR support from Namrup and Lakwa
- Leads to opening of 220 kV AGBPP-Mariani (AS) and 220 kV Mariani- Namrup lines as a precautionary measure
- SLDC Assam is requested to take necessary actions regarding the following:
  a. Real time SCADA data availability from state owned generating stations
  b. Namrup and Lakwa should deliver maximum MVAR support as per capability curve limit

Reactive power capability testing at Loktak completed on 17th July, 2020 remotely from NERLDC control room in close coordination with Loktak, NHPC. Recommendations recorded in the minutes may be completed by NHPC.
Next testing may be done in AGBPP.

Return to Index

Transmission Elements Issues

C.1. Auto-reclosure issues at Azara:

- In 167th OCCM, it was decided that signal mismatch between Silchar & Azara would be resolved in June'20- STATUS REVIEW

D.11. Charging of elements at Sihhmui S/S of Mizoram without prior intimation to NERLDC and without following FTC procedure

- Information of charging and commissioning of 02 nos of 132 kV Bays of Melriat – Sihmui D/C at Sihhmui Substation, 132 kV Sihhmui Bus and 132/33 KV, 12.5 MVA Transformer at Sihhmui Substation on 28.05.2020 was received from P&ED, Mizoram vide email dated 07/07/2020.
- Permission for charging of 132 kV Melriat(PG) – Sihhmui(P&ED, Mizoram) D/C was accorded to POWERGRID, NERTS only till the Gantry of Sihhmui (P&ED, Mizoram) Substation vide approval no: NERLDC/SOII/Trial Oprn/0365 dated 26.10.17.
- The charging of the said elements was done without prior intimation to NERLDC and without following the First Time Charging Procedure of NERLDC which is a violation of the guidelines as per Clause no 1(c) and Clause no 1(e) of Annexure 17.2 a of NER Operating Procedure 2019 , Clause no. 6 of CEA (Grid Standards) Regulations, 2010.Clause no 5.2(c) and Clause no. 4.6.2 of CERC (Indian Electricity Grid Code) Regulations, 2010.
- P&ED, Mizoram is requested to abide by the procedure strictly during first time charging of any upcoming elements for ensuring safe and secure operating of the NER grid.
- P&ED, Mizoram is requested to submit relevant documents/annexures and clearances in view of charging of above-mentioned elements at Sihhmui Substation in FTC portal at the earliest.

Return to Index

Operational Issues

D.9. Phase shift errors in PMU

DETAILS

- Voltage correction is done for all substations except 132 kV Dimapur (PG).
- Two issues that needs discussion:
    1) Current sequence is also to be corrected to avoid the discrepancy in fault phase observed from voltage and current waveform. But if current sequence is changed it will not match with DR.
    2) To match phase sequence with DR, voltage sequence is needed to be reverted to old sequence. But this shall cause error in PMU phase angle as before.
- It is recommended that for protection analysis, DR and PMU phase sequence is to be matched and for solving phase angle error, primary side connections should be changed.

C.2. Implementation of SPS-2&4 related to Bangladesh

- In 167th OCCM, NERTS informed that cabling for SPS-2 & 4 has been completed at Surjamaninagar and Palatana.
- The final connection and testing shall be done during Shutdown proposed by Bangladesh on 22.06.2020/23.06.2020. – STATUS REVIEW

D.10. Reserve Shutdown guidelines for NER constituents

- In order to have an organized approach regarding decisions of sending units under RSD in real time, a guideline document has been prepared for NER constituents in line with Detailed Operating Procedure for RSD prepared by POSOCO and approved by hon'ble CERC vide order no. L-1/219/2017-CERC dated 5th May, 2017.
- Following are the new inclusions w.r.t the CERC procedure:
    1) Real time timelines for RSD
    2) Methodologies for swapping of units under RSD
- Treatment of schedule while swapping of units to be decided.

RSD Guideline Document

Return to Index

Network Issues

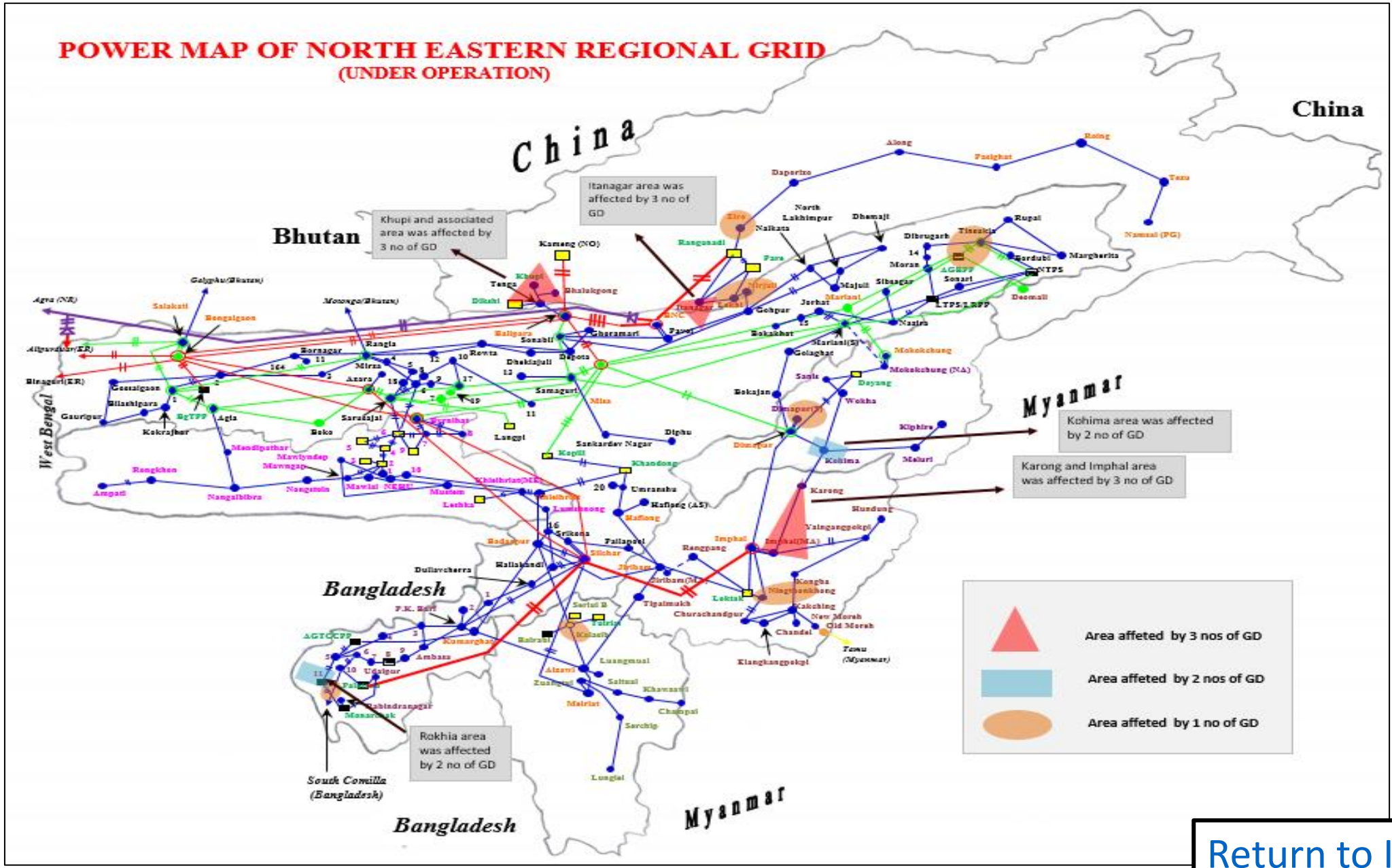
Grid Disturbance during June 2020

Events / Incidents	June'19	June'20	May'20
No of GDs	**32**	**20**	**15**
No of GI	**14**	**11**	**9**

Repeated Tripping of the following lines has led to GD in the region:	
1. 132 kV Lekhi - Pare line and 132 kV Lekhi - Nirjuli line.	caused GD 1 times
2. 132 kV Karong-Kohima line	caused GD 1 times
3. 132 kV Karong-Kohima line and Imphal-Imphal I&II	caused GD 2 times
4. 132 kV Balipara-Tenga line	caused GD 3 times
5. 132 kV RHEP- Itanagar line & 132kV Pare- Itanagar line	caused GD 3 times
6.132 kV Dimapur- Kohima line & 132 kV Wokha -Kohima line	caused GD 2 times
7. 132 kV Rokhia - Agartala 2 line & 132 kV Rokhia - Monarchak line	caused GD 2 times
8. 132 kV Loktak- Ningthoukhong and 132 kV Imphal - Ningthoukhong lines	caused GD 1 times

Tripping of critical elements of NER

Transmission Line	No. of Trippings
1. 400 kV Silchar-Azara	0
2. 400 kV Silchar-Byrnihat	0

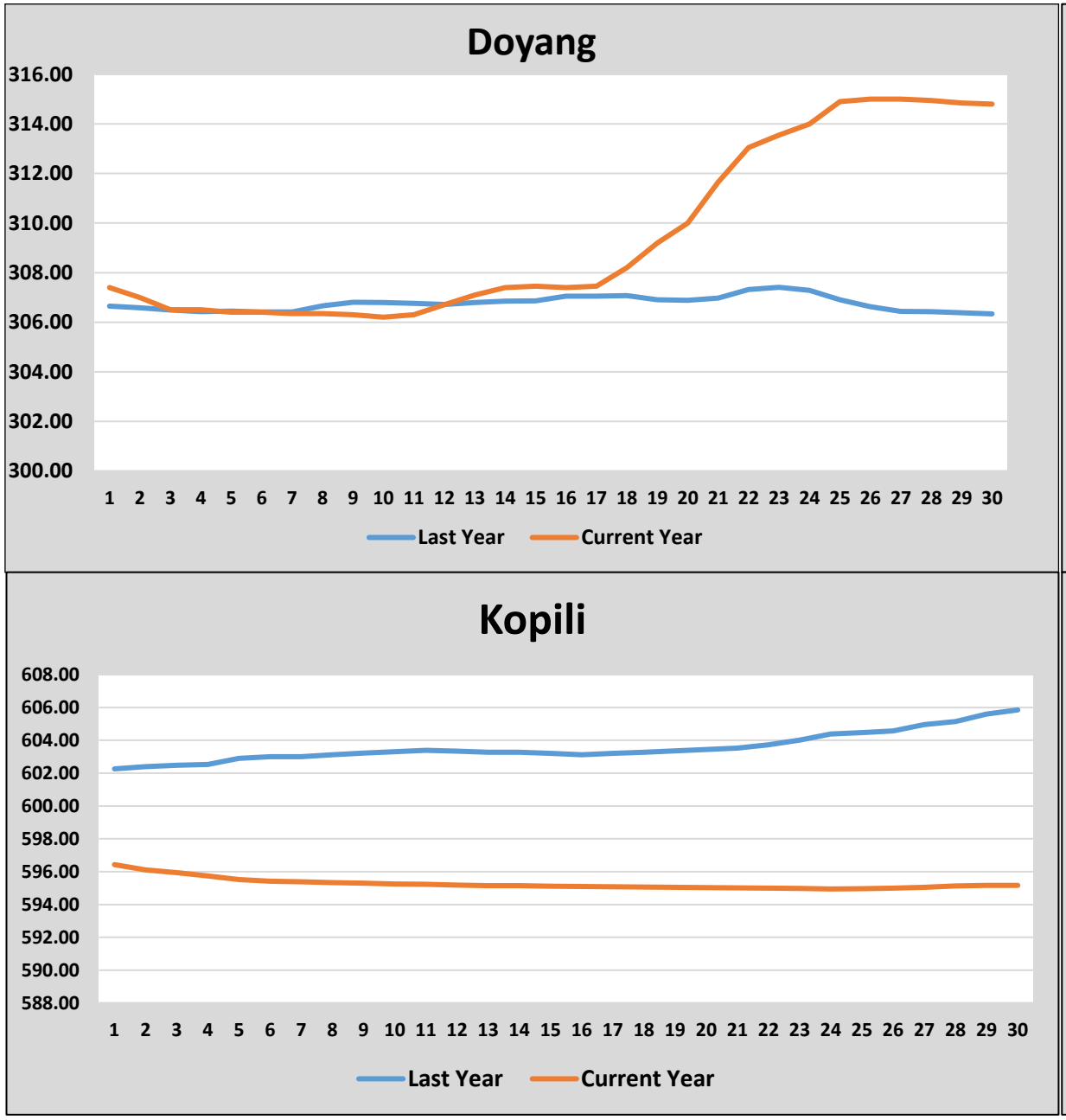


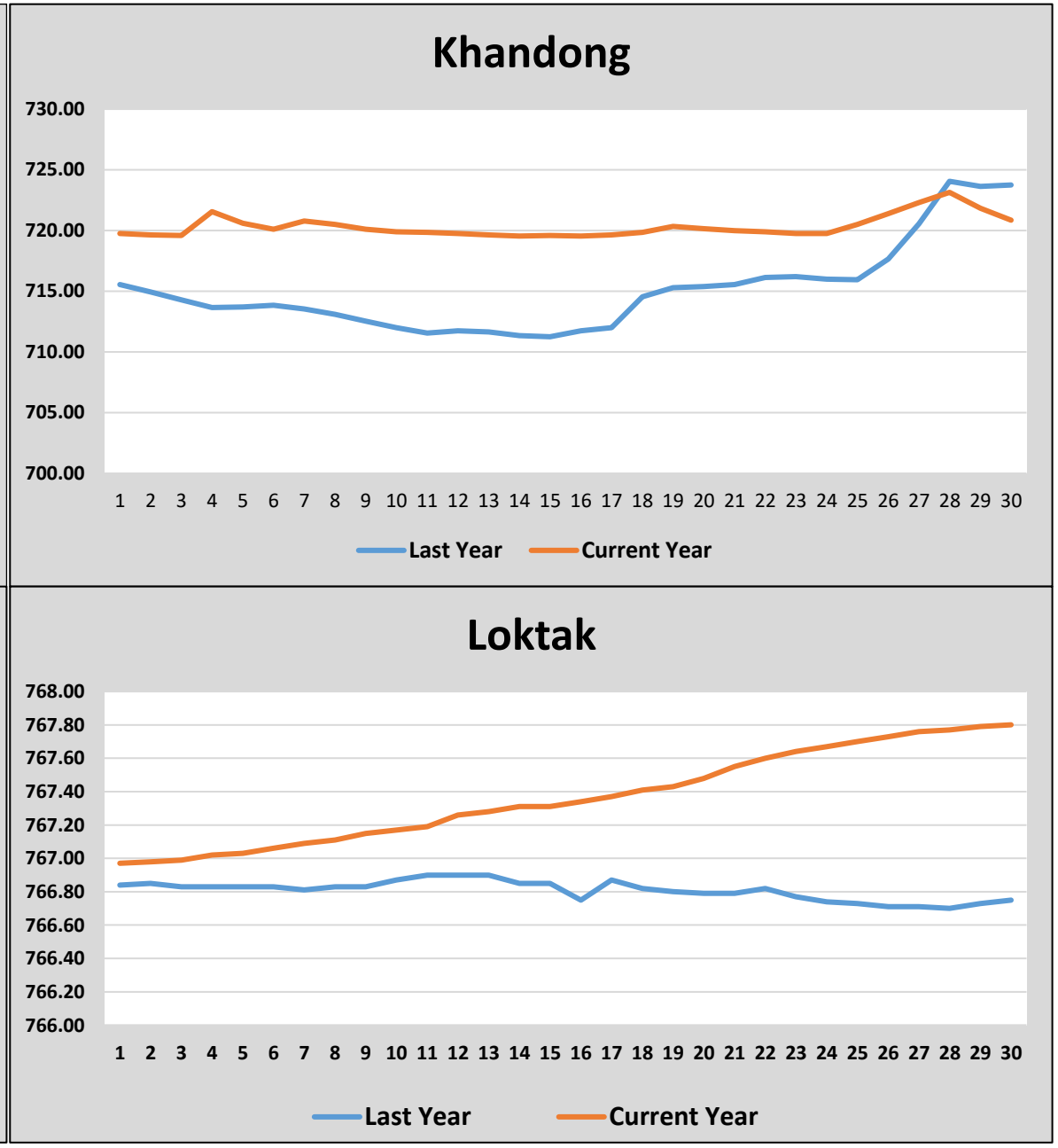
Return to Index

Number of Days as per Current Hydro Generation

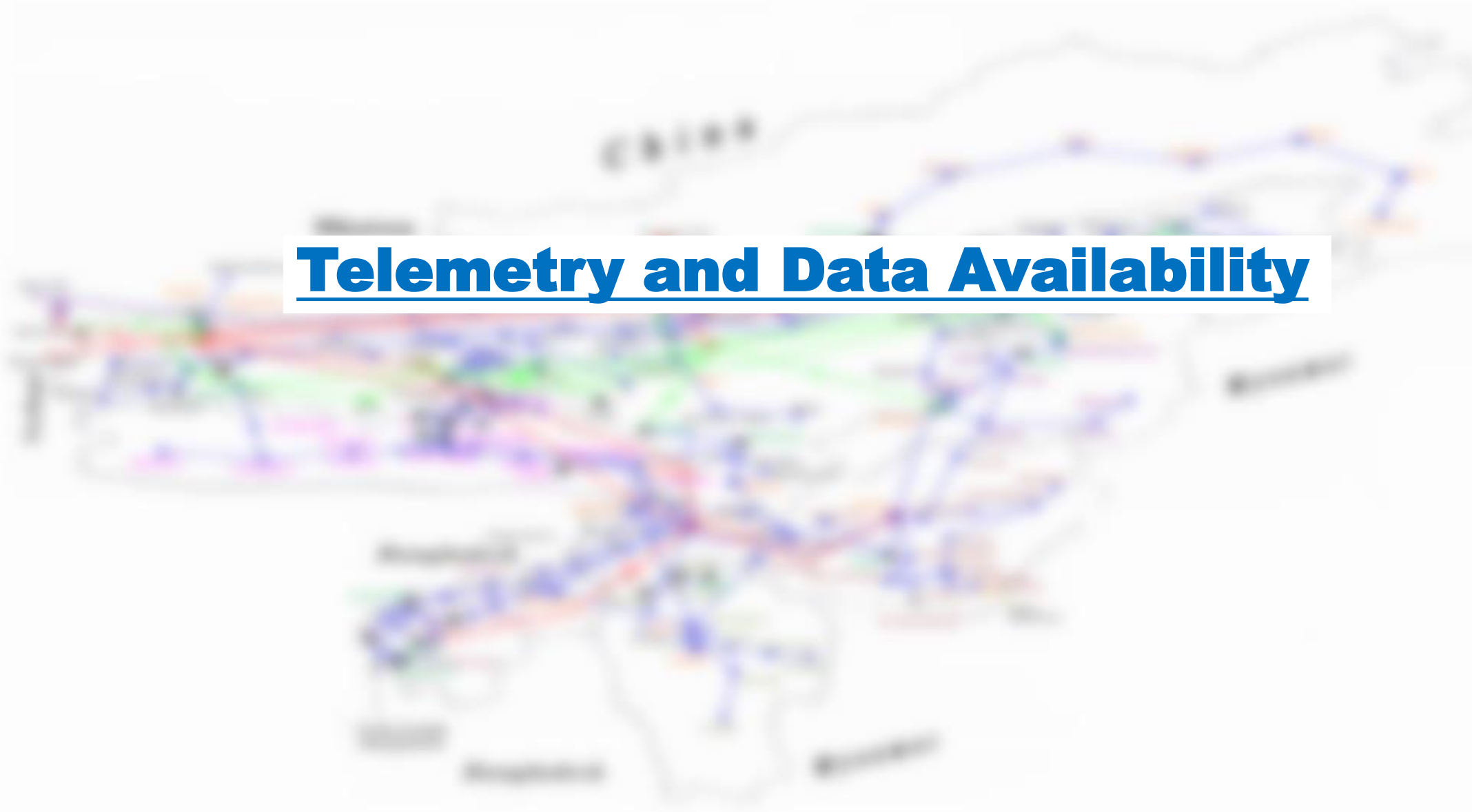
Plants	Reservoir Level in meters (as on 30/06/2020)	MU Content	Present DC (MU)	No of days as per current Generation
Khandong + Kopili STG II	720.85	27.61	0	-
Kopili	-	-	-	-
Doyang	314.80	11.8	1.14	10
Loktak	767.34	93	1.80	52

RESERVOIR LEVEL – June 2020

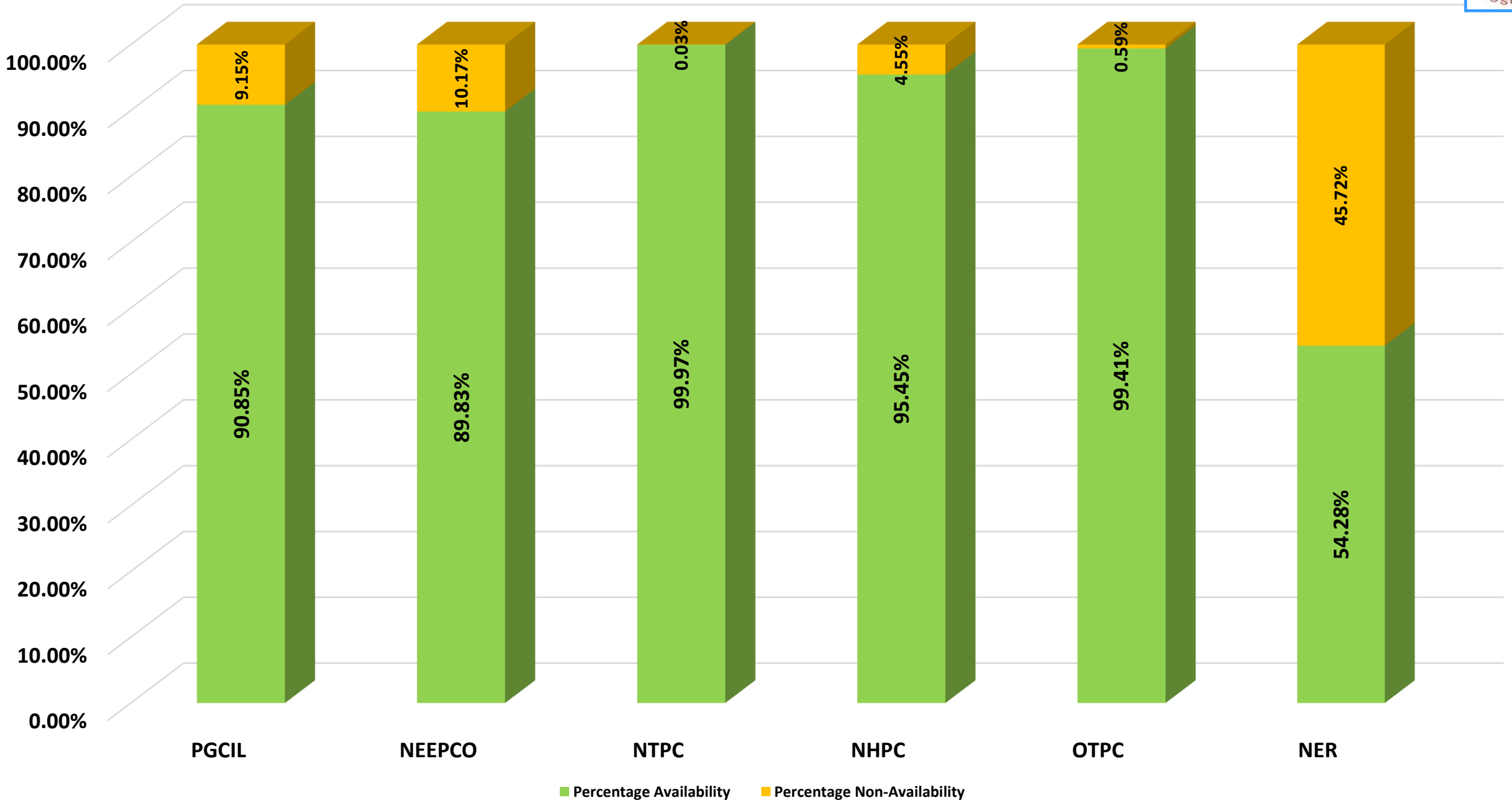




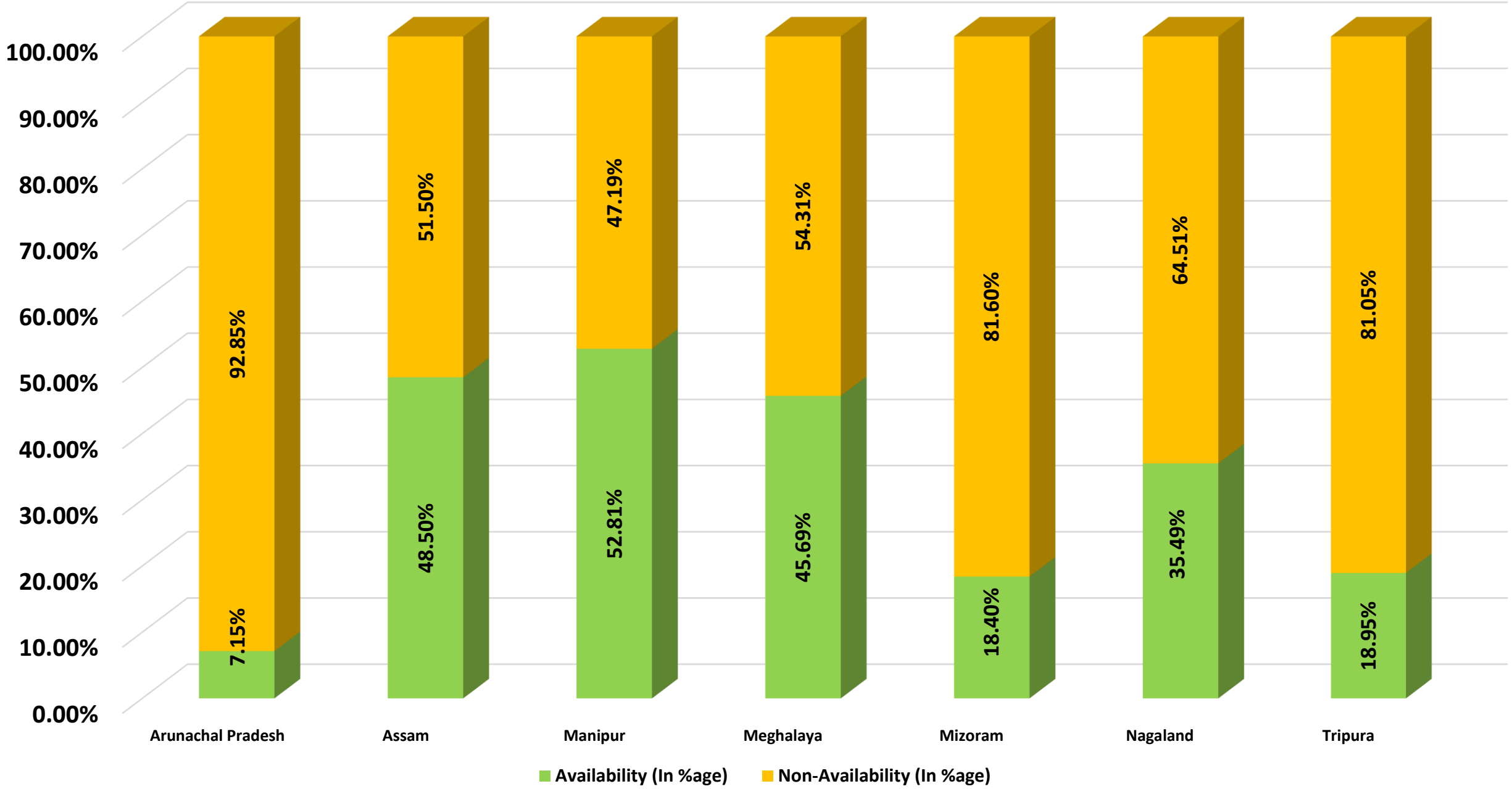
Telemetry and Data Availability



Telemetry Statistics for Central Sector of NER (Average availability of data for the Month of May'20)



Telemetry Statistics for NER States (Average availability of data for the Month of May'20)



METERING STATUS REVIEW

D.13 SEMs to be Procured

- In 167th OCCM NERTS informed that work order has been placed to M/s L&T. The party informed that production is in advanced stage of completion. With testing and inspection, the same shall be ready for dispatch by 30.06.20. Delivery of meters is expected by first week of July'20.
- **Status Review**

D.14 SEM time drift:

- In 167th OCCM NERTS informed that the time drift reports shall be furnished by 19.06.20. NERLDC requested Nagaland to send the time drift report on weekly basis.
- **Status Review**

Return to Index

Additional Agenda items

D.15 Shutdown of Bay/bay elements prior to CoD:

- Post FTC, any testing activities on elements might cause grid instability and thus is a threat to grid safety.
- Shutdown approval for any such activities should be taken from OCC Forum, even if CoD of the element is pending.

D.16 Delay in submission of compliance status of recommendations of Third Party Protection Audit

- As per the 54th PCC meeting held on 22nd January, 2020, target for submission of compliance of Thrid Party Protection audit status was Feb'20. Status of the same may be discussed.

Additional Agenda items

D.17 Status of NERPSIP, Comprehensive Scheme of Transmission & Distribution System in Arunachal Pradesh & Sikkim and TBCB projects

- Status of transmission lines being constructed under the various schemes mentioned above may be discussed
- Regarding the TBCB projects, A review was taken on 16.07.2020 regarding progress of works pertaining to the projects being undertaken by M/S Kalpataru and M/S Sterlite in presence of NERTS and NERLDC in which the following timelines have been given by them:
  - 400 KV link Imphal-New Kohima-New Mariani(PG) - by end of July,2020.
  - 400 KV PK Bari-SM Nagar D/C - by Sept'2020
  - 400 KV Silchar-Misa D/C - by Nov'2020.
  - 132 kV BnC – Itanagar D/C with one ckt LILO at Gohpur – by Dec' 2020
  - 132 kV AGTCCPP – P.K Bari D/C – by Sept'2020

Additional Agenda items

D.18 Status of Renovation and Upgradation works under PSDF funded projects

- Substation wise status of works should be monitored in very OCC meeting- States may please give furnish the substation wise status report

D.19 Restoration of Khandong- Kopli- Misa link

- Already covered in Agenda D.4

D.20 Effect of COVID-19 pandemic on planned shutdown management

- As many as 111 numbers of shutdowns approved for the period of 25th March 2020 to 30th April 2020 out of total 128 numbers could not be availed by the constituents of NER – Constituents may update the status of these shutdowns whether they have already availed the same.

Additional Agenda items

D.21 Improving SCADA data availability & expediting communication network projects

- The present SCADA data availability in NER is around 54%, which is causing great difficulties in real time grid operations
- Although, as per Minutes of 18th TCC meeting (Agenda B.11), the target date for completion of NER FO expansion and Micro-Wave vacation projects was November 2018, the projects are still under implementation.
- Status of the projects and completion targets may be discussed

Return to Index

Thank You

Phase Sequence Correction of NER grid

Tripping of 132 kV Badarpur-Khlieriat Line at 14:20 Hrs on 15/04/2020

Analysis of DR output from Badarpur:

Fault initiation: Fault start at 14:20:45.261 Hrs ; Fault characteristics: ***Y-N fault*** ; Iy: 7.6 kA, In: 7.5 kA;Vye:41 kV; Detection of fault/Trip: Z-1 at 14:20:45.275 Hrs, Angle between V& I of faulty phases during fault : -56 Degrees (Sudden increase in current indicates SOLID fault) , Status of Carrier/DT Signal: Yes ;carrier recieved: No; Status of auto recloser:Not Operated; Fault clearance time: 62 msec.

Analysis of DR output from Khlieriat:

Fault initiation: Fault start at 14:20:45.269 Hrs ; Fault characteristics: ***Y-N fault*** ; Iy: 1.0 kA, In: 1.0 kA;Vye:33 kV; Detection of fault/Trip: Z-2 at 14:20:45.281 Hrs, Angle between V& I of faulty phases during fault : -60 Degrees , Status of Carrier/DT Signal: NO ;carrier recieved: NO; Status of auto recloser:Not Operated; Fault clearance time: 538 msec.

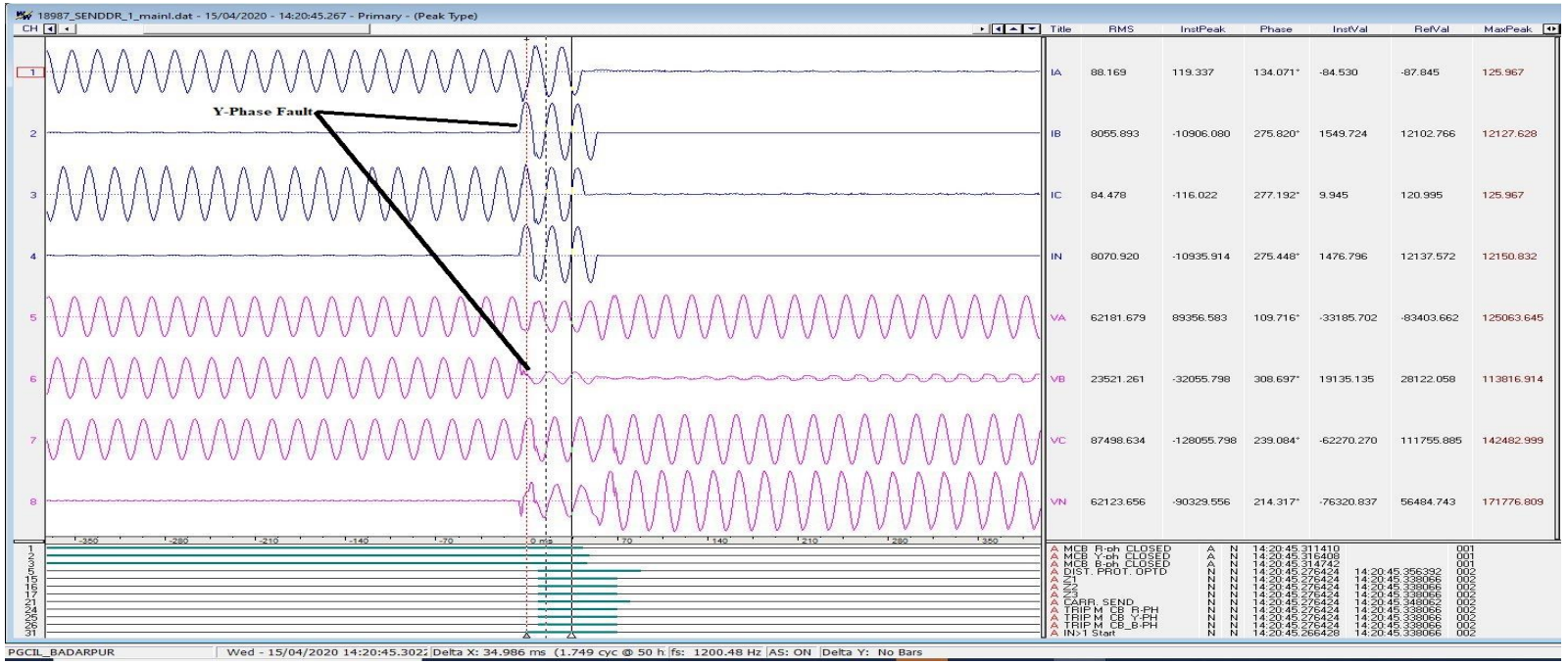


Figure-1: DR snapshot of Badarpur end

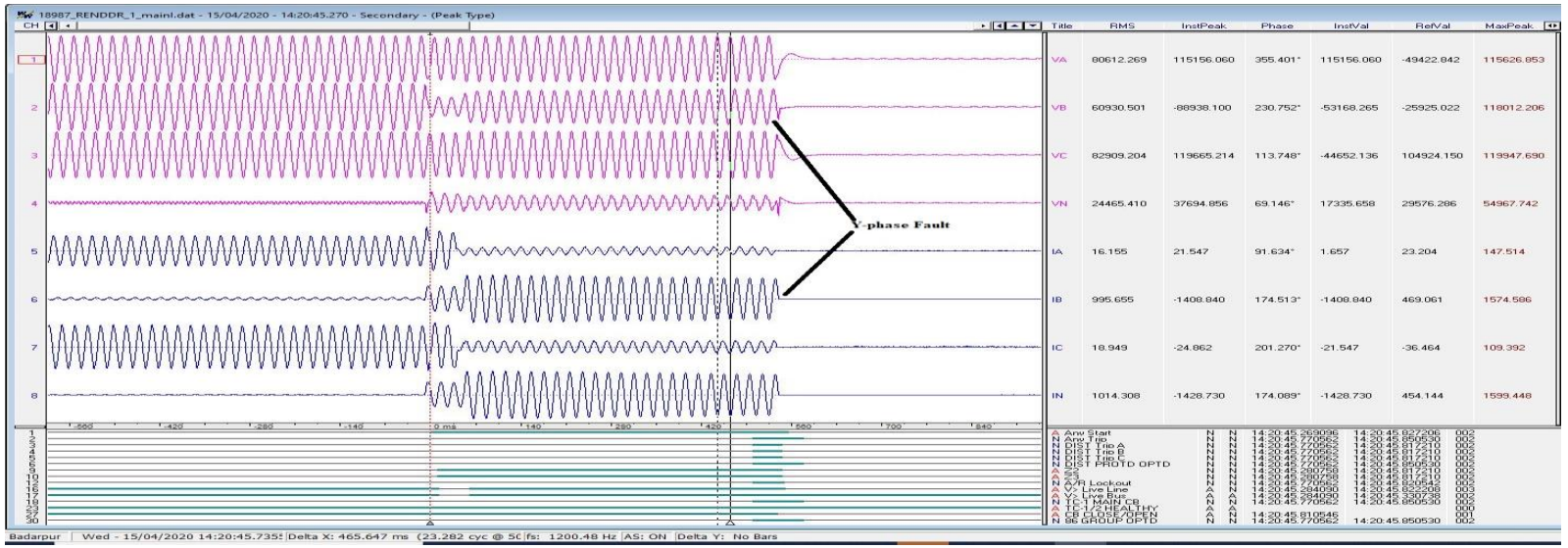


Figure-2: : DR snapshot of Khlieriat end

Tripping of 132 kV 132 kV Badarpur-Khlieriat Line at 14:20 Hrs on 15/04/2020

Analysis of events as per PMU:

Fault start at 14:20:45.360 Hrs as per PMU of 132 kV Badarpur-Khliehriat line,

Fault Type:

1) As per voltage signal ***R-E fault*** (67 kV dip) which is shown in Figure-1

2) As per Current signal ***Y-E fault*** (6.2 kA rise) which is shown in Figure-2

Figure-1: PMU Voltage Signal of 132 kV Badarpur-Khliehriat

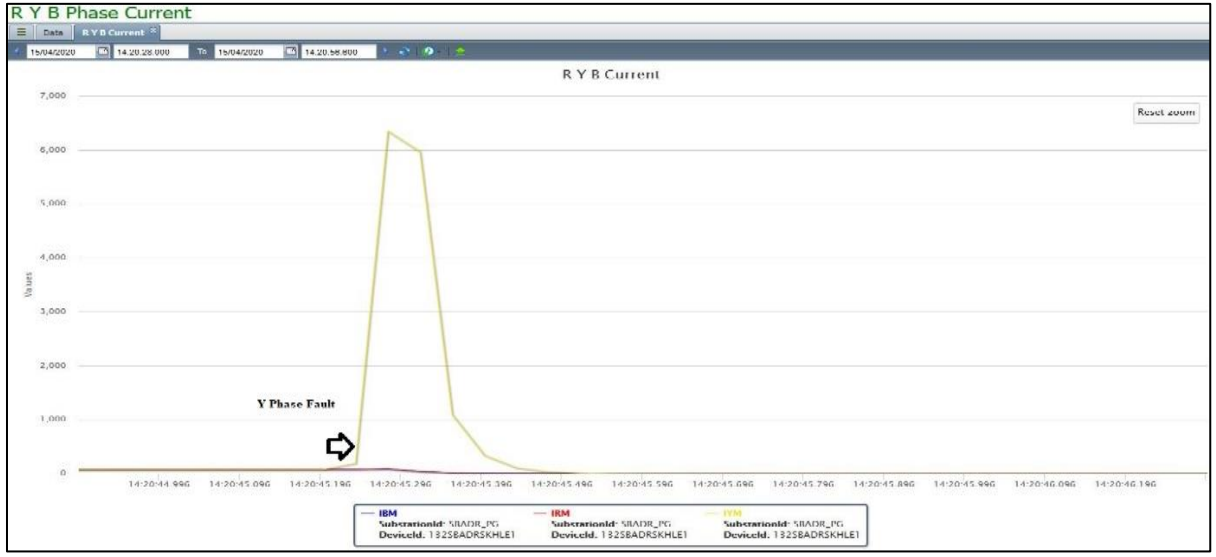


Figure-2: PMU Current Signal of 132 kV Badarpur-Khliehriat

Back

Minutes of Reactive Power Capability Testing at LOKTAK HEP (NHPC) conducted remotely from NERLDC Control Room on 17-07-2020

Representatives from NERLDC, POSOCO (at NERLDC Control Room)

1. Sourav Mandal, Dy. Manager (S.O 1)
2. Sumit Kumar, Dy. Manager (S.O-1)
3. Kritika Debnath, Engineer (S.O-1)

Representatives from LOKTAK HEP, NHPC (at Loktak HEP)

1. CL Khayuingam, SM(E)
2. Anirban Bhattacharjee, Manager (E)
3. Saurav Das, AM (E)
4. Arunabha Mukherjee, Engineer (E)

As per discussion in 166th OCC Meeting, Reactive Power Capability Testing was scheduled be conducted at Loktak in April 2020. But due to COVID-19 lockdown the same could not be conducted as per schedule. Thus, NERLDC conducted the reactive power capability test at Loktak HEP remotely from NERLDC control room on 17-07-2020. The test was conducted in close coordination with Loktak HEP while discussing over VOIP phone. All deliberations, exchange of information, readings, etc. was done through VOIP phone. The test was conducted as per the procedure approved by OCC Forum for Reactive Power Capability Testing. Due to high water level at Loktak reservoir, tests were conducted on Loktak Unit-1 only in place of all the three units. The tests were conducted in the load levels of 35 MW (full load), 25 MW (loading just above cavitation zone) and 8 MW (loading just below cavitation zone). Test readings are attached as Annexure. The observations and recommendations by NERLDC during the testing are as follows:

1. **Low absorption of MVAR at 35 MW and 25 MW load levels due to Load angle limiter alarm in AVR:**
   The absorption of MVAR at Leading p.f was lesser than the absorption capability of the unit as per the Capability Curve. The absorption was limited due to hitting of limit which resulted in activation of Load angle limiter alarm. NHPC was requested to check and correct the AVR load angle limiter setting.
2. **Mal operation of field failure alarm during MVAR absorption test at loading of 8 MW:**
   The field failure alarm wrongly activated during absorption of MVAR at loading of 8 MW. The alarm was activated while the unit-1 was absorbing around 4.5 MVAR which is lower than the absorption capability of the unit at 8 MW as per the Capability Curve. After observation of mal operation of field failure alarm, the test was continued by reducing AVR Vref such that absorption was continued below 4.5 MVAR and it was continued upto around 10 MVAR without any issues. NHPC was advised to check and correct the mal operation of the filed failure alarm.
3. **Disruption of voice communication (VOIP) and SCADA data during the testing**
   The voice communication via VOIP phone over which coordination was being done between NERLDC and Loktak interrupted twice during the 1 and ½ hour duration of testing. It was also observed that during this interruption of voice communication, SCADA/Telemetry data (RTU) reporting at NERLDC which is through PG OPGW was also interrupted. Both SCADA/Telemetry data and voice communication automatically got restored after around 10-15 minutes. The issue needs to be resolved after finding the rot cause of such disruption.

Date: 17/07/2020 (LOKTAK Test Result)		Temperature		Gross Generator Output		Net Output to system			Voltage		System	Station Service Load		Current			Remarks
		Stator	Field	Real Power	Reactive Power	Real Power	Reactive Power	Hydrogen Pressure	Gen Terminal Voltage	Auxiliary Bus Voltage (secondary side of UAT)	Bus Voltage (HV)	Real Power	Reactive Power	Stator current	Field voltage	Field current	
Sl. No.	Time	(Celsius)	(Celsius)	MW	MVAr	MW	MVAr	PSIA	kV	V	kV	MW	MVAr	Amp	Amp	Amp	
Unit 1 Leading																	Under Voltage setting : 7.7 kV
1	16:05	84.5	54	35.1	-1.35				10.58	379	130.2			1937	85	750	Load angle limiter alarm hit
2	16:32	78.1	54.1	25	-4.77				10.45	370	130.2			1430	70	520	Load angle limiter alarm hit
3	16:54	68	54.1	8	-4.6				10.45	374	129.4			518	50	400	Field failure alarm hit
4	16:56	65.2	53.9	8	-9.63				10.24	366	129.4			714	40	400	
Unit 1 Lagging																	
1	15:26	84	54.1	35.2	2.9				10.746	385 V	130.3			1932	90	600	Over Voltage setting : 13.2 kV with 1 sec dealy; 15.4 kV instantaneous
2	15:58	84.2	54.2	35.2	8.8				10.99	394 V	130.8			1930	100	870	No alarm. Stopped on plant operator's request.
3	16:18	83	54	25.2	8.6				11.01	394	130.7			1420	90	800	No alarm. Stopped on plant operator's request.
4	16:24	81.6	54.1	25.2	10.2		-		11.09	397	131			1421	100	850	No alarm. Stopped on plant operator's request.
5	16:42	74.4	54.1	8.2	12.51				11.13	389	131.1			785	90	800	No alarm. Stopped on plant operator's request.

By signing below, I as an authorised representative of the generator listed in this form certify that the data submitted for the lagging and leading reactive power Capability Tests accurately demonstrate the reactive lagging and leading power of the generator at the time of test

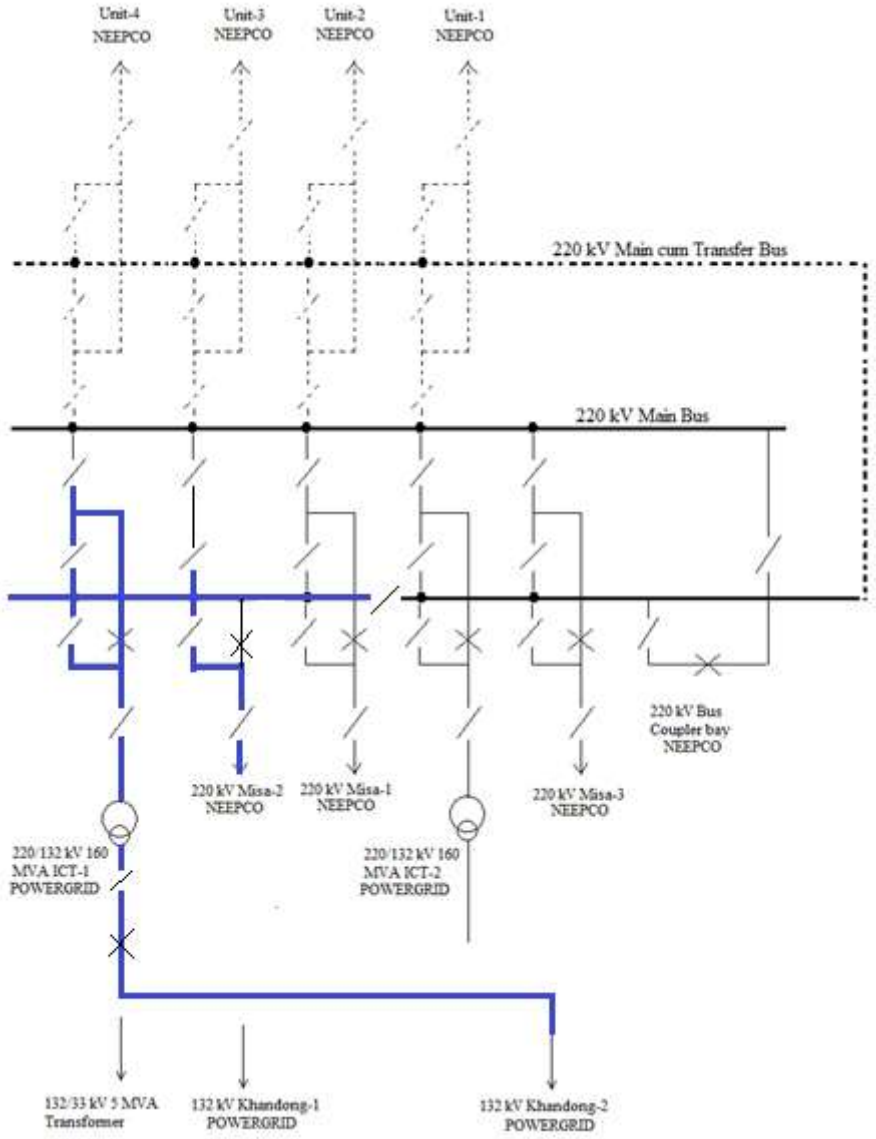
Signature: Khayinga

Name: CL Khayiingam

Date: 17/7/2020

Annexure -D.4

Plan for temporary restoration of power through Kopili Switch Yard



Background: At 05:00 Hrs on 07.10.19, the power house and the switch yard at Kopili HEP were badly damaged. The restoration of the 220 kV GT Bays in the switch yard has been taken up by NEEPCO along with the Generators and POWERGRID has made a plan to restore the line and ICT bays along with the three numbers 220 kV Line bays earlier belonging to NEEPCO, within one and half years.

However NERLDC, in the 166th and 167th OCC requested POWERGRID to explore the possibility to temporarily restore at least one 220 kV Line , one 132 kV Line with one 220 /132 kV ICT, as per requirement of the grid, till permanent restoration is done.

Accordingly, the following plan is made:

Restoration of ICT : The 220/132 kV 160 MVA ICT can be put in to service with the following corrective actions:

(1) The 220 kV Side CB shall be put in to service after overhauling of it's driving mechanism and replacement of it's control and power cables. The 220 kV CT control cables are to be replaced.
(2) The ICT has to be attended for all leakages and oil filtration and topping up to be done. The damaged N2 injection system will have to be removed and the Hydrant system restored for fire protection. All local and remote control and power cables are to be replaced. The damaged Online drying out system has to be un installed.
(3) In the 132 kV side of the ICT, the control and power cables to the equipments are to be replaced.

Restoration of one 220 kV Line: The 220 kVMisa-2 line bay is nearest to the ICT-1 220 kV side bay. The line can directly be connected to the 220 kV Main cum transfer Bus using Bypass (Transfer) Isolator. Portion of the 220 kV Main cum Transfer Bus with Misa-1, Misa-2 and ICT-1 bays can be isolated from the rest of the Bus using the existing Sectionalising Isolator mounted on the gantry structure. The dropper to the Misa-2 line bay and all the droppers to the Misa-1 Line bay and it's Transfer Islolator will be removed. This will ensure safe working during restoration of the 220 kV Switch Yard, while keeping the ICT-1 and Misa-2 in service. The three CVTs and three LAs already connected to the line shall continue to be in service.

Since the Misa-2 line shall be connected to the bus using transfer Isolator, it's protection and manual disconnection shall be done through the 220 kV CB of the ICT-1.

Restoration of one 132 kV Line : Since the 132 kV Khandong-2 line has higher capacity due to it's Zebra conductor, this line can be directly connected to the 132 kV side bay of the ICT-1 by using the Aluminium IPS Tube Bus, which is not yet dismantled. Protection and manual disconnection of the Khandong-2 line shall be done through the 132 kV CB of the ICT-1. Also the spare cores of the 132 kV CT of LV side of the ICT can be used for protection of the line.

Control and Protection: The existing prefabricated Kiosk is the switchyards has been dislocated during the devastation. The same will have to be put back in to it's original position. The kiosk housed the Control and Protection panels of both LV and HV side of the ICT-1, the 132 kV Khandong-2 Line and the station transformer, which do not seem to have suffered any damage and can be used for the temporary restoration. One / Two Nos Protection Panels (Main-1 and Main-2) for the 220 kV Misa-2 Line, will have to be diverted from Silchar and placed in this Kiosk or in the GIS Control Room. All local and remote control and Power cables will have to be replaced.

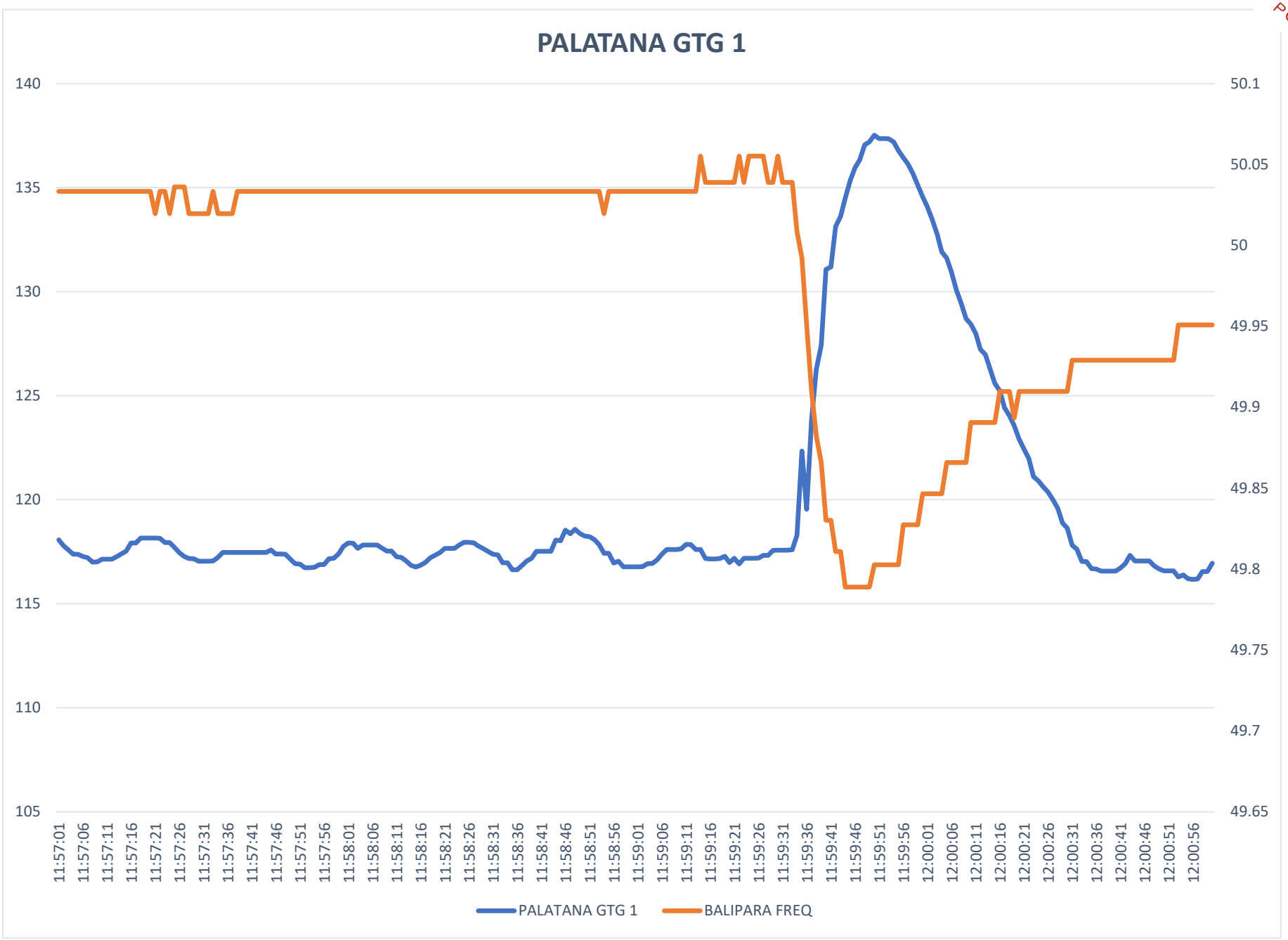
PLCC: PLCC equipment or Kandong already exists in the existing kiosk. One PLCC equipment / Link will have to be diverted from Silchar to establish communication & tele-protection with Misa.

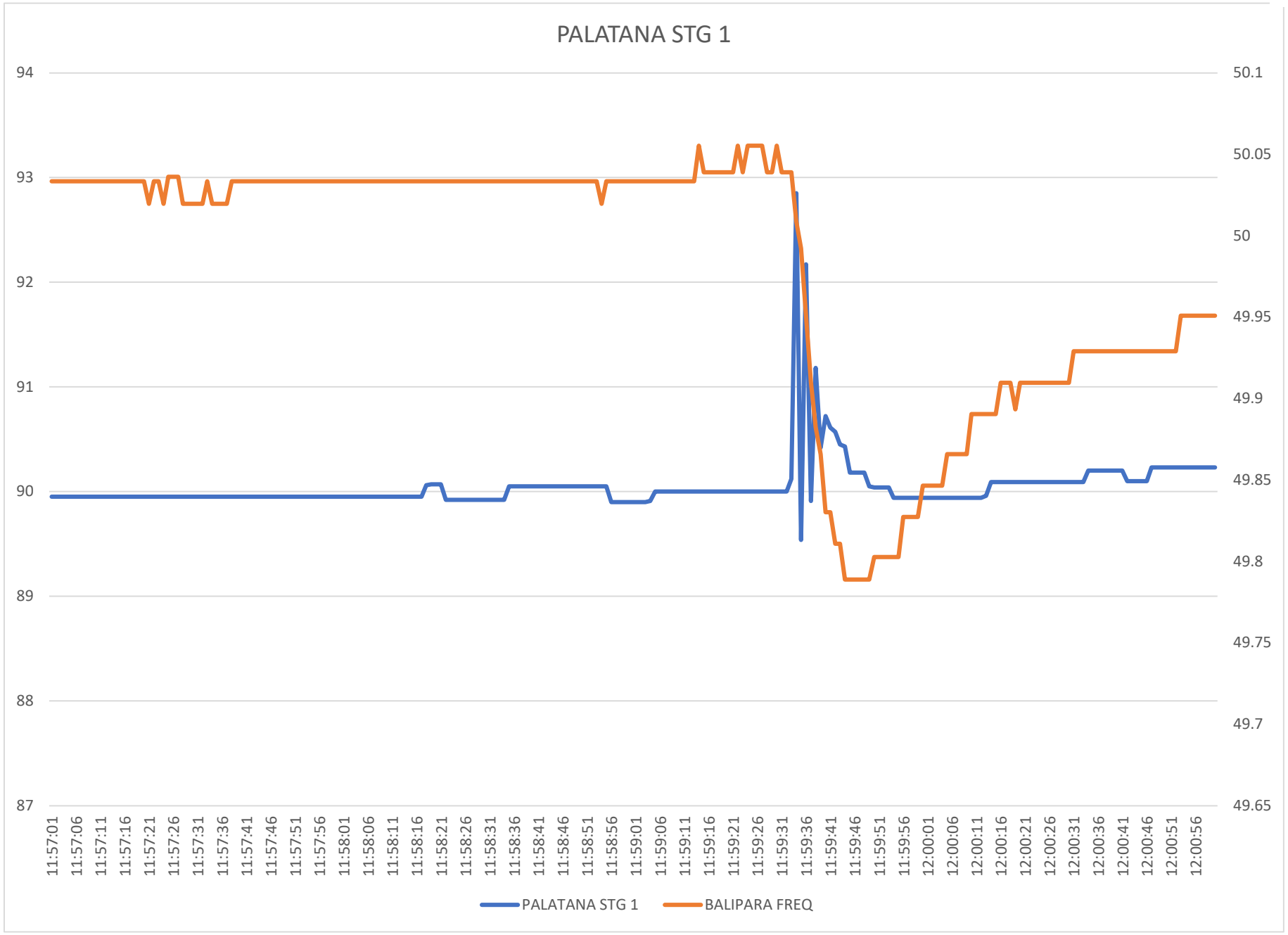
Auxilliary AC and DC Supply :Auxilliary AC Supply can be taken from Khandong Power Station by charging the 132 kV Khandong-1 Line at 33 kV and installing a 33/0.4 kV Transformer at Kopili. For Auxilliary DC supply, the DCDB, DC Charger and the Battery Bank installed in a separate kiosk in the switchyard shall have to be restored / replaced.

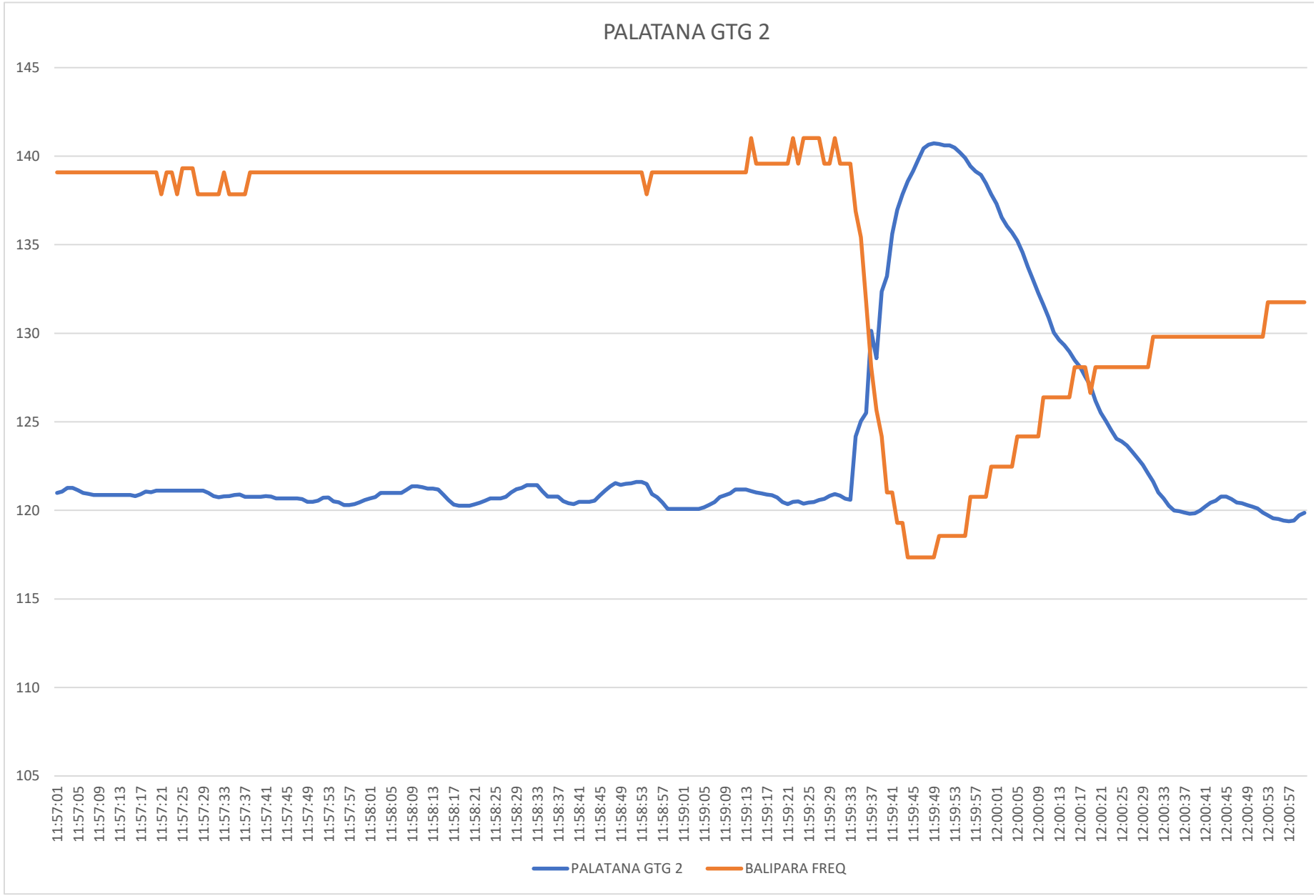
Alternatives: POWERGRID is also exploring the possibility of using mobile 220 kV and 132 kV Bays on hiring basis for temporary restoration of one 220 kV Line, one 132 kV Line and one ICT.

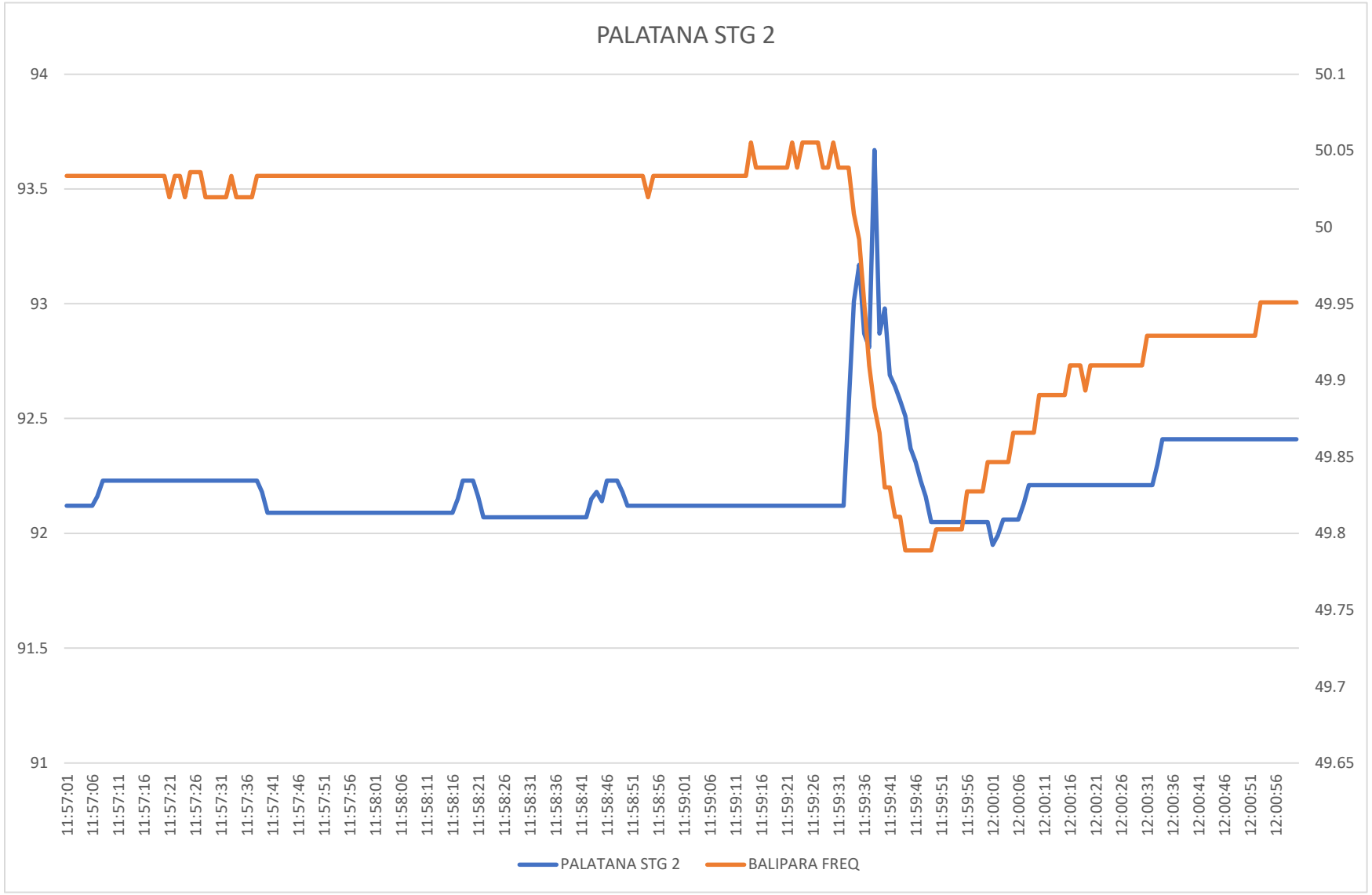
RGMO Analysis for event dated 11th June 2020 causing Gen. Loss of around 2126 MW Solar Gen. in NR Region

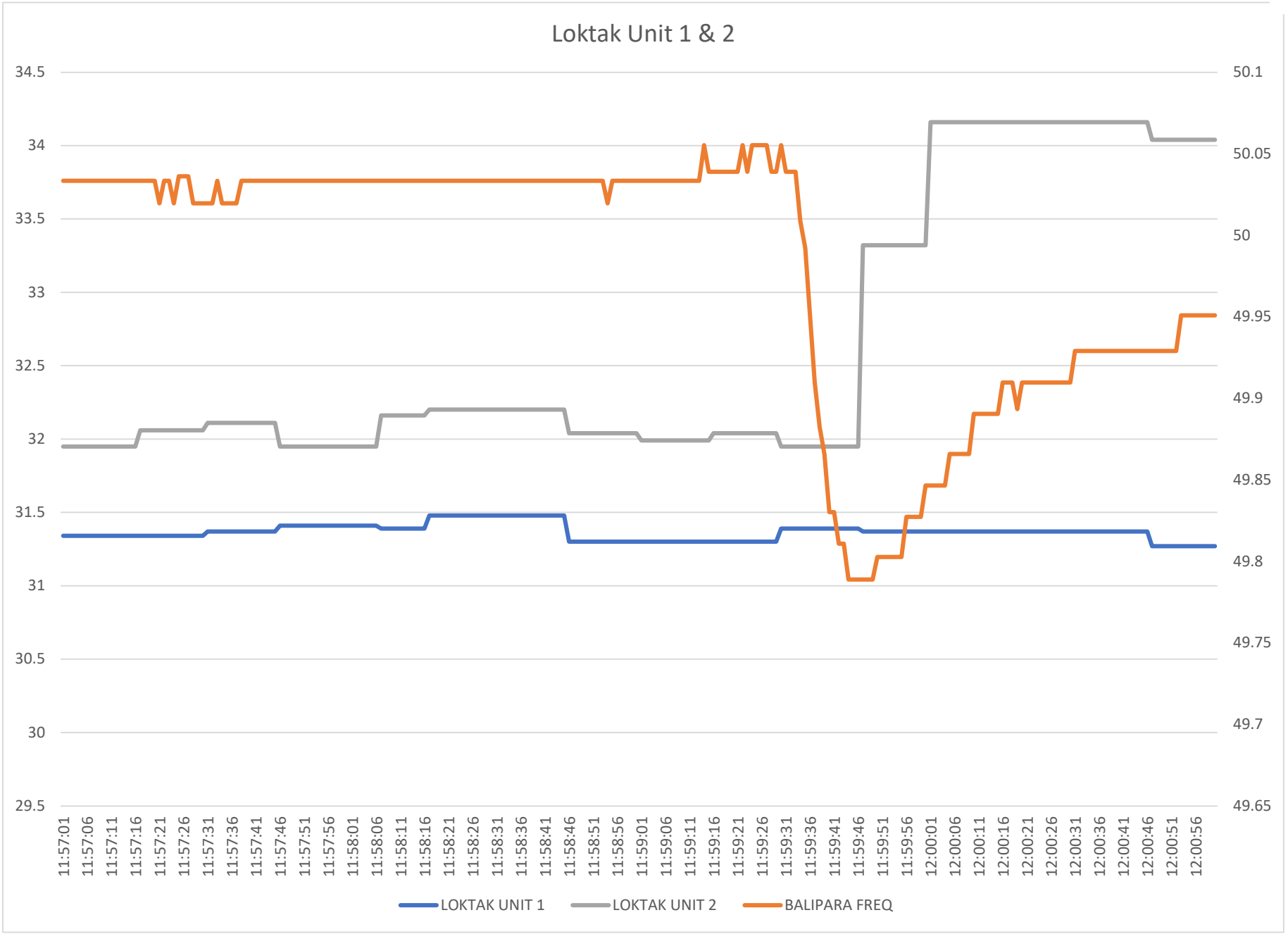
Max Rate of Change of Freq = 0.25 Hz

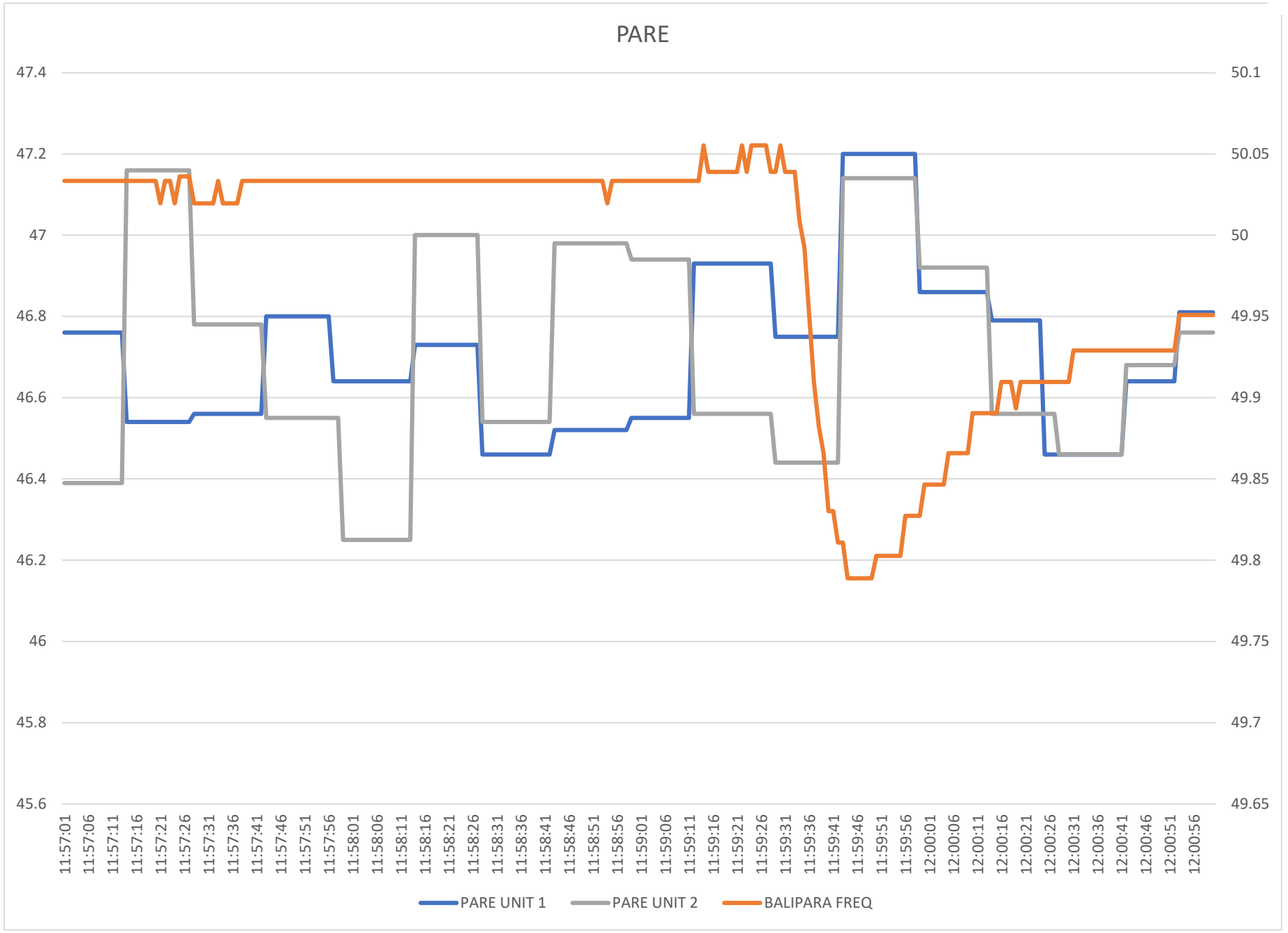

PALATANA GTG 1
140
135
130
125
120
115
110
105
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA GTG 1
BALIPARA FREQ

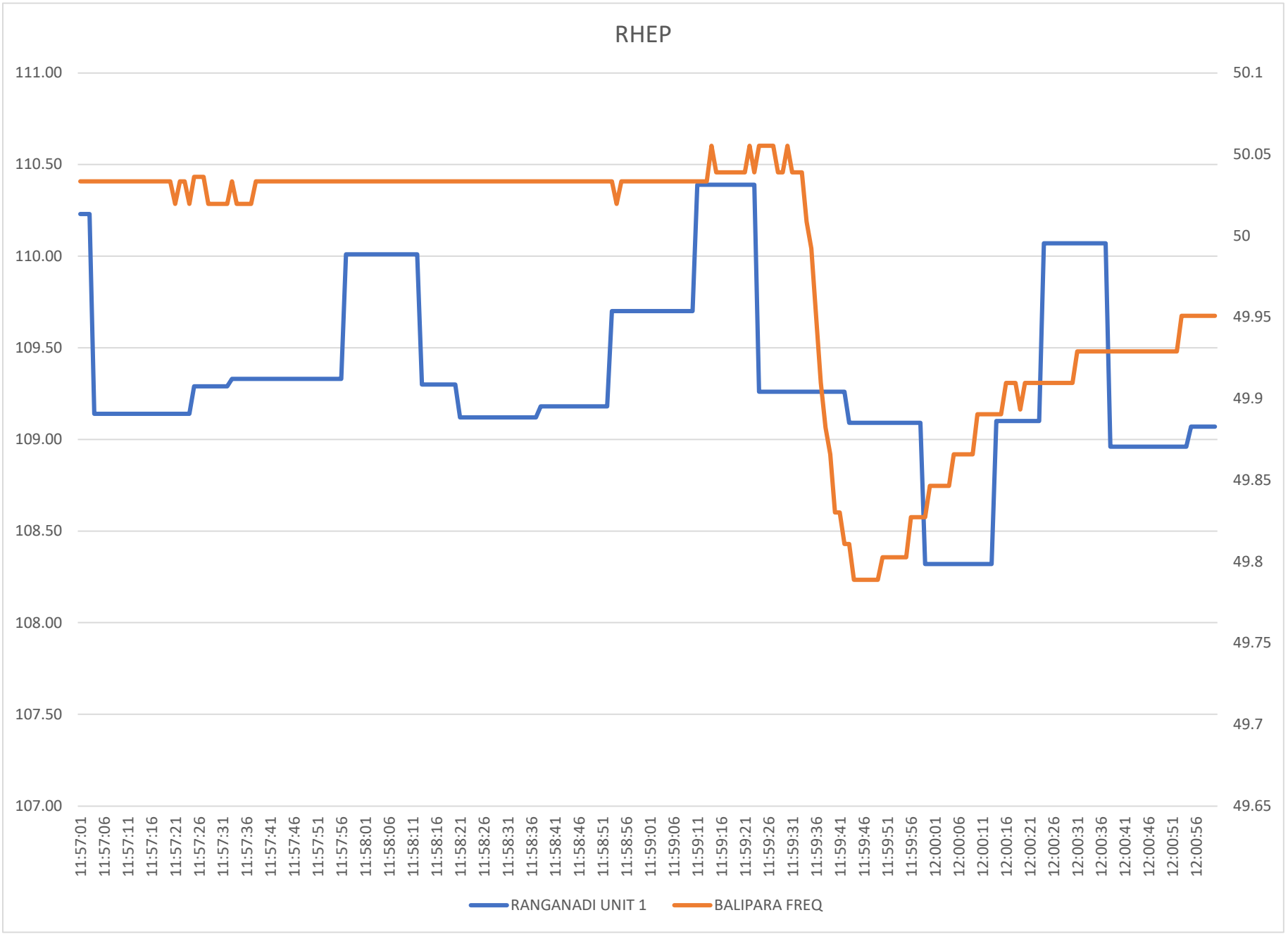

PALATANA STG 1
94
93
92
91
90
89
88
87
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA STG 1
BALIPARA FREQ

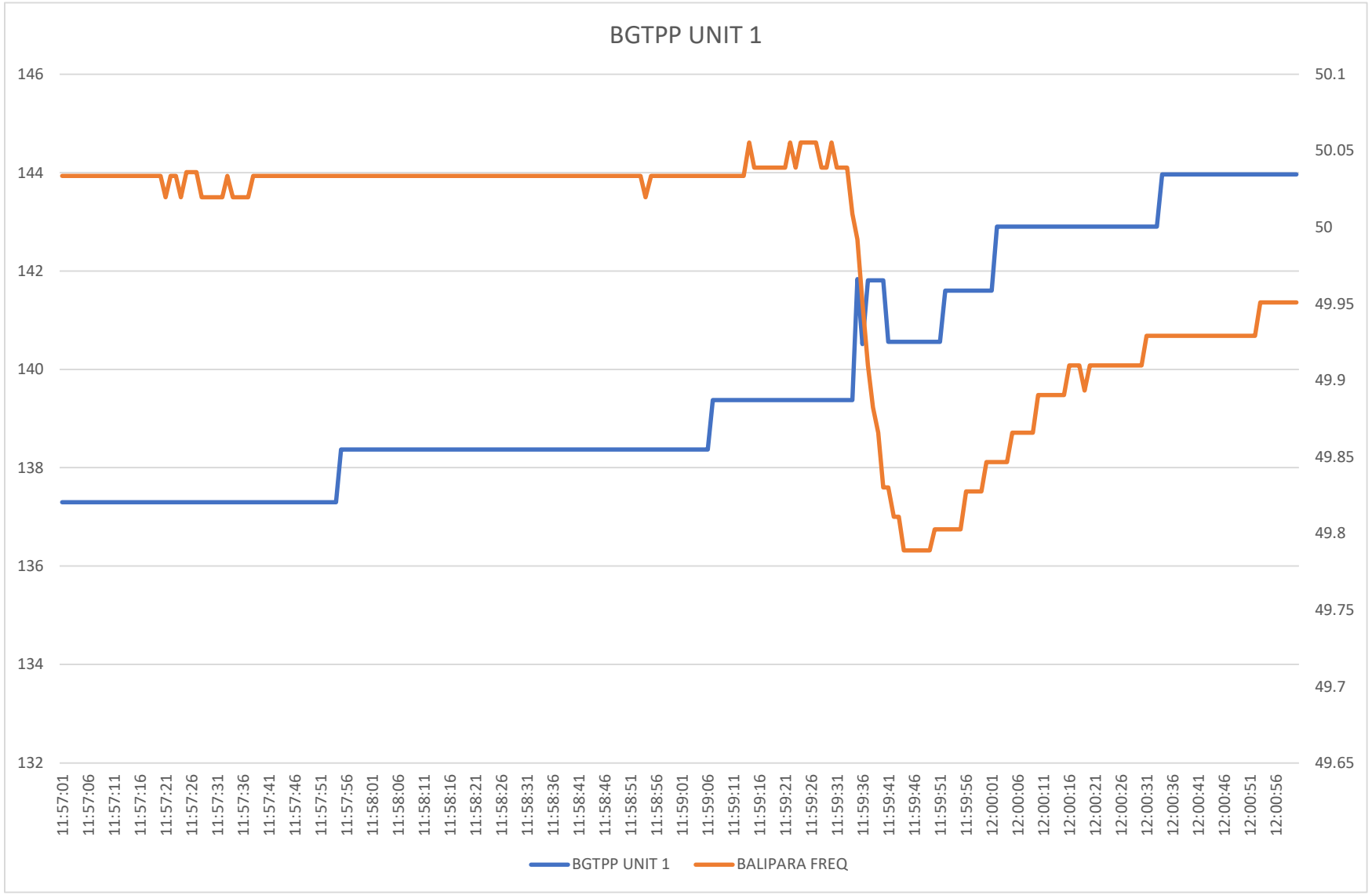

PALATANA GTG 2
145
140
135
130
125
120
115
110
105
11:57:01
11:57:05
11:57:09
11:57:13
11:57:17
11:57:21
11:57:25
11:57:29
11:57:33
11:57:37
11:57:41
11:57:45
11:57:49
11:57:53
11:57:57
11:58:01
11:58:05
11:58:09
11:58:13
11:58:17
11:58:21
11:58:25
11:58:29
11:58:33
11:58:37
11:58:41
11:58:45
11:58:49
11:58:53
11:58:57
11:59:01
11:59:05
11:59:09
11:59:13
11:59:17
11:59:21
11:59:25
11:59:29
11:59:33
11:59:37
11:59:41
11:59:45
11:59:49
11:59:53
11:59:57
12:00:01
12:00:05
12:00:09
12:00:13
12:00:17
12:00:21
12:00:25
12:00:29
12:00:33
12:00:37
12:00:41
12:00:45
12:00:49
12:00:53
12:00:57
PALATANA GTG 2
BALIPARA FREQ

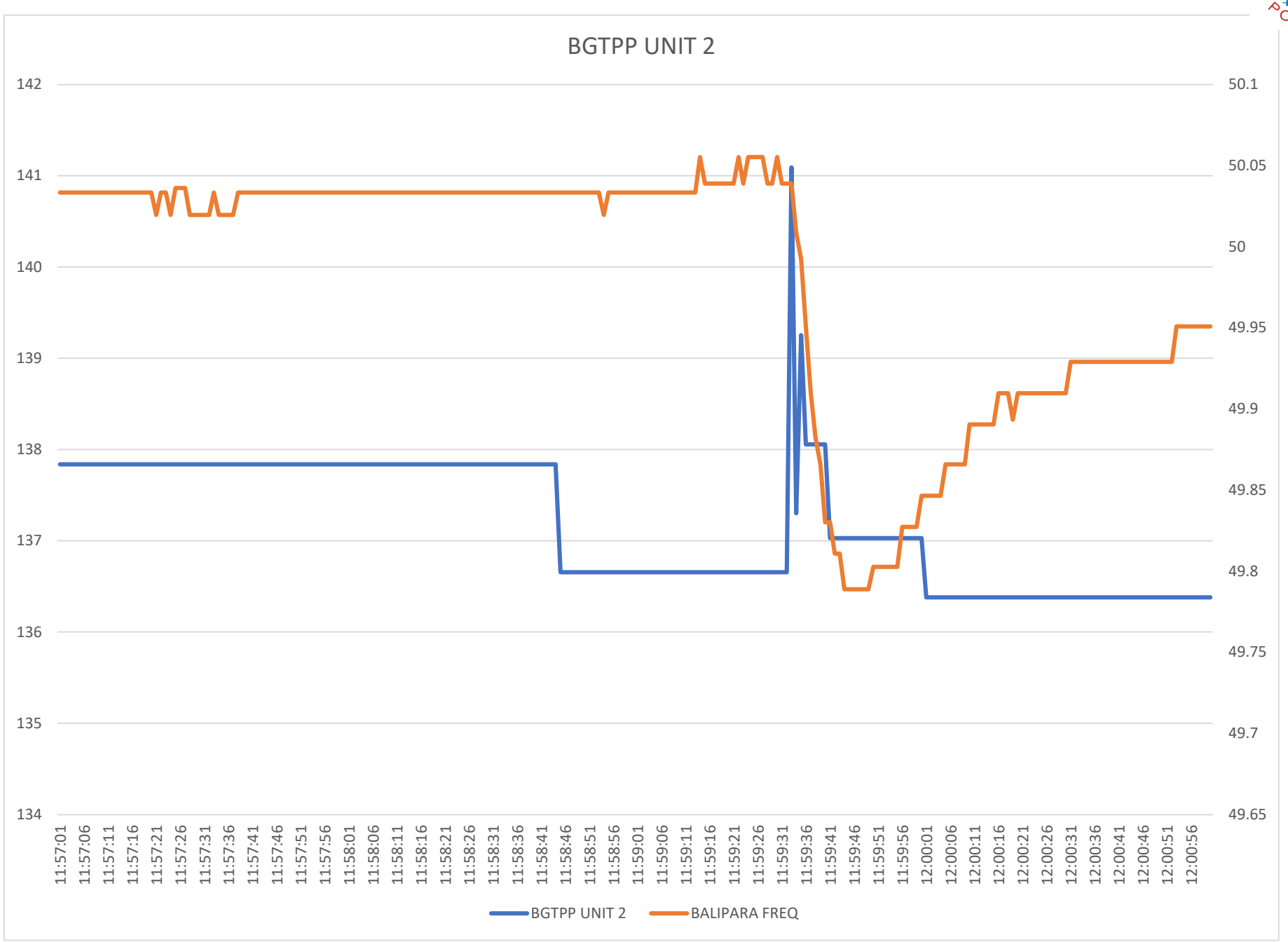

PALATANA STG 2
94
93.5
93
92.5
92
91.5
91
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA STG 2
BALIPARA FREQ

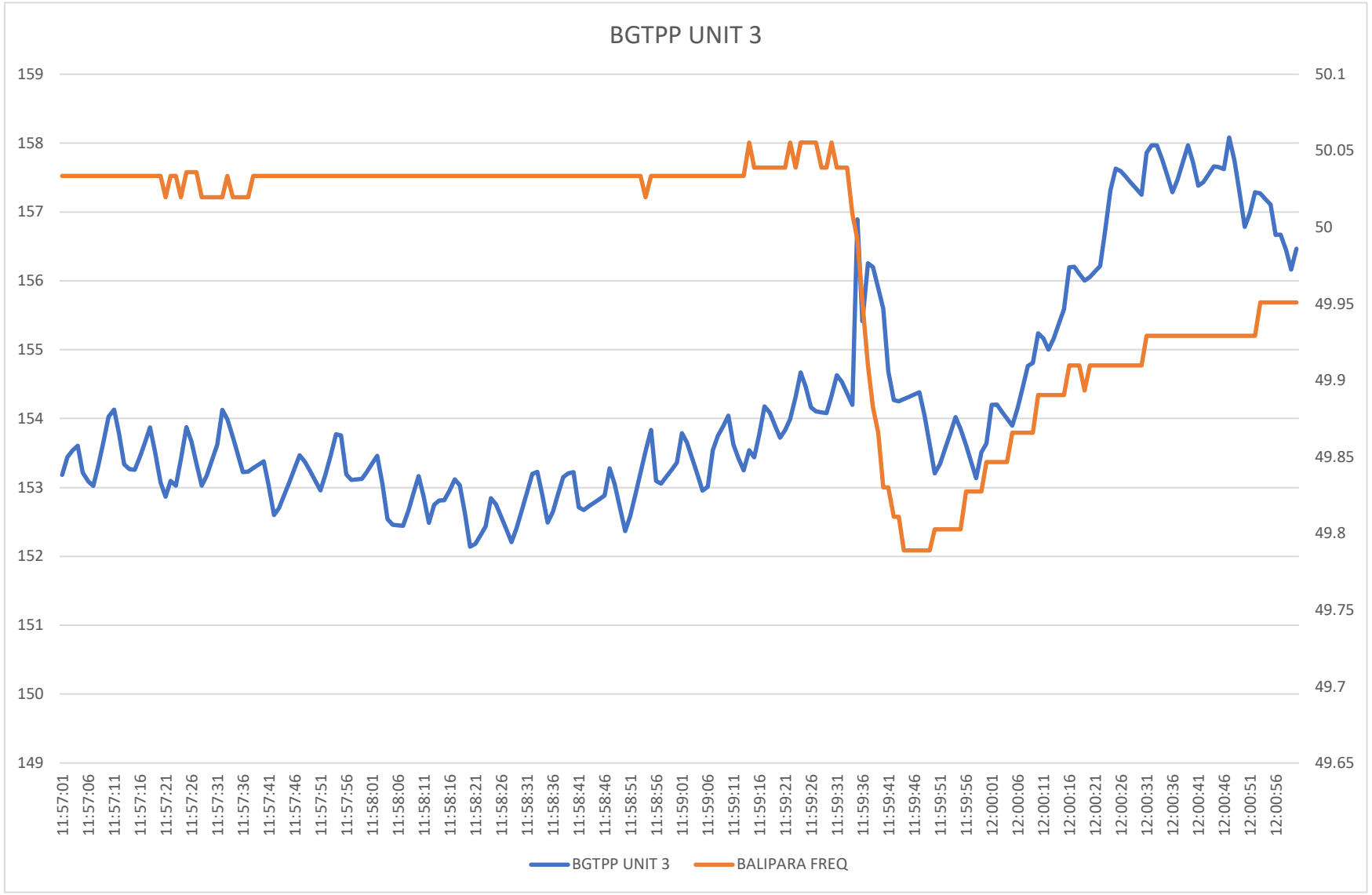

Loktak Unit 1 & 2
34.5
34
33.5
33
32.5
32
31.5
31
30.5
30
29.5
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
LOKTAK UNIT 1
LOKTAK UNIT 2
BALIPARA FREQ

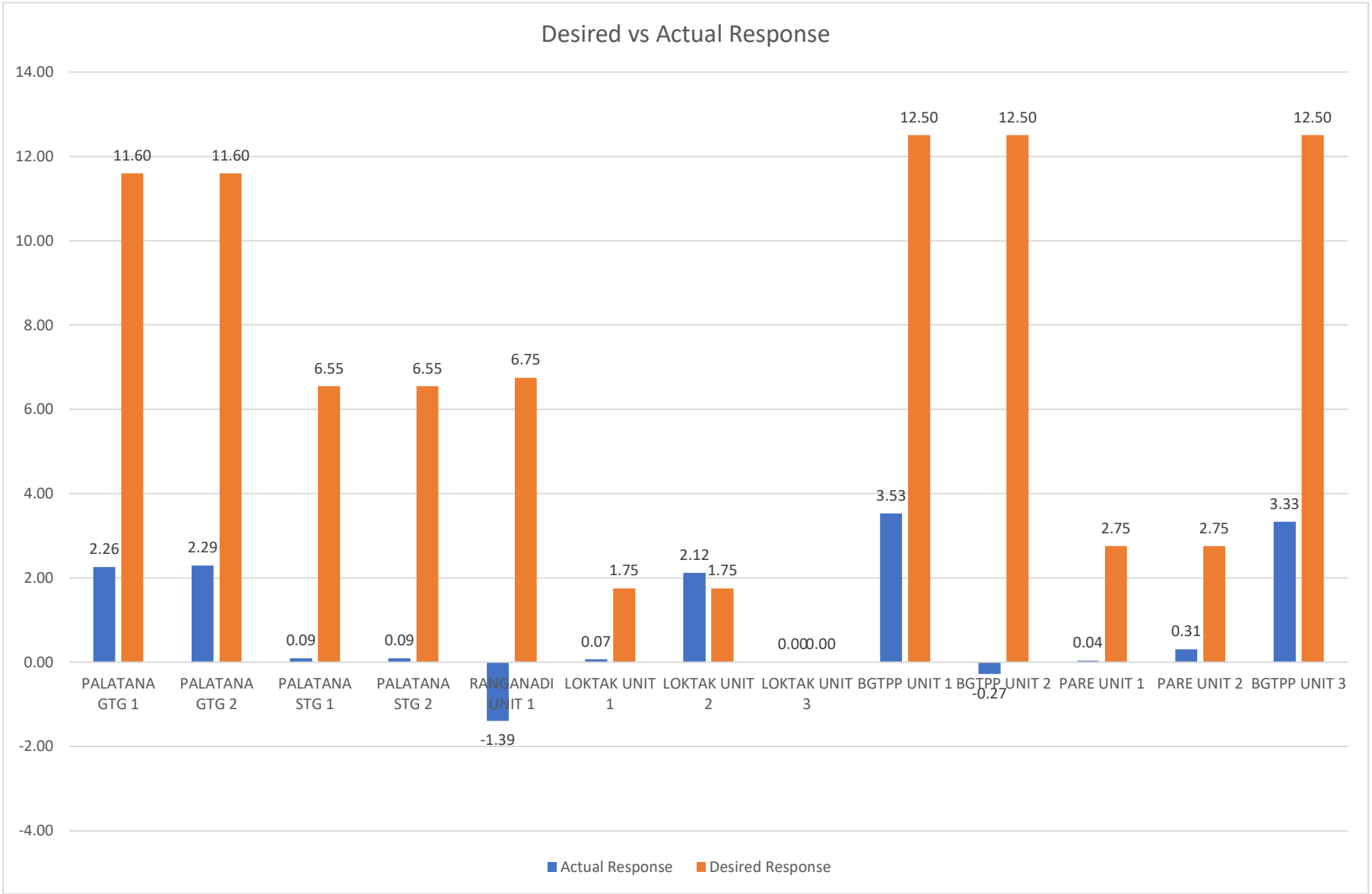

PARE
47.4
47.2
47
46.8
46.6
46.4
46.2
46
45.8
45.6
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PARE UNIT 1
PARE UNIT 2
BALIPARA FREQ

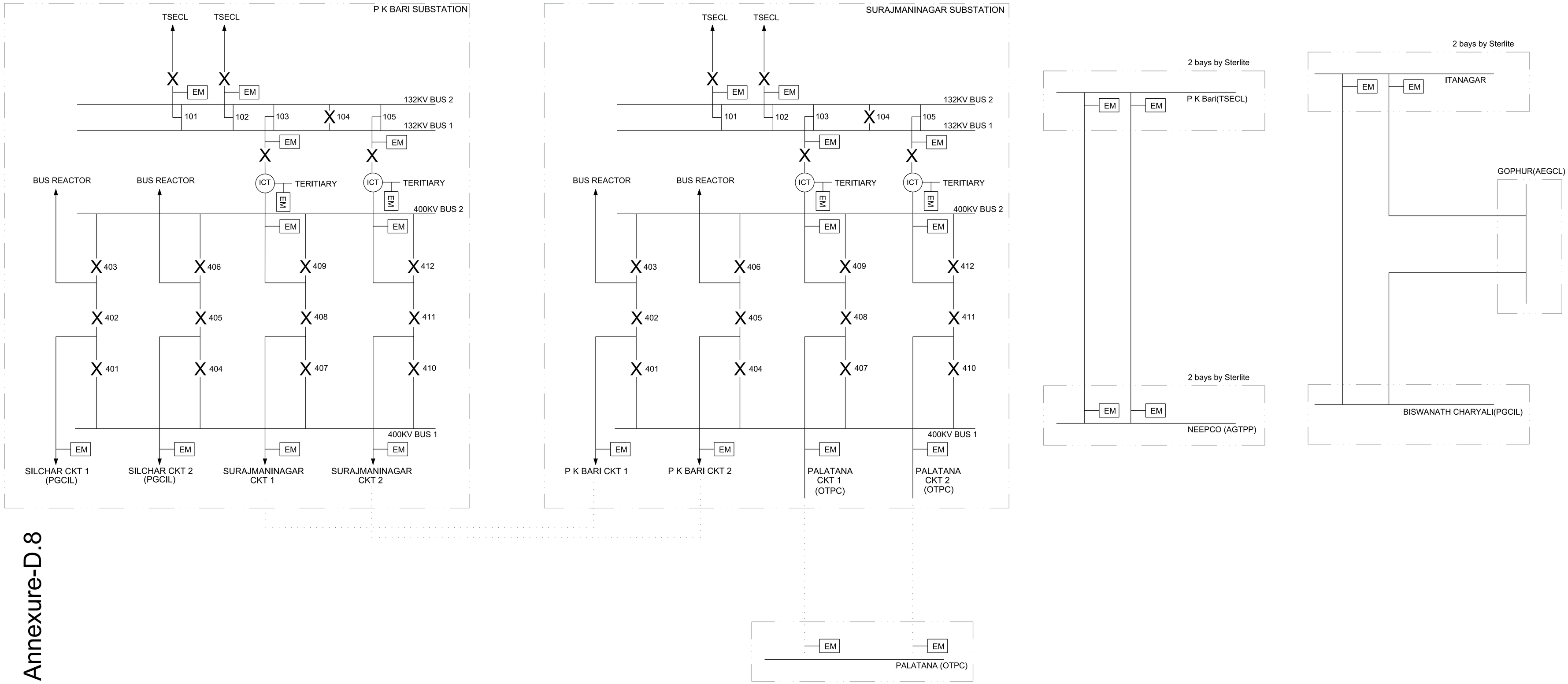

RHEP
111.00
110.50
110.00
109.50
109.00
108.50
108.00
107.50
107.00
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
RANGANADI UNIT 1
BALIPARA FREQ


BGTPP UNIT 1
146
144
142
140
138
136
134
132
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 1
BALIPARA FREQ


BGTPP UNIT 2
142
141
140
139
138
137
136
135
134
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 2
BALIPARA FREQ


BGTPP UNIT 3
159
158
157
156
155
154
153
152
151
150
149
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 3
BALIPARA FREQ


Desired vs Actual Response
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
11.60
11.60
6.55
6.55
6.75
1.75
1.75
12.50
12.50
12.50
2.75
2.75
2.26
2.29
0.09
0.09
-1.39
0.07
2.12
0.00
0.00
3.53
-0.27
0.04
0.31
3.33
PALATANA GTG 1
PALATANA GTG 2
PALATANA STG 1
PALATANA STG 2
RANGANADI UNIT 1
LOKTAK UNIT 1
LOKTAK UNIT 2
LOKTAK UNIT 3
BGTPP UNIT 1
BGTPP UNIT 2
PARE UNIT 1
PARE UNIT 2
BGTPP UNIT 3
Actual Response
Desired Response



Annexure-D.8

NOTES:

1. Energy meters for line silchar ckt 1 & 2 at PGCIL Sichar substation shall be provied by PGCIL
2. For 132 KV lines terminating at TSECL substations, the meters are to be provided by TSECL.
3. For 132 KV lines terminating at Gophur(AEGCL) substation, the meters are to be provided by Gophur(AEGCL).
4. For 132 KV lines terminating at Biswanath charyali(PGCIL) substation, the meters are to be provided by PGCIL.

Sterlite Power

STERLITE POWER GRID VENTURES LIMITED (SPGVL)

PROJECT

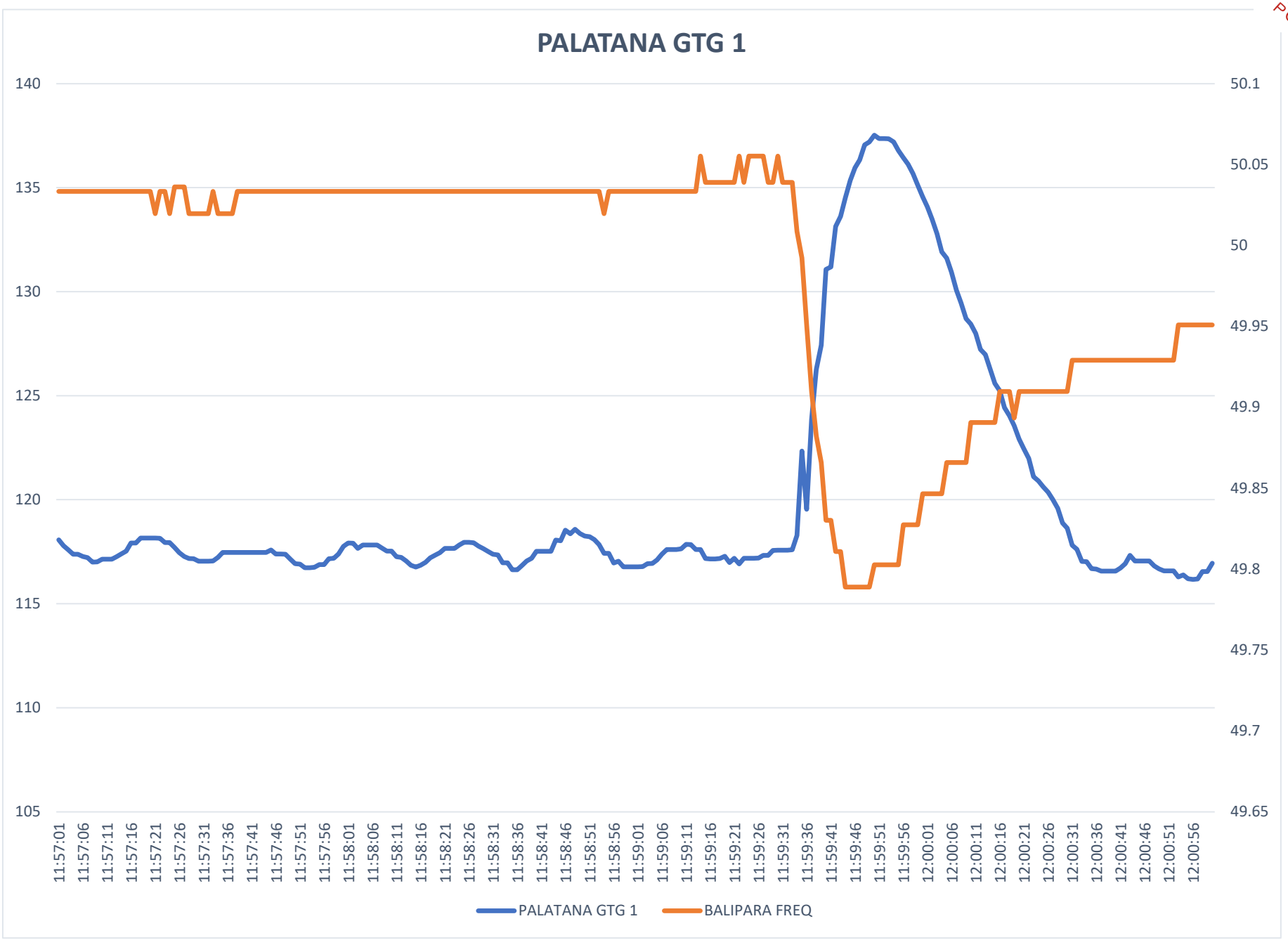
ESTABLISHMENT OF TRANSMISSION SYSTEM FOR "NER SYSTEM STRENGTHENING SHEME–II(PART–B) & V"

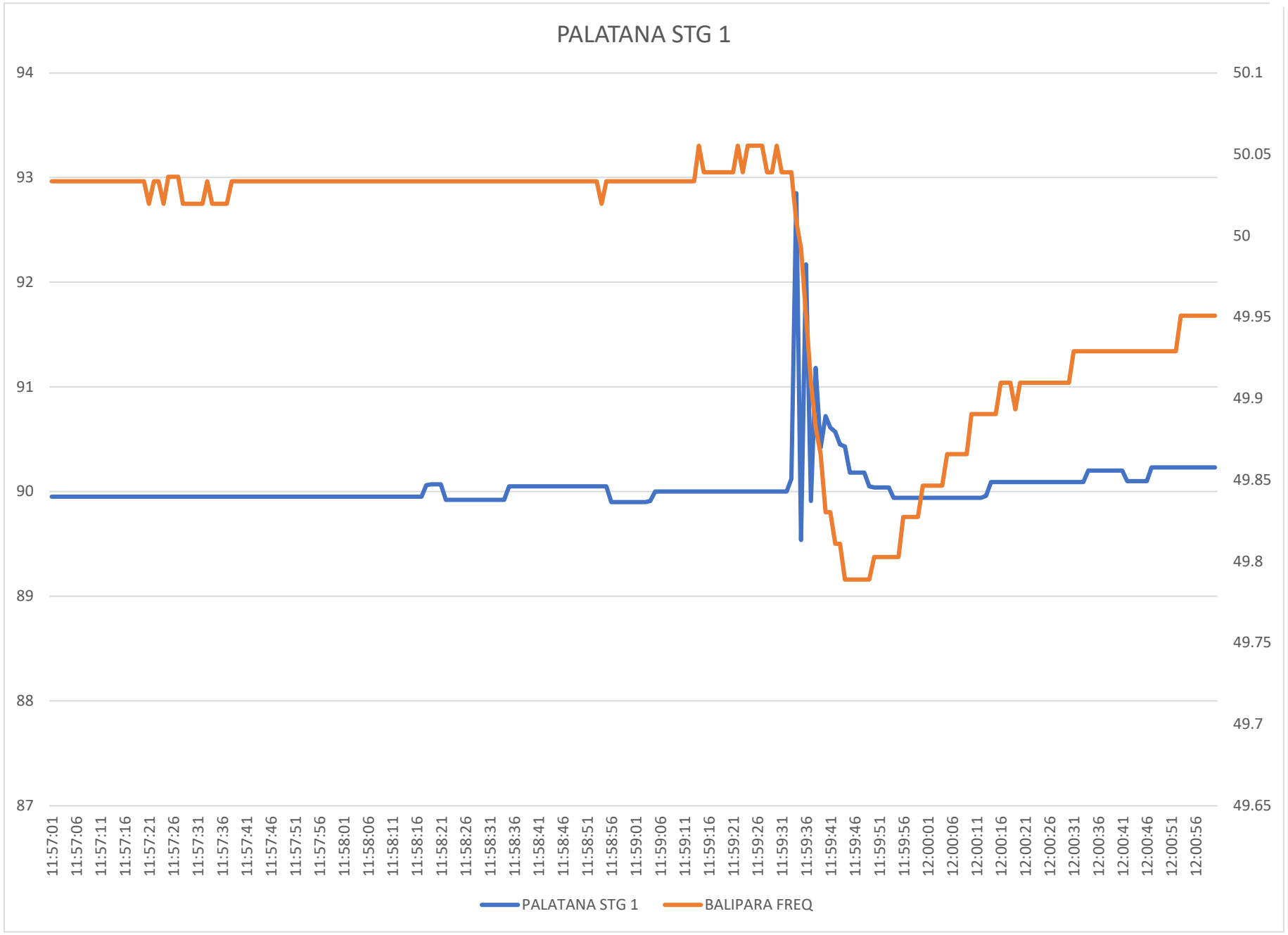
TITLE

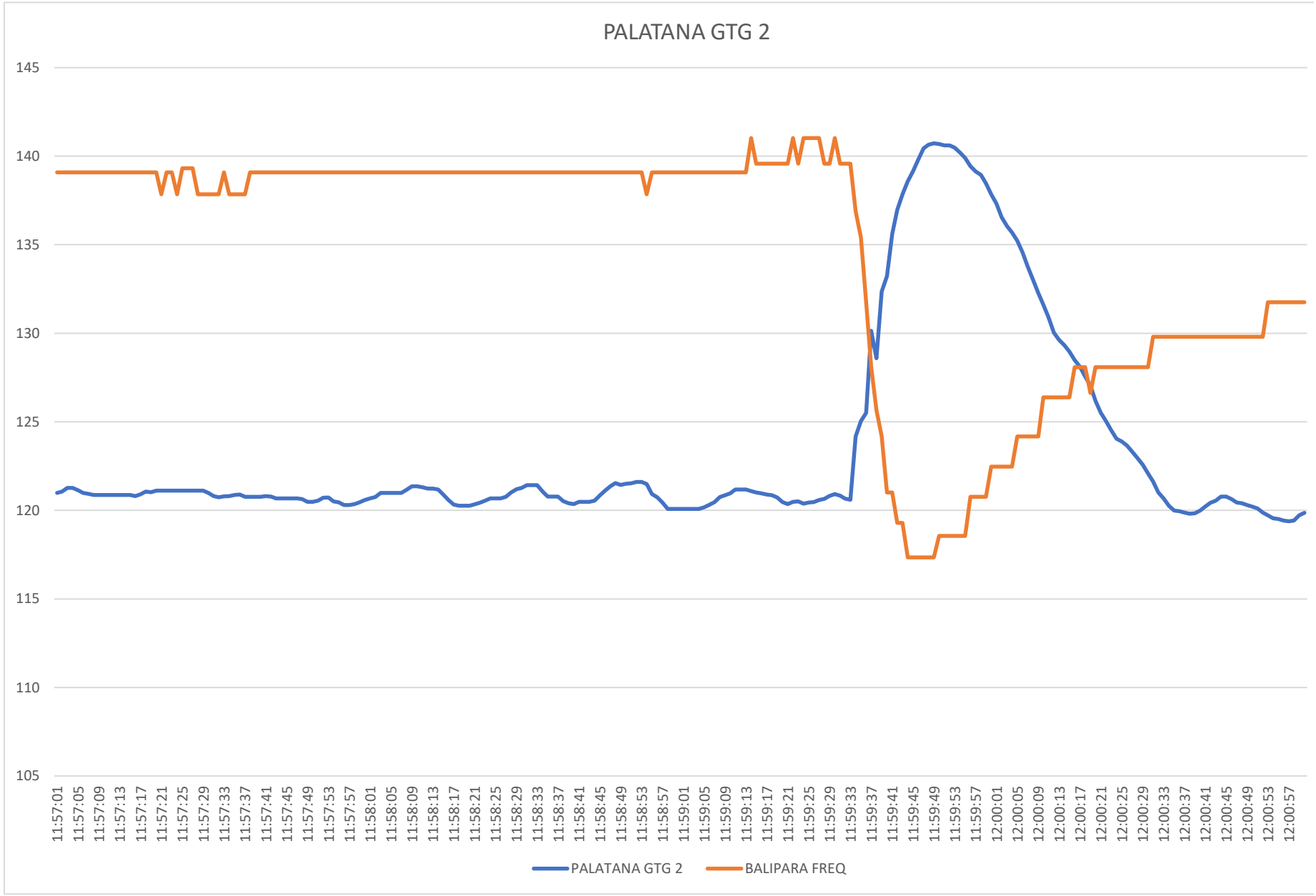
ENERGY METERING SCHEME FOR "NER SYSTEM STRENGTHENING SHEME–II(PART–B) & V"

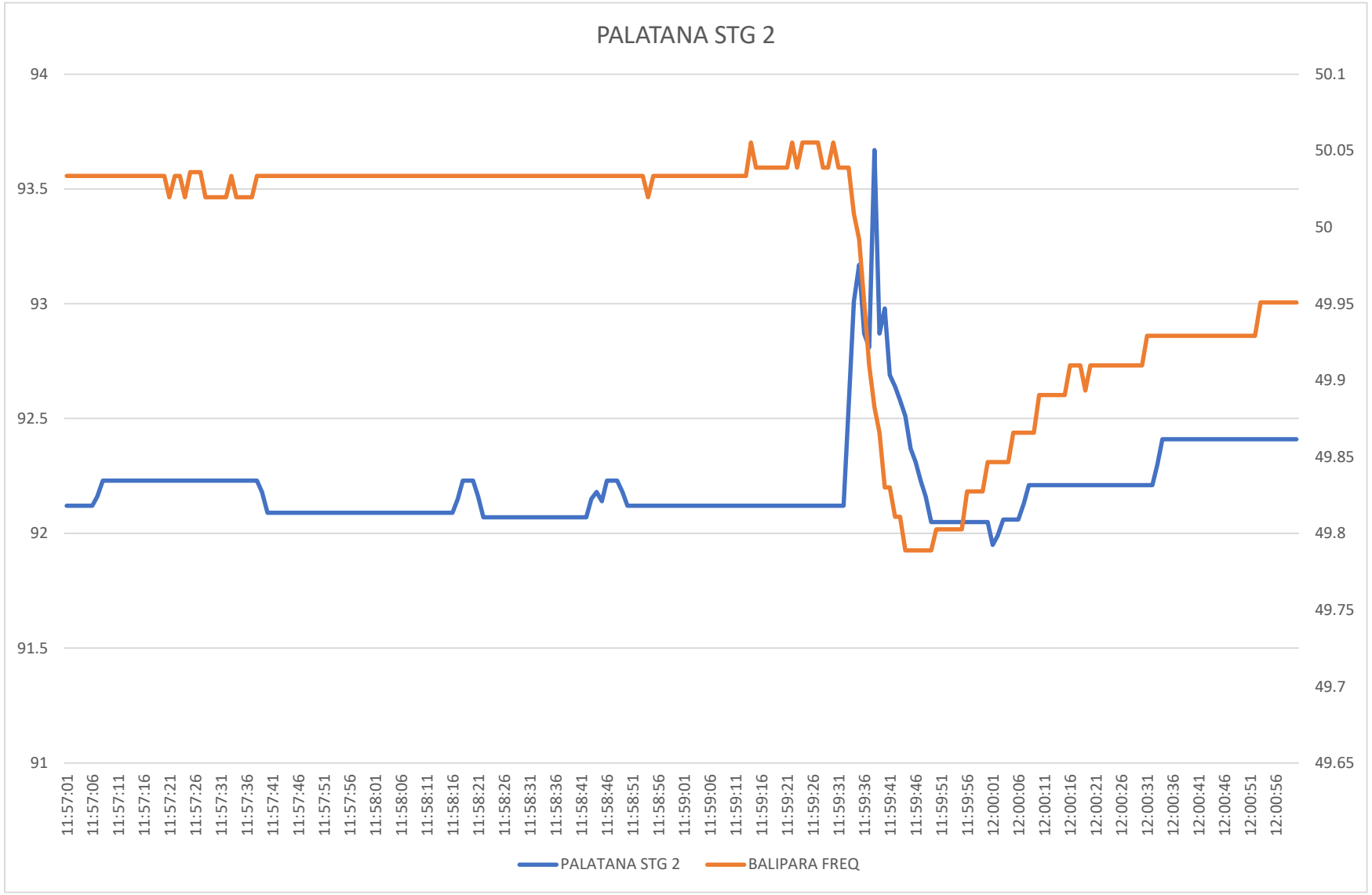
RGMO Analysis for event dated 11th June 2020 causing Gen. Loss of around 2126 MW Solar Gen. in NR Region

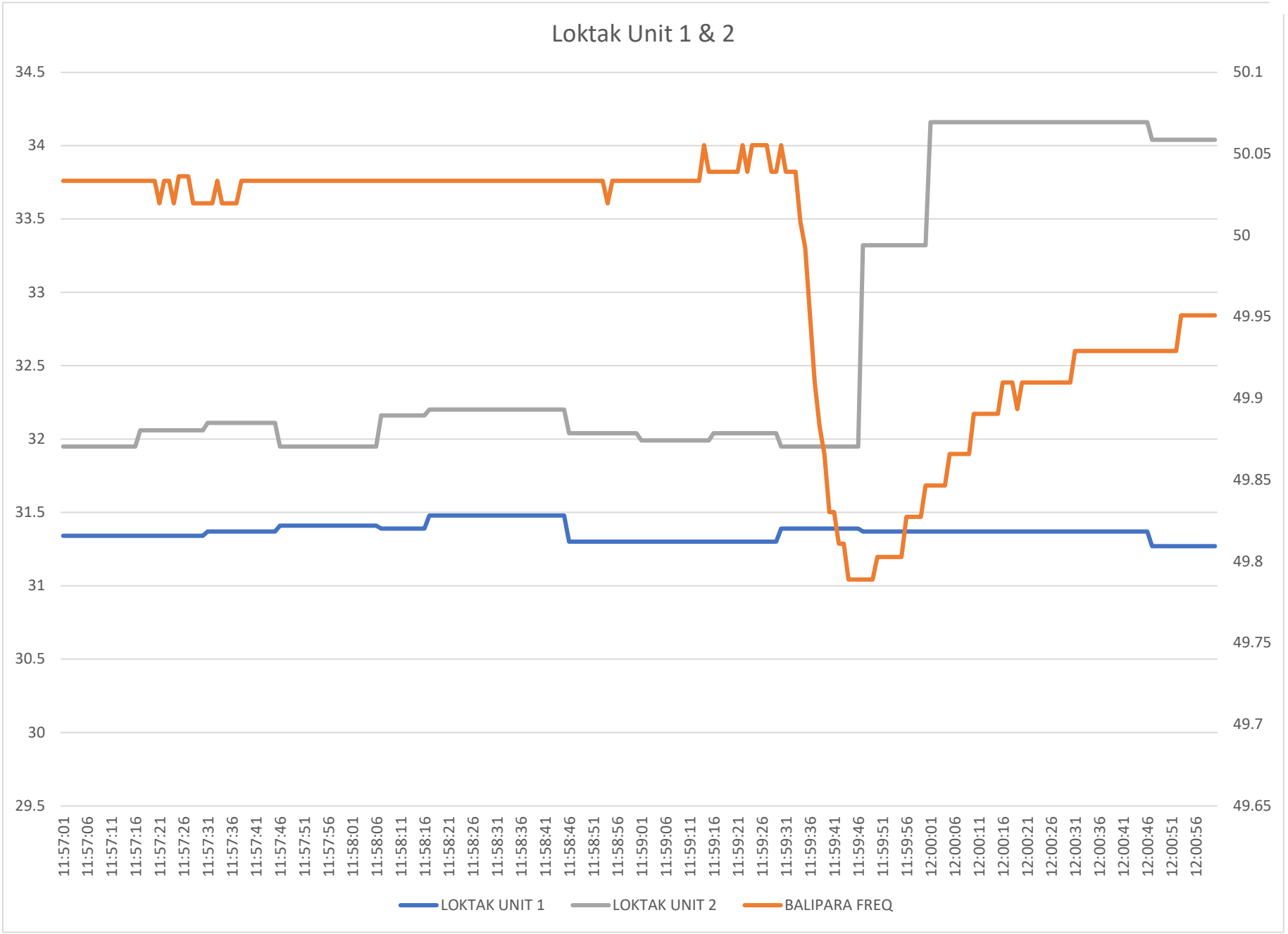
Max Rate of Change of Freq = 0.25 Hz

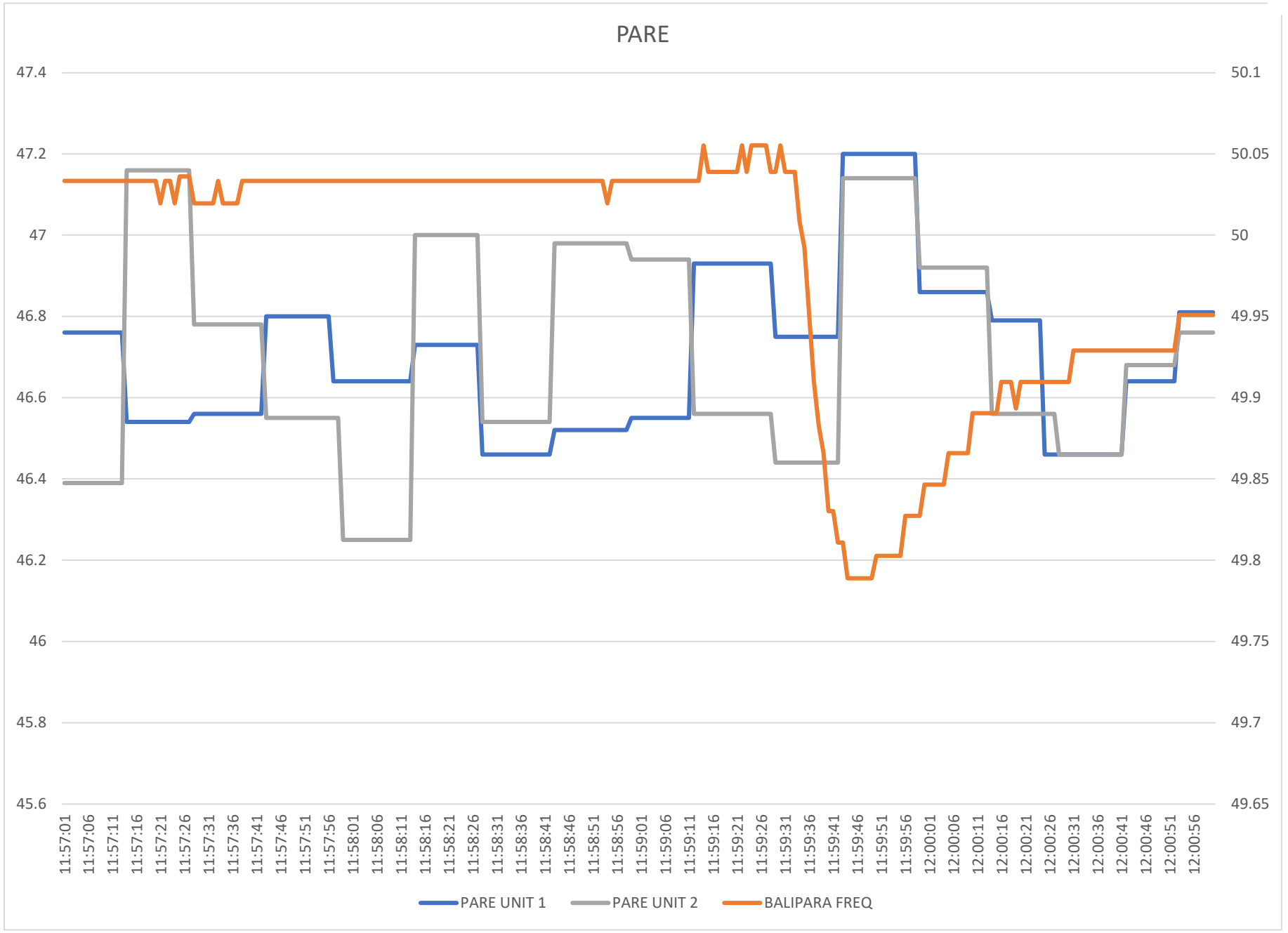

PALATANA GTG 1
140
135
130
125
120
115
110
105
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA GTG 1
BALIPARA FREQ

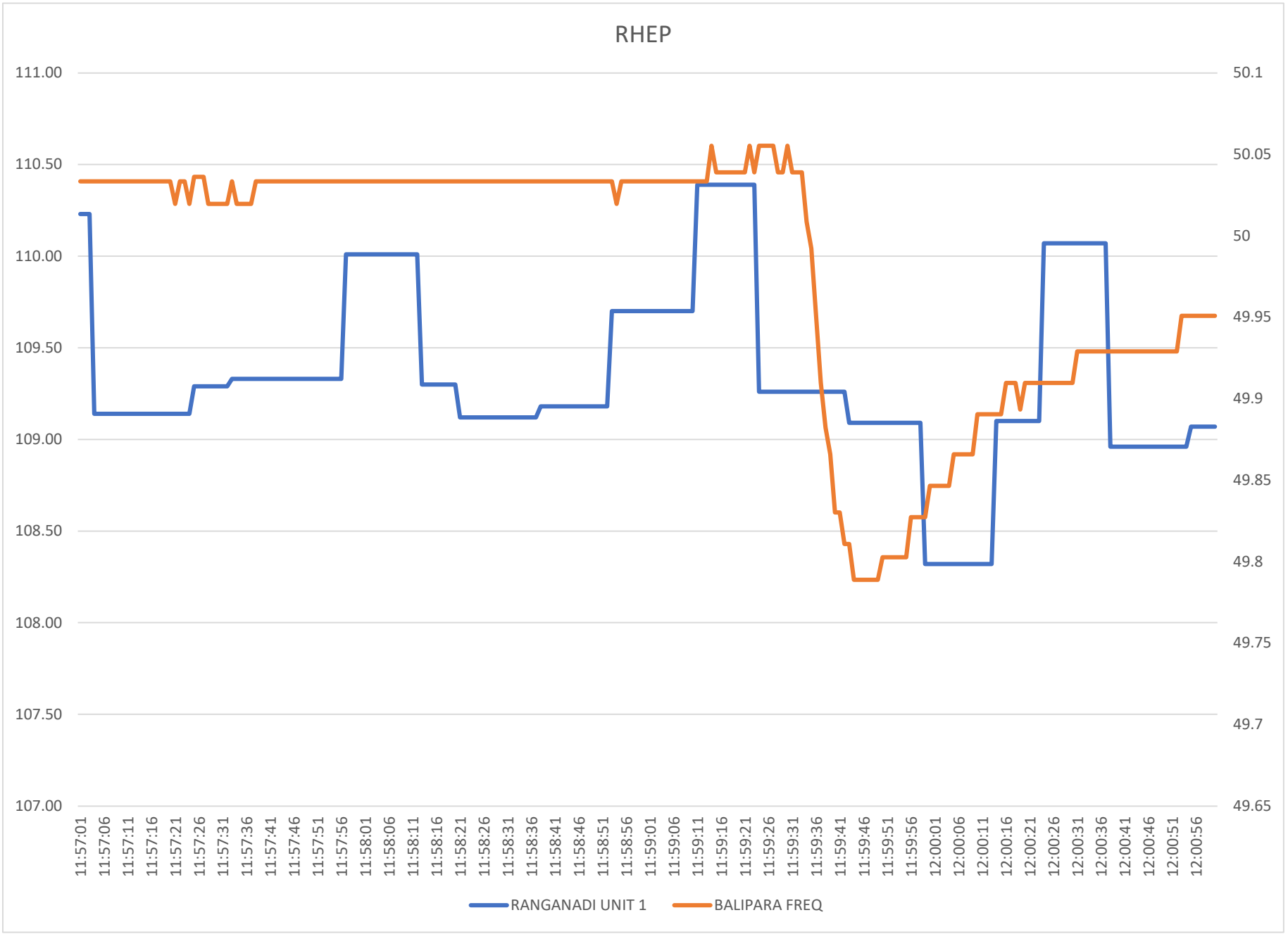

PALATANA STG 1
94
93
92
91
90
89
88
87
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA STG 1
BALIPARA FREQ

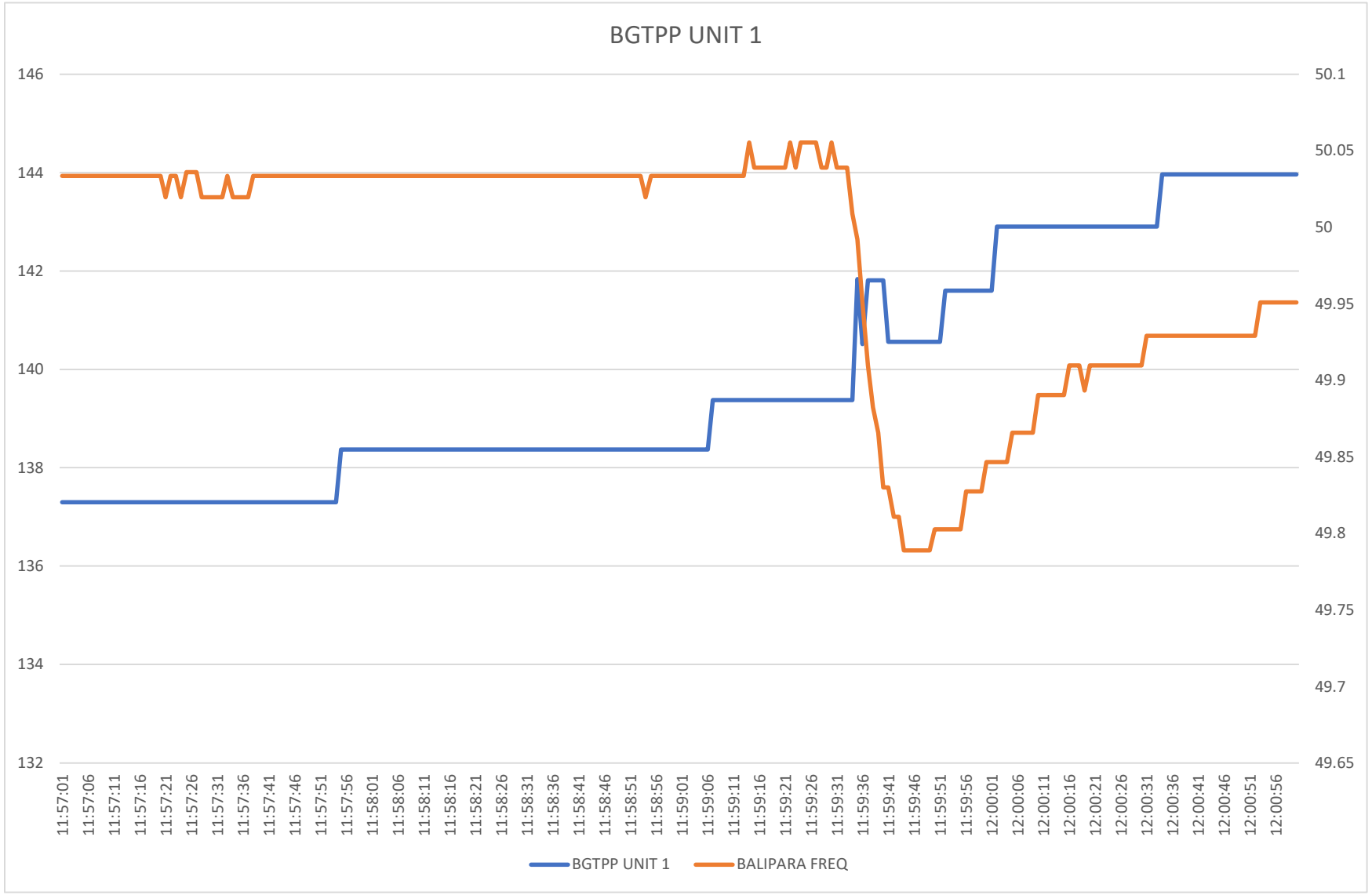

PALATANA GTG 2
145
140
135
130
125
120
115
110
105
11:57:01
11:57:05
11:57:09
11:57:13
11:57:17
11:57:21
11:57:25
11:57:29
11:57:33
11:57:37
11:57:41
11:57:45
11:57:49
11:57:53
11:57:57
11:58:01
11:58:05
11:58:09
11:58:13
11:58:17
11:58:21
11:58:25
11:58:29
11:58:33
11:58:37
11:58:41
11:58:45
11:58:49
11:58:53
11:58:57
11:59:01
11:59:05
11:59:09
11:59:13
11:59:17
11:59:21
11:59:25
11:59:29
11:59:33
11:59:37
11:59:41
11:59:45
11:59:49
11:59:53
11:59:57
12:00:01
12:00:05
12:00:09
12:00:13
12:00:17
12:00:21
12:00:25
12:00:29
12:00:33
12:00:37
12:00:41
12:00:45
12:00:49
12:00:53
12:00:57
PALATANA GTG 2
BALIPARA FREQ

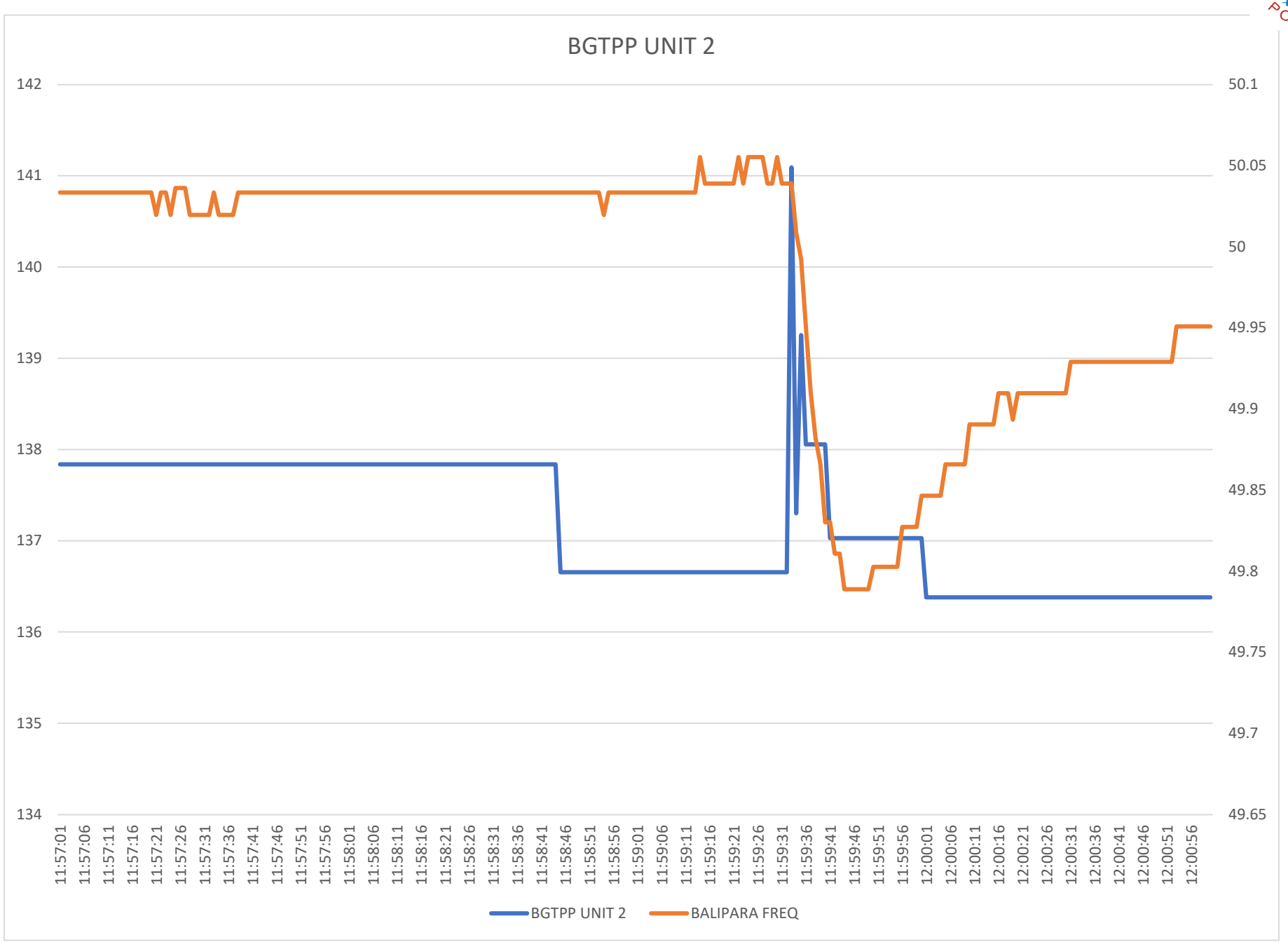

PALATANA STG 2
94
93.5
93
92.5
92
91.5
91
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PALATANA STG 2
BALIPARA FREQ

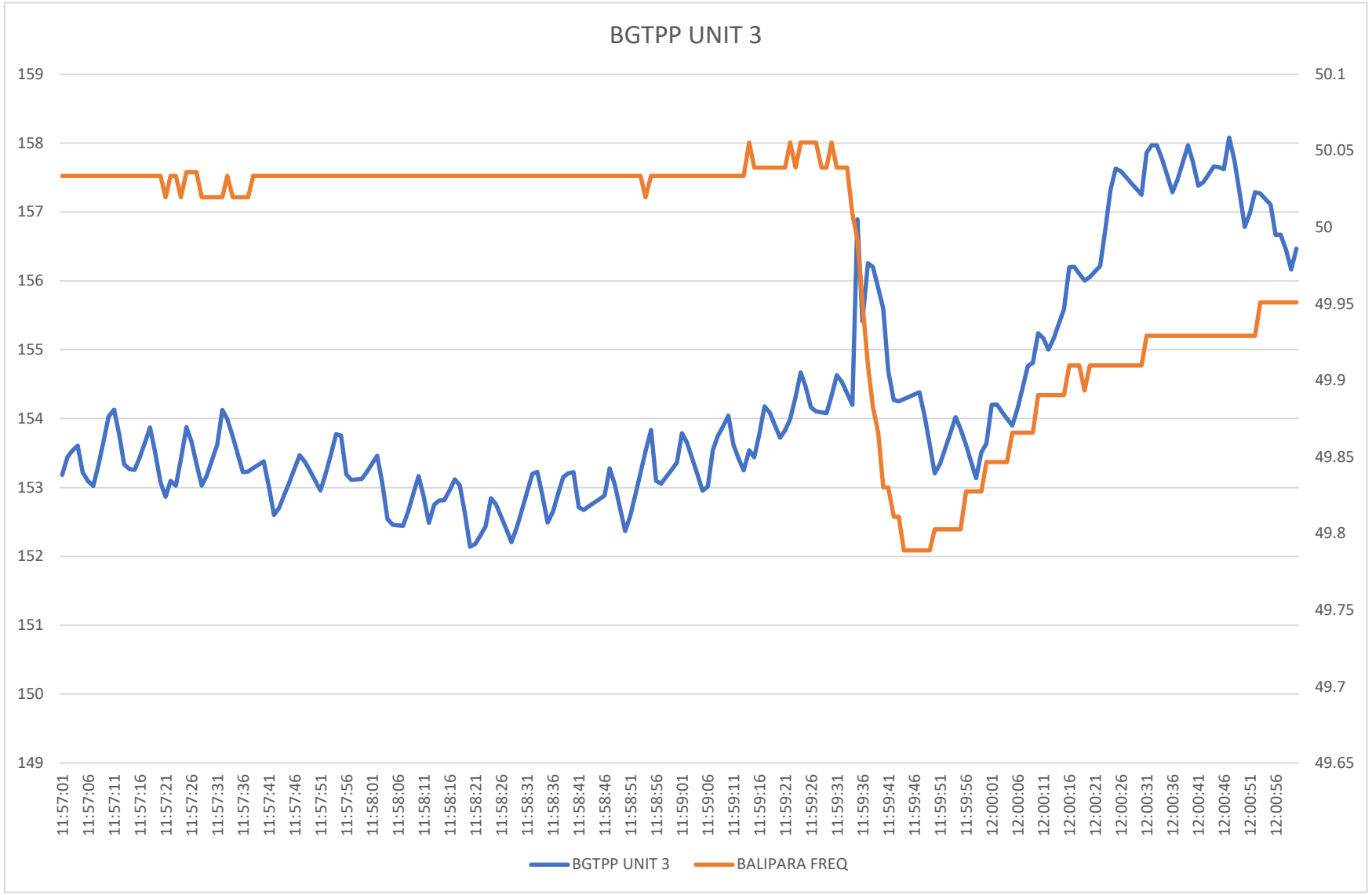

Loktak Unit 1 & 2
34.5
34
33.5
33
32.5
32
31.5
31
30.5
30
29.5
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
LOKTAK UNIT 1
LOKTAK UNIT 2
BALIPARA FREQ

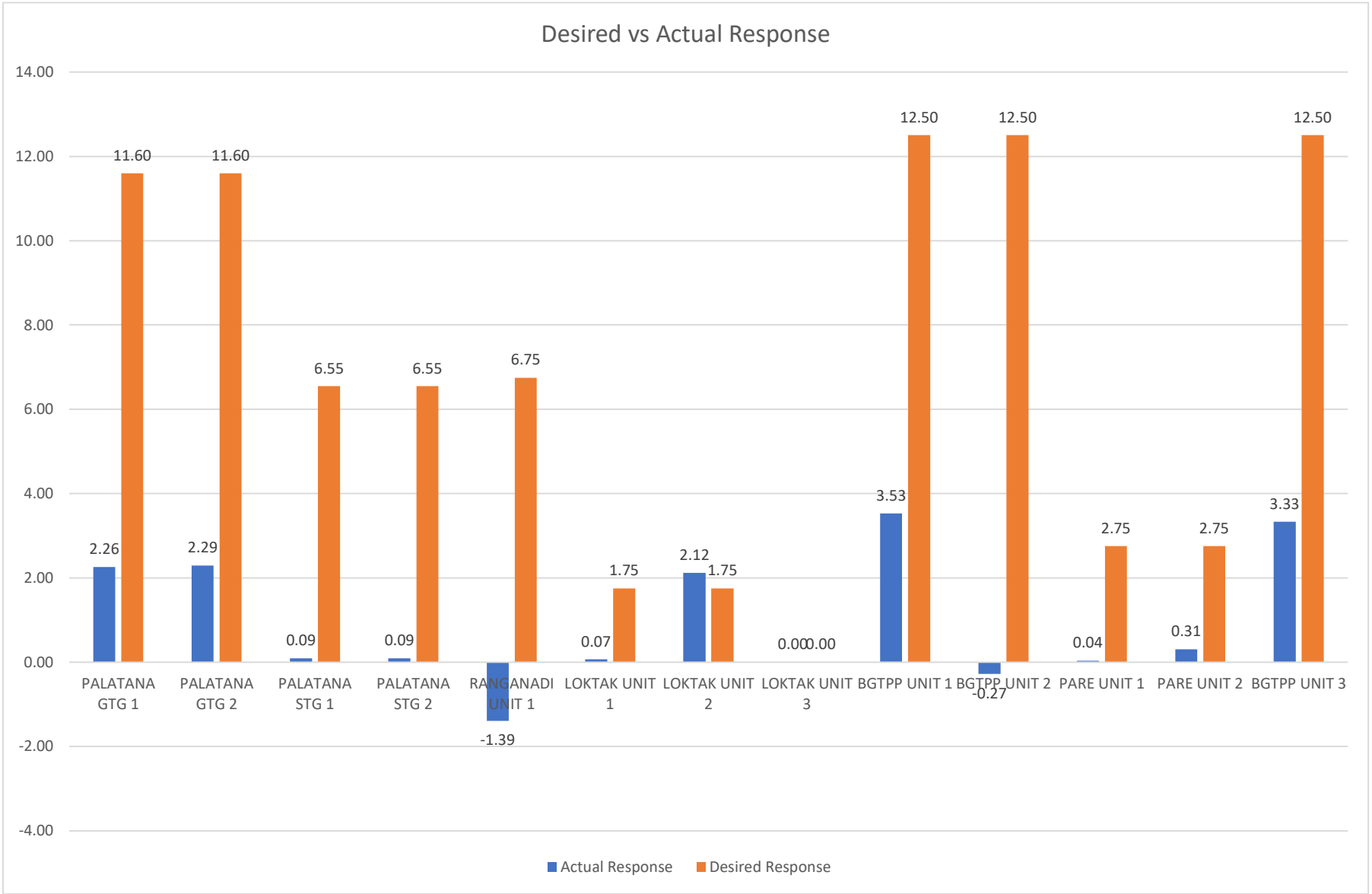

PARE
47.4
47.2
47
46.8
46.6
46.4
46.2
46
45.8
45.6
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
PARE UNIT 1
PARE UNIT 2
BALIPARA FREQ


RHEP
111.00
110.50
110.00
109.50
109.00
108.50
108.00
107.50
107.00
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
RANGANADI UNIT 1
BALIPARA FREQ


BGTPP UNIT 1
146
144
142
140
138
136
134
132
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 1
BALIPARA FREQ


BGTPP UNIT 2
142
141
140
139
138
137
136
135
134
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 2
BALIPARA FREQ


BGTPP UNIT 3
159
158
157
156
155
154
153
152
151
150
149
50.1
50.05
50
49.95
49.9
49.85
49.8
49.75
49.7
49.65
11:57:01
11:57:06
11:57:11
11:57:16
11:57:21
11:57:26
11:57:31
11:57:36
11:57:41
11:57:46
11:57:51
11:57:56
11:58:01
11:58:06
11:58:11
11:58:16
11:58:21
11:58:26
11:58:31
11:58:36
11:58:41
11:58:46
11:58:51
11:58:56
11:59:01
11:59:06
11:59:11
11:59:16
11:59:21
11:59:26
11:59:31
11:59:36
11:59:41
11:59:46
11:59:51
11:59:56
12:00:01
12:00:06
12:00:11
12:00:16
12:00:21
12:00:26
12:00:31
12:00:36
12:00:41
12:00:46
12:00:51
12:00:56
BGTPP UNIT 3
BALIPARA FREQ


Desired vs Actual Response
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
11.60
11.60
6.55
6.55
6.75
1.75
1.75
12.50
12.50
12.50
2.75
2.75
2.26
2.29
0.09
0.09
-1.39
0.07
2.12
0.00
0.00
3.53
-0.27
0.04
0.31
3.33
PALATANA GTG 1
PALATANA GTG 2
PALATANA STG 1
PALATANA STG 2
RANGANADI UNIT 1
LOKTAK UNIT 1
LOKTAK UNIT 2
LOKTAK UNIT 3
BGTPP UNIT 1
BGTPP UNIT 2
PARE UNIT 1
PARE UNIT 2
BGTPP UNIT 3
Actual Response
Desired Response

Annexure-II

ACCC® Conductor for a Low Carbon World

North Eastern Region Power Committee

20.07.20

CTC GLOBAL

CTC Global Corporation & Manufacturing Partners

- Headquarters in Irvine, California
- 250+ Employees based in Irvine
- 3 Core Prod. Facilities US, China, Indonesia
- R&D began in 2003
- Trial Lines Installed in 2004
- Commercially Deployed in 2005
- ISO Certified Production since 2006
- 34 Conductor Manufacturing Partners
- 11 Hardware Suppliers

CTC Global Factory tour video:
https://www.youtube.com/watch?v=V1_4J41fbQM

North East India - The 'Powerhouse of India'

- North-East India is one of the most fascinating regions in India having one of the highest biodiversity density found anywhere in the world.
- In terms of Hydro Power, North East India has almost 40% of the country's total hydro potential.
- Energy demand is increasing in this region and also increasing is its ability to export power to a wider base which is extremely important as demand for affordable, reliable and clean energy continues to grow.
- The ACCC® conductor's added capacity and improved efficiency can support numerous initiatives to see this happen and contribute towards North East India becoming the **'Powerhouse of India.'**
- Some of the ACCC® Projects completed in North Eastern Region are :

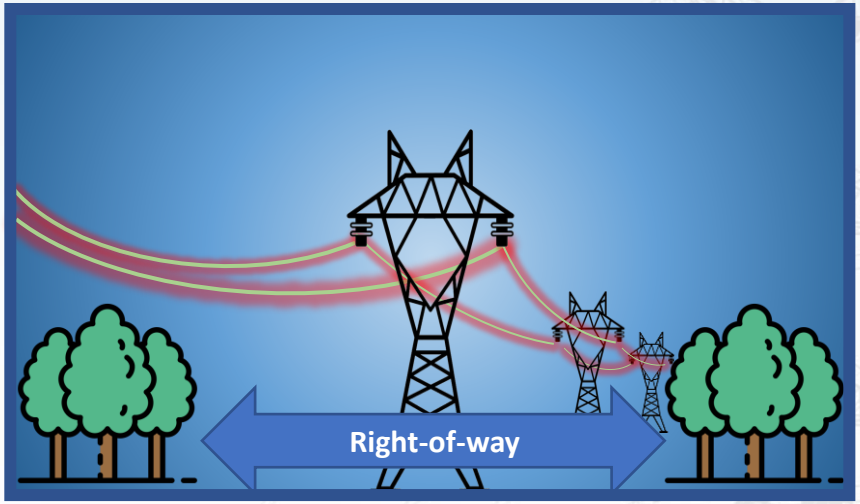
Sr. No.	Line Details	State
1	132kV D/C Agartala GBPP- Agartala Line	Tripura
2	132kV D/C Imphal (POWERGRID)- Yurembam (Imphal S/S – Manipur).	Arunachal Pradesh
3	132kV Salakhati - Kokrajhar line 2nd circuit	Assam
4	132KV Rangia S/s – Nathkuchi S/s Line.	Assam

CTC GLOBAL

Right of Way: ROW

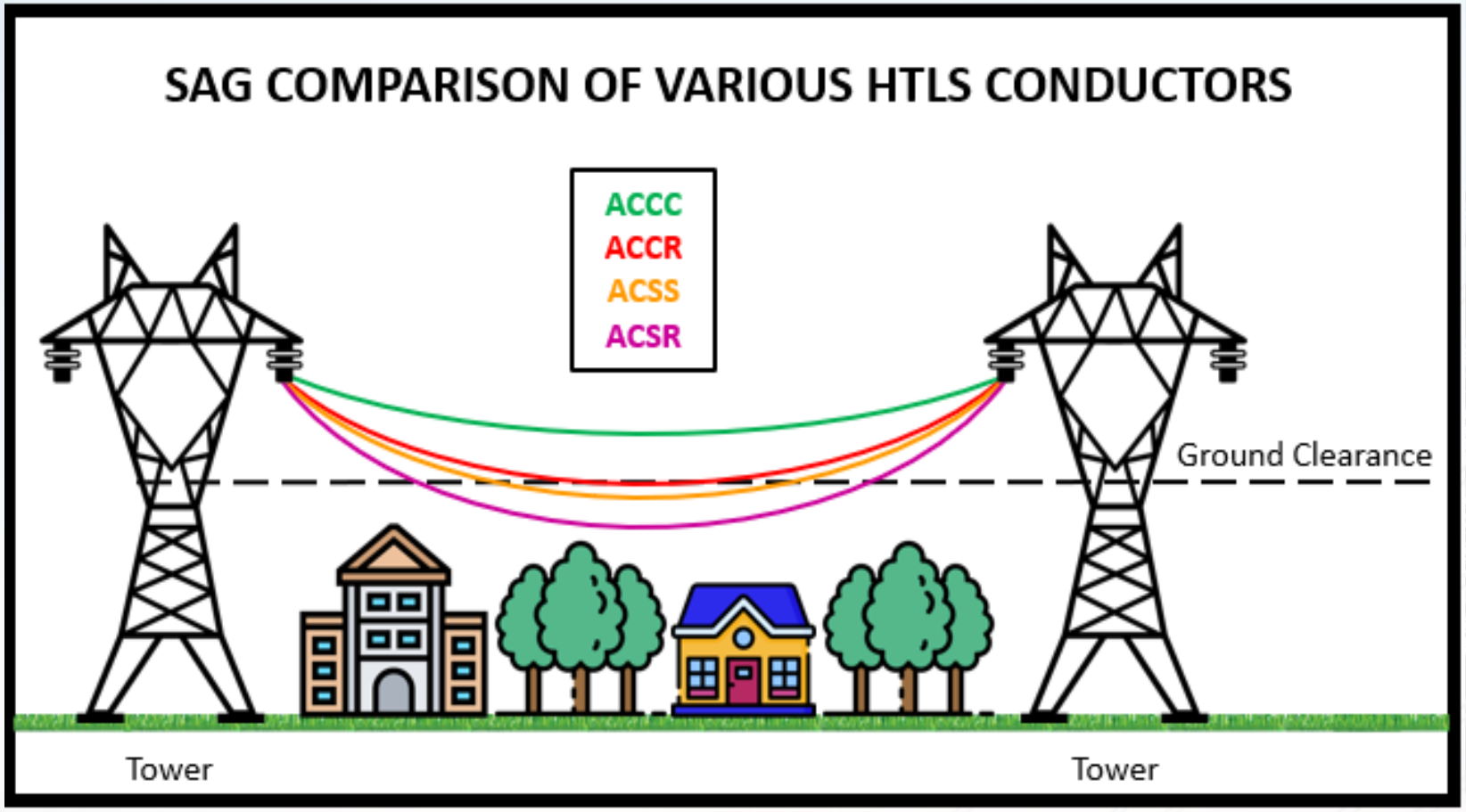
"Right of Way (ROW), when it comes to setting up power transmission lines is emerging as one of the significant challenges for transmission companies."

- Too difficult to acquire **RIGHT OF WAY** for New Lines.
- **Time Constraint**.
- Very **High cost** for new line construction.
- As the **urbanization** is rapidly increasing, it's becoming difficult to construct new transmission lines in & around cities.



CTC GLOBAL

“Re-conductoring” is the answer to ROW problems!



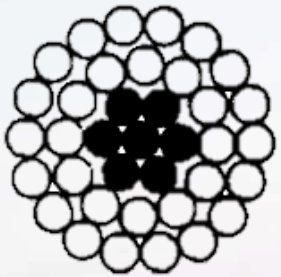
- **Reconductoring** of existing transmission and distribution lines with **high performance conductors** like ACCC® can improve the **transmission capacity up to 2.5X** with **lower sag** and **losses**.

CTC GLOBAL

Evolution of Conductor Performance

ACCC® conductors combine annealed aluminium with high temperature composite technology and an increased aluminium cross sectional area

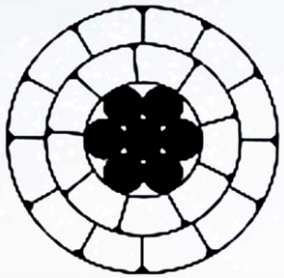
ACSR Drake



Basic Conductor Design
Round Wire and Steel Core

1,627 kg/km

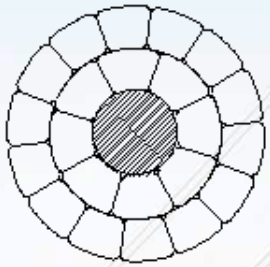
ACSS -TW Drake



Use of Trapezoidal Wire
Increases Conductor Area
But Adds Weight

1,960 kg/km

ACCC® –TW Drake



Carbon Fiber Core
Corrects Weight Gain
While Improving Strength

1,558 kg/km

CTC GLOBAL

ACCC® Conductor…

- Increases the capacity and efficiency of new and existing transmission lines
- Carbon and glass fiber core provides very high strength (310 to 375 ksi)
- Lighter weight core allows 28% more aluminum without weight penalty
- Very low coefficient of thermal expansion reduces thermal sag
- Composite core resists corrosion and cyclic load fatigue
- Added aluminum content decreases electrical resistance and line losses by ~ 30%
- Core is produced to ASTM Standard B987 / B987M – 17
- Available through 34 authorized manufacturing partners

VERIFIED
by SCS GLOBAL SERVICES
✓REDUCED LINE LOSSES
✓REDUCED CO_2 EMISSIONS

CTC GLOBAL

CTC Global Footprint

Served	Installations	Projects	Countries
250+ Utilities	100,000+ km (including 11,000+ km in India)	850+ 11kV - 533 kV	>50 (all climates and terrains)

CTC GLOBAL

Energy Efficiency/CO_2 Certification by Third party confirms losses reduction through ACCC®

SCS Global Services *does herby certify that an independent assessment has been conducted for:*

CTC Global Corporation

2026 McGaw Avenue, Irvine, CA, United States

Validation Scope:

SCS reviewed CTC's Conductor Comparison Program (CCP) for its validity in calculating line losses and the resulting CO_2 emissions for Aluminum Conductor Composite Core (ACCC) and Aluminum Conductor Steel-Reinforced (ACSR) transmission line technologies. ACCC is a conductor which has the potential to reduce electrical transmission losses and associated CO_2 emissions. The certification was conducted in accordance with ISO 14044:2006 standard for Life Cycle Assessment (LCA), a methodology used for evaluating the environmental performance of various products.

Validation Opinion:

Assuming installations where ACCC substitutes for ACSR lines of similar design characteristics and identical operating conditions, ambient conditions, and grid power generation mix, SCS is able to substantiate the following claims:

- SCS certifies that use of the ACCC technology in lieu of ACSR will reduce line losses and associated CO_2 emissions by 27-31% over the following range of parameters:
  - Line length: 20 to 60 miles
  - Diameter: 0.7 to 1.3 inches
  - Voltage: 110 to 400 kV
  - Peak operating amps: 650 to 2700 amps
- SCS certifies use of the CCP tool as a reasonable way to estimate reductions in line losses and associated CO_2 emissions achieved by installing ACCC in lieu of ACSR technologies.
- SCS confirms, and has no reason to doubt, that use of the ACCC technology in lieu of ACSR will reduce line losses and associated CO_2 emissions in general settings.

VERIFIED by SCS GLOBAL SERVICES
✓REDUCED LINE LOSSES
✓REDUCED CO_2 EMISSIONS

Certificate # SCS-ECV-00003

Valid from: November 1, 2016 to March 27, 2021

SCSglobal SERVICES

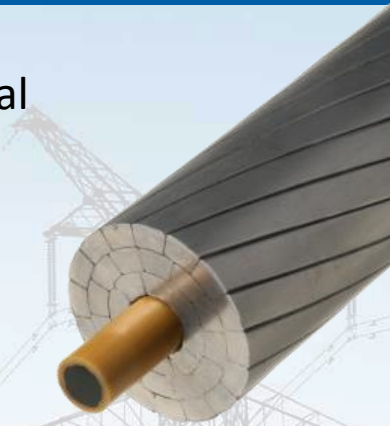
Stanley Mathuram, PE, Vice President
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA

SCS Global Services verified that ACCC® conductor reduces CO2 emissions associated with transmission line losses by 27 to 31 percent under certain design conditions compared to conventional steel reinforced ACSR conductor. (5 scenarios were generically evaluated)

VERIFIED
by SCS GLOBAL SERVICES
✓REDUCED LINE LOSSES
✓REDUCED CO_2 EMISSIONS

CTC GLOBAL

Broad Range of Applications

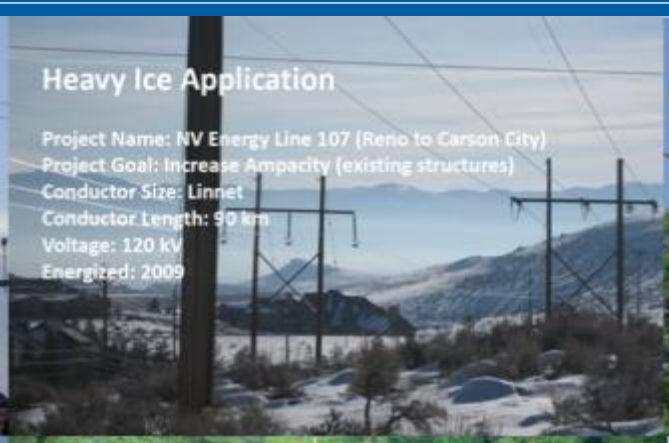


- **Reconductor Projects** – increase corridor capacity, reduce environmental impact, permitting, and capital costs by retaining existing towers
- **Rebuild Projects** – When its determined that existing structures are too old or when storm hardening is required
- **New Lines** – reduce upfront capital costs by increasing spans between fewer and/or shorter structures
- **Generation Tie Lines** – increase asset efficiency and investment returns
- **Long Span Applications** – enables critical long spans with high strength, reduced sag and excellent damping
- **EHV / UHV (and DC) Voltages** – excellent core stability and surface smoothness enable bundling and decreased corona
- **Mountainous Terrain** – outstanding strength, toughness and field experience help installations in difficult and mountainous terrain
- **Highly Corrosive Environments** – composite core is impervious to corrosion in salt air and heavy polluted industrial environments

Proven advantages for many project types

CTC GLOBAL

ACCC® Project Examples



Reconductoring with ACCC® Conductor

UPPTCL – 132kV High Speed Installation

- ACCC® Casablanca Conductor is used to replace ACSR Panther.
- 102 ckm Stringing done in 78 Shutdown Days.
- Corridor passing through congested and high profile areas of Lucknow.

AEGCL – 132kV Hot Line Stringing

- ACCC® Casablanca Conductor Hot line Stringing done to replace AAAC Conductor.
- Line Uprated to 875 Amps.
- 132kV Salakhati (BTPS) – Kokrajhar Double Circuit Line.

PTCUL - 132kV Reconductoring in densely Populated area.

- Completed under very cold and dense fog conditions apart from Aged structures, dense population areas and canal crossings.
- ACCC® Copenhagen is used for 132kV D/c Roorkee-Mangalore Transmission Line .

WBSETCL – 132kV Ganga River Crossing

- Berhampore - Gokarna line was completed amidst various challenges which included a 787 meter (~2,600 ft) span over the Ganga river.

CTC GLOBAL

Greenfield Installations: ACCC® Conductors

Malaysia – 275kV Triple Bundle Installation

- ACCC Dublin size conductor used for 50 km Double Circuit Johor – Baharu Line, Malaysia.
- Line utilizes lattice structures and steel monopoles .

Bangladesh– 400kV Double Circuit Line

- Power Transmitted by 163 Kms Patuakhali (Payra)-Gopalganj Line will be around 1320MW.
- Line has been built over four rivers – the Patra, Sondha, Sugondha and Laukathi.

Nepal – will use ACCC® Drake in 220 kV D/C Kushma – New Butwal line

- Transfer Capacity requirement is 1600 MW. 220 kV with ACCC® Conductor reduces tower foot print significantly from 52 m (400 kV) to 35 m.
- Project is under execution.

Bihar – 132kV Double Circuit ACCC® Line

- Ampacity Requirement is of 1050 Amps.
- 132 KV D/C Laukahi – Phulparas Transmission Line
- 25 Kms Line Length.
- Project is under execution.

CTC GLOBAL

Compliance to International Standard

Fully Complies to ASTM B987

Performed Design validation test as per ASTM B987 on almost all sizes of composite core.

Design validation tests specified in ASTM B987

1) Tensile test
2) Glass Transition Temperature
3) Density
4) **Heat Exposure**
5) Heat / Stress Test
6) Bending Test
7) Dye Penetrant after bending test
8) Tensile test after bending test
9) **Galvanic protection barrier layer thickness test**

CTC GLOBAL

ACCC® Conductor

Technical Comparative

CTC GLOBAL

ACCC® conductor replacing ACSR Dog

Description	Unit	ACSR Dog	ACCC® Silvassa
Area of Aluminum	sq. mm	105	122.7
Overall Diameter of Conductor	mm	14.15	14.351
Mass of Conductor per 1000m	Kg/km	394	393.9
Rated Tensile Strength of Conductor	KN	32.3	67.3
DC resistance at 20°C	Ω/km	**0.2691**	**0.2286**
Number of Circuits	no.	2	2
Maximum Working Current/Resistance @ 75°C	A	252	275
Maximum Working Current/Resistance @ 180°C	A	-	**632**
Sag of Conductor in a 260 m Span at maximum continuous operating temperature	m	**6.12**	**4.89**

Lesser Resistance at 20° C

2X Ampacity

Lower Sag

Lesser resistance at 20 °C means less I^2R losses

Assumptions:

- Ambient temp: 45°C, Wind 0.56 m/sec, Sun Radiation 1045 Watt/m², Elevation 0 ft; Solar Absorptivity 0.8 and Emissivity 0.45. Ampacity/Temperature calculated using IEEE 738.
- Sag values are calculated based on max. continuous operating temperature (75°C for ACSR and 180°C for ACCC)

CTC GLOBAL

ACCC® conductor replacing ACSR Panther

Description	Unit	ACSR Panther	ACCC® Casablanca
Area of Aluminum	sq. mm	212.15	273.62
Overall Diameter of Conductor	mm	21.000	20.498
Mass of Conductor per 1000m	Kg/km	974.0	834.0
Rated Tensile Strength of Conductor	KN	91.6	101.1
DC resistance at 20°C	Ω/km	0.1332	0.1024
Number of Circuits	no.	2	2
Maximum Working Current/Resistance @ 75°C	A	382	434
Maximum Working Current/Resistance @ 180°C	A	-	1049
Sag of Conductor in a 325 m Span at maximum continuous operating temperature	m	7.30	4.44

Lesser Resistance at 20° C

2X Ampacity

Lower Sag

Lesser resistance at 20 °C means less I^2R losses

Assumptions:

- Ambient temp: 45°C, Wind 0.56 m/sec, Sun Radiation 1045 Watt/m², Elevation 0 ft; Solar Absorptivity 0.8 and Emissivity 0.45. Ampacity/Temperature calculated using IEEE 738.
- Sag values are calculated based on max. continuous operating temperature (75°C for ACSR and 180°C for ACCC)

CTC GLOBAL

ACCC® conductor replacing ACSR Zebra

Description	Unit	ACSR Zebra	ACCC® Drake
Area of Aluminum	sq. mm	429.06	519.68
Overall Diameter of Conductor	mm	28.620	28.143
Mass of Conductor per 1000m	Kg/km	1621	1565
Rated Tensile Strength of Conductor	KN	132.3	183.3
DC resistance at 20°C	Ω/km	0.0659	0.0536
Number of Circuits	no.	2	2
Maximum Working Current/Resistance @ 75°C	A	564	625
Maximum Working Current/Resistance @ 180°C	A	-	1592
Sag of Conductor in a 350 m Span at maximum continuous operating temperature	m	9.12	6.61

Lesser Resistance at 20° C

2X Ampacity

Lower Sag

Lesser resistance at 20 °C means less I^2R losses

Assumptions:

- Ambient temp: 45°C, Wind 0.56 m/sec, Sun Radiation 1045 Watt/m², Elevation 0 ft; Solar Absorptivity 0.8 and Emissivity 0.45. Ampacity/Temperature calculated using IEEE 738.
- Sag values are calculated based on max. continuous operating temperature (75°C for ACSR and 180°C for ACCC)

CTC GLOBAL

Thank You

50 km 275 kV triple bundle ACCC conductor generation tie line energized in Malaysia July, 2017

CTC Global Corporation
2026 McGaw Avenue
Irvine, CA 92614 USA
+1(949)428-8500
www.ctcglobal.com

CTC GLOBAL

Contact Us

Mayank Jaggi

Regional Manager –Business Development

Email: MJaggi@ctcglobal.com

Phone: +91 954 543 8264

Bhavik Solanki

Engineering support Manger

Email: BSolanki@ctcglobal.com

Phone: +91 722 888 9697

Visit us @ www.ctcglobal.com

CTC GLOBAL