Annexure-I

List of Participants in the 223rd OCC Meeting held on 28.02.2025

SN	Name & Designation	Organization	Contact No.
1	Sh. Tarik Mize,E.E (E)	Ar. Pradesh	09436059758
2	Sh.Ojing Jerang, EE (E), SLDC	Ar. Pradesh	08974640622
3	Sh. S.Jerang,	Ar. Pradesh	08838290625
4	Sh. Tarali Deka, AGM (T)	Assam	09864981330
5	Sh. Anand Kumar, DM (E), SLDC, AEGCL	Assam	07002350891
6	Sh. S.Burgohain, AM (PP&D)	Assam	09508025344
7	Sh. Dipmoni Nath, AM, AEGCL	Assam	08011117393
8	Sh. Akash Jha, AM, SLDC	Assam	-
9	Smti Kalpajyoti Das, JM, SLDC	Assam	06900961055
10	Sh. Hanjabam V. Sharma, Dy.Mgr,MSPCL	Manipur	08131026640
11	Sh. Marem Malungsing, Mgr, MSPCL	Manipur	09774133713
12	Sh. T.Gidon, SE, SLDC	Meghalaya	06009094044
13	Sh. J.A.W.Pariat, EE, MePGCL	Meghalaya	09856005898
14	Sh. M.K.War, EE, SLDC	Meghalaya	09774012696
15	Sh. F.Swer, AEE, SLDC	Meghalaya	09615291366
16	Sh. C.Daniela, EE (MRT)	Mizoram	09774692380
17	Sh. Alex E.Ngullie, JE	Nagaland	08837080321
18	Sh. M.Talukdar, GM (T)	NEEPCO	09435339690
19	Sh. M.P. Sharma, Sr.Mgr	NEEPCO	08729901871
20	Sh. Amaresh Mallick, ED	NERLDC	09436302720
21	Sh. Sachin Singh, Manager	NERLDC	-
22	Sh. Sunil Singha, Manager	NERLDC	08414865365
23	Sh. Asim Das, AM	NERLDC	07576850053
24	Sh. Yogendra Singh, Engineer	NERLDC	07005587509
25	Sh. Subal Das, Engineer	NERLDC	07086834629
26	Sh. Binod Deb Barma, Ch.Mgr	PGCIL	09856293371
27	Sh. Ashim Paul, DGM	PGCIL	09436602688
28	Sh. R.Haribabu, DGM	PGCIL	09448021006
29	Sh. Ashim De, DM(E)	NHPC	09800284587
30	Sh. Alok Kumar Gautam, Lead-Operation	OTPC	07368069397
31	Sh. Jyotirmoy Barman, AM	NETC	07002036191
32	Sh. Navin Kr. Poddar, Incharge (O&M)	NETC	09555593044
33	Sh. Mahesh Bhagat, Mgr	STERLITE	09206682124
34	Sh. Rakesh Kumar, AGM	NTPC	09131171001

35	Sh. Samriddhi Gogoi, Associate	INDIGRID	09101330587
36	Sh. K.B.Jagtap, Member Secretary	NERPC	-
37	Sh. Alikpanth De, Dy.Director	NERPC	-
38	Sh. Vikash Shankar, AD-I	NERPC	09455331756

Annexure 2.1

STATION NAME	UNIT NO	CAPACITY	STATION TYPE	REGION	STATE	ORGANIZAT	Outage 1 (Fro	Outage 1 (To	Outage 2 (Fro	Outage 2 (To	Outage 3 (Fro	Outage 3 (To	Outage 4 (Fro	Outage 4 (To D
BONGAIGAON TPP	2	250.00	COAL	NER	Assam	NTPC Ltd.	18-01-2026	21-02-2026						
BONGAIGAON TPP	3	250.00	COAL	NER	Assam	NTPC Ltd.	01-04-2025	20-04-2025						
KATHALGURI CCPP	1	33.50	GAS	NER	Assam	NEEPCO.	01-07-2025	14-07-2025	01-11-2025	07-11-2025	01-02-2026	07-02-2026		
KATHALGURI CCPP	2	33.50	GAS	NER	Assam	NEEPCO.	15-07-2025	28-07-2025	01-11-2025	07-11-2025	08-02-2026	14-02-2026		
KATHALGURI CCPP	3	33.50	GAS	NER	Assam	NEEPCO.	01-08-2025	14-08-2025	08-11-2025	14-11-2025	15-02-2026	21-02-2026		
KATHALGURI CCPP	4	33.50	GAS	NER	Assam	NEEPCO.	15-09-2025	28-09-2025	15-09-2025	19-10-2025	08-11-2025	14-11-2025	22-02-2026	28-02-2026
KATHALGURI CCPP	5	33.50	GAS	NER	Assam	NEEPCO.	15-11-2025	21-11-2025	15-11-2025	09-12-2024				
KATHALGURI CCPP	6	33.50	GAS	NER	Assam	NEEPCO.	15-02-2026	21-02-2026	15-02-2026	11-03-2026				
KATHALGURI CCPP	7	30.00	GAS	NER	Assam	NEEPCO.	01-02-2026	10-02-2026	01-02-2026	07-02-2026				
KATHALGURI CCPP	8	30.00	GAS	NER	Assam	NEEPCO.	08-02-2026	17-02-2026	08-02-2026	14-02-2026				
KATHALGURI CCPP	9	30.00	GAS	NER	Assam	NEEPCO.	01-12-2025	14-12-2025	15-02-2026	24-02-2026	15-02-2026	21-02-2026		
AGARTALA GT	1	21.00	GAS	NER	Tripura	NEEPCO.	05-07-2025	05-07-2025	26-12-2025	27-12-2025				
AGARTALA GT	2	21.00	GAS	NER	Tripura	NEEPCO.	15-07-2025	15-07-2025	28-12-2025	29-12-2025				
AGARTALA GT	3	21.00	GAS	NER	Tripura	NEEPCO.	07-08-2025	14-08-2025	05-12-2025	06-12-2025				
AGARTALA GT	4	21.00	GAS	NER	Tripura	NEEPCO.	05-09-2025	10-10-2025	05-01-2026	06-01-2026				
AGARTALA GT	5	25.50	GAS	NER	Tripura	NEEPCO.	16-05-2025	22-05-2025	24-05-2025	30-05-2025	16-11-2025	30-11-2025		
AGARTALA GT	6	25.50	GAS	NER	Tripura	NEEPCO.	01-06-2025	07-06-2025	01-11-2025	15-11-2025	14-12-2025	20-12-2025		
TRIPURA CCPP	1	363.30	GAS	NER	Tripura	ONGC	10.07.2025	20.07.2025	05.11.2025	08.11.2025				
TRIPURA CCPP	2	363.30	GAS	NER	Tripura	ONGC	10.06.2025	29.06.2025	01.12.2025	04-01-1900				
MONARCHAK CCPP	1	65.40	GAS	NER	Tripura	NEEPCO.	01-12-2025	10-12-2025						
MONARCHAK CCPP	2	35.60	GAS	NER	Tripura	NEEPCO.	01-12-2025	10-12-2025						

Annexure 2.1.1

Shutdown Proposed for the month of March 2025

SN	Name of Element	Mar-25	Time	Reason	Category	Study Comments
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				
	SHUTDOWNS PROPOSED BY PGCIL					
1	132kV LOKTAK(NHPC)-IMPHAL		***CSD*** 0000 Hrs to 23:59 Hrs	For HTLS Reconducting Works-Construction related works under NERSS-XIX	Construction activities related shutdown.	SD May be availed subjected to avilability of 132 kV Loktak-Ningthokong - Imphal link, and Loktak- Jiribam link. Maximum of 70 MW can only be scheduled at Loktak HeP during shutdown period. Subject to NHPC consent
2	132kV KHLIEHRIAT-KHLIEHRIAT(MePTCL)-1		***CSD*** 0090 Hrs to 16:00 Hrs	Replacement of existing CTs with higher CT ratings at both ends under NERES-XX Project	Construction activities related shutdown.	SD may be availed, subject to availability of 132kV Khleihriat,-Khleihriat (ME)-2 & 132 kV Badarpur - Panchgram - Lumshnong - Khleihriat (ME) link. Considering N-1 of Khleihriat - Khleihriat(ME)-2, 132kV Umiam - Umiam St I line loading need to be maintain below 65 MW and internal generation of Meghalaya need to maximised the generation depending on the real time grid condition *(at least one unit of Leshka generation when Meghalaya demand crosses 230 MW).* Subject to Meghalaya consent
3	132kV MELRIAT-ZEMABAWK(MIZORAM)		***CSD*** 000 Hrs to 23:59 Hrs	For Re-conductoring of the existing single AAAC Panther with ACCC HTLS Conductor under NERES-XX Project	Construction activities related shutdown.	SD may be availed subjected to following conditions, Post SD Melriat-Sihhmui-Zuangtui. and 132 kV Aizwal- Luangmual line Subject to Mizoram consent.
4	132 KV Kumarghat - RC Nagar line		***CSD*** 0800 Hrs to 17:00 Hrs	For restoration of vulnerable tower 237 from ERS tower to Permanent tower in same location and orientation on account of land slide located at hilltop.	Construction activities related shutdown.	SD may be availed subjected to availability of 132 kV PK Bari - Kumarghat and all adjacent lines at 132kV RC Nagar S/s (AgGPS). Intimation to NEEPCO
5	132 kV Namsai-Tezu TL & 132kV Namsai Main & Transfer Bus		0700 Hrs to 1500 Hrs	For testing of LBB relay in 02 nos. new bays at Namsai S/S and Jumpering upto Main & Transfer Bus of new bays. S/D is required to facilitate augmentation of 02 nos. new bays under NERSS - XV project at Namsai S/S.	Construction activities related shutdown.	SD may be availed subjected to availability of 132 kV Panyor - Ziro- Daporijo - Basar- Along - Pasighat lines. SPS related to Panyor kept into service. The 132kV Roing, 132kV Tezu and 132kV Namsai S/s will be Blackout. Power may taken Rupai downstream, outage team may discussed. Subject to AP consent and Assam
6	132kV Roing Bus		0700 Hrs to 1500 Hrs	For integration of LBB relays and Bus bar testing works for New line bays Dambuk Bay at Roing SS and 220/132KV ICT-1&2 bays at Namsai SS.	Construction activities related shutdown.	
7	132kV SILCHAR-HAILAKANDI(ASSAM)-2		0900 Hrs to 1100 Hrs	Replacement of damaged Isolator fingers connected to Bus 1 and rectification of Bus 1 isolator alignment.	Normal Maintenance related shutdown.	SD May be availed subjected to avilability of 132kV Silchar - Hailakandi ckt 1
8	132kV SILCHAR-SRIKONA(ASSAM)-1	Subject to restoration of 132kV Silchar - Hailakandi ckt 2	1100 Hrs to 1300 Hrs	Replacement of damaged Isolator fingers connected to Bus 1 and rectification of Bus 1 isolator alignment.	Normal Maintenance related shutdown.	SD May be availed subjected to avilability of 132kV Silchar - Srikona ckt 1 and 132kV Pailapool - Srikona. Subject to Assam consent.
9	132kV SILCHAR-BADARPUR-1	Subject to restoration of 132kV Silchar - Srikona ckt 1	1300 Hrs to 1500 Hrs	Replacement of damaged Isolator fingers connected to Bus 1 and rectification of Bus 1 isolator alignment.	Normal Maintenance related shutdown.	SD May be availed subjected to avilability of 132kV Silchar - Badarpur ckt 2
10	132kV AIZWAL-KUMARGHAT		0800 Hrs to 1600 Hrs	Commissioning of Line Differential Protection Function in existing P543 relays using P591 converters at both ends.	Existing system improvement related shutdown.	S/D may be availed subjected to availability of 132kV Kumarghat - Karimganj and all other adjacent line pertaining to 132 kV Aizwal Substation and 132kV MELRIAT-ZEMABAWK(MIZORAM)
11	132kV AIZWAL-KOLASIB LINE		0800 Hrs to 1600 Hrs	Conductor Repairing works location no.180&181 by Aizwal TLM	Normal Maintenance related shutdown.	SD may be availed subjected to avilability of 132kV Badarpur - Kolasib. Subject to Mizoram consent.

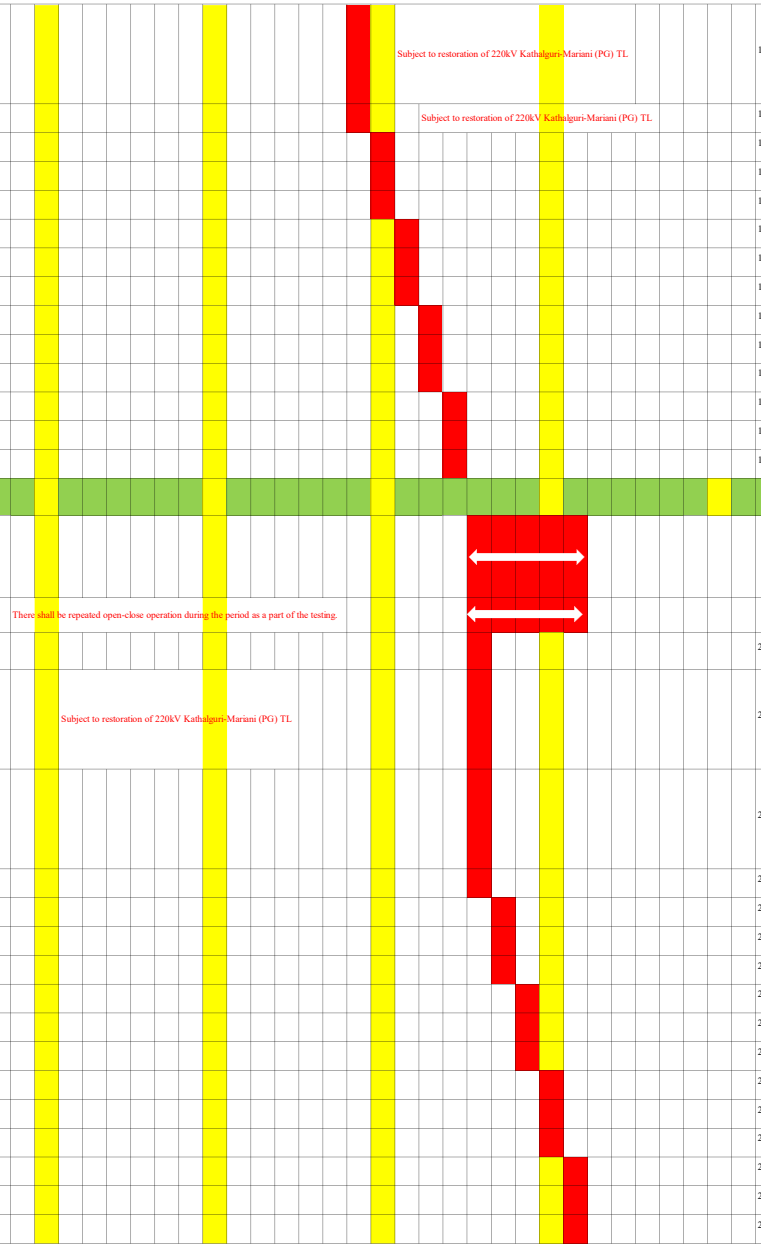
12	132kV JIRIBAM-HAFLONG LINE	CSD0800 Hrs to 1600 Hrs	For erection of new 400 kV DD+6 Tower constructed against Tower No.: 04 in the same orentation of the line & shifting of conductor from ERS to new tower.	Construction activities related shutdown.	SD may be availed subjected to avilability of 132kV Khandong - Umrangsho - Haflong (PG). Subject to Assam consent.
13	132KV BNC ITANAGAR LINE	0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subjected to avilability of 132kV Panyor - Itanagar. Subject to AP consent
14	132 KV BNC- GHOPUR LINE	0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subjected to avilability of 132kV BNC (PG) - Pavoi (AS) D/C lines and 132kV Itanagar - Gohpur.
15	132kV Tinsukia-Ledo Line (Single Ckt. Line) of AEGCL.	0700 Hrs to 1600 Hrs	Stringing in between loc.34/0 to 35/0 of 220kV D/C Kathalguri-Namsai Line.		SD may be availed subject to availability of 132kV Tinsukia-Rupai-Margherita link. The loading of Tinsukia - Rupai to be maintained below 300A during the shutdown period. SPS related to overloading of Tinsukia-Rupai to be kept in ON condition. SPS related to tripping of 132kV Panyor-Ziro to be kept in ON condition. **132kV Roing-Chapakhowa line to be kept open**. Subject to Assam consent.Subject to AP consent
16	A/R of 132kV JIRIBAM-TIPAIMUKH(MANIPUR)	0800 Hrs to 1600 Hrs	NON - AUTO MODE required for OPGW installation works under Reliable Communication Scheme.	Construction activities related shutdown.	A/R can be disabled
17	A/R of 132kV AGARTALA GAS (PG) - KUMARGHAT (PG)	0800 Hrs to 1600 Hrs	NON - AUTO MODE required for OPGW installation works under Reliable Communication Scheme.	Construction activities related shutdown.	A/R can be disabled
18	A/R of 132 KV IMPHAL - DIMAPUR-1	0800 Hrs to 1600 Hrs	NON - AUTO MODE required for OPGW installation works under Reliable Communication Scheme.	Construction activities related shutdown.	A/R can be disabled
19	A/R OF 400kV SILCHAR-IMPHAL-1	0800 Hrs to 1600 Hrs	For replacement of conventional porcelain insulators by composite long rod polymer insulators at Power/Deep valley/River/SH/NH crossing locations in 400kV SILCHAR-IMPHAL-2 line	Existing system improvement related shutdown.	A/R can be disabled

SN	Name of Element	Mar-25																													Time	Reason	Category	Study Comments
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
	220kV Transmission lines																																			
20	220kV MISA-DIMAPUR-2 Line																																0800 Hrs to 1600 Hrs	AMP of Bay equipments at Misa SS	Normal Maintenance related shutdown.	SD may be availed subjected to availability of 220kV MISA-DIMAPUR-1, 132 kV Dimapur Imphal, 132 kV Dimapur- Doyang D/C-Mockokchung - Mockokchung link and 132 kV Dimapur-Kohima link. Reliability of the system is reduced.
21	220kV MISA-KOPILI(NEEPCO)-1																																0800 Hrs to 1600 Hrs	AMP of Bay equipments at Misa SS	Normal Maintenance related shutdown.	SD may be availed subjected to availability of 220kV Misa - Koipili II & III. Intimation to NEEPCO
22	220kV D/C Kathalguri-Tinsukia Line (Ckt-I and Ckt-II) of AEGCL.																																0700 Hrs to 1600 Hrs	Stringing in between loc.42/0 to 43/0 of 220kV D/C Kathalguri-Namsai Line.		SD may be availed subjected to availability of 220kV NRPP - Tinsukia, 220kV NRPP-NTPS-Tinsukia line, 220kV Mariani (AS) - Amguri - NTPS lines, 220/132kV Tinsukia ICTs and 132kV NTPS - Bordubi - Tinsukia line. Considering N-1 220kV Kathaguri - Mariani (PG), the Kathalguri may kept 210 MW for safe evacuation of generation. Subject to Assam consent and NEEPCO

SN	Name of Element	Mar-25																													Time	Reason	Category	Study Comments
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
	400kV Transmission lines																																			
23	400kV SILCHAR-P K BARI(STERLITE)-1 &2 Lines																																CSD 0800 Hrs to 1600 Hrs	For tower shifting works under NHIDCL diversion. Towers of locations 329 to 333 shall be dismantled and re erected at new locations in the same oreintation of the line.	Construction activities related shutdown.	SD may be availed one circuit at a time and subject to availability of 400kV D/C Silchar - Palatana I & II, 132kV PK Bari - PK Bari (TSECL)
24	400kV SILCHAR-IMPHAL-2																																0800 Hrs to 1600 Hrs	For replacement of conventional porcelain insulators by composite long rod polymer insulators at Power/Deep valley/River/SH/NH crossing locations	Existing system improvement related shutdown.	SD may be availed subject to availability of 400kV Silchar - Imphal-1
25	400KV Bongaigaon-Balipara-2 T/L																																0900 Hrs to 1600 Hrs	Replacement of old electromechanical LBB relay with numerical relay Micom P442 in 411 Tie Bay and for wiring and Testing works	Existing system improvement related shutdown.	SD may be availed subject to availability of all other circuits of 400kV Bongaigaon - Balipara
26	400KV Bongaigaon-Balipara-2 T/L																																0900 Hrs to 1600 Hrs	Replacement of old electromechanical LBB relay with numerical relay Micom P442 in 412 Main Bay and for wiring and Testing works	Existing system improvement related shutdown.	SD may be availed subject to availability of all other circuits of 400kV Bongaigaon - Balipara
27	400KV Bongaigaon-Balipara-1 T/L																																0800 Hrs to 1600 Hrs	Replacement of old electromechanical LBB relay with numerical relay Micom P442 in 413 Main Bay and for wiring and Testing works	Existing system improvement related shutdown.	SD may be availed subject to availability of all other circuits of 400kV Bongaigaon - Balipara
28	400kV Silchar-Palatana-2 T/L																																0800 Hrs to 1600 Hrs	Firmware upgradation of Main 1& 2 relay and testing	Existing system improvement related shutdown.	**SD deferred**
	400kV Balipara SS																																			
29	400KV Balipara-BNC_2 Main Bay no.407 at Balipara SS																																0800 Hrs to 1600 Hrs	AMP works	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV BNC II share with dia with 400kV Misa II at 400kV Balipara S/s.
30	400KV Balipara-BNC_1 Main Bay no.412 at Balipara SS																																0800 Hrs to 1600 Hrs	AMP works	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV BNC I share with dia with 400kV Misa I at 400kV Balipara S/s.
31	132KV,160MVA ICT-1 Bay no.122 at Balipara SS																																0800 Hrs to 1600 Hrs	AMP works	Normal Maintenance related shutdown.	Subject to no outage of element. The ICT shall be in service via TBC Bay
32	**400kV BNC SS**																																			
33	400Kv Filter 3 Tie Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. Subject to NLDC Consent.
34	400KV Balipara 4 Main Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV Balipara IV share with dia with 400kV Balipara II at 400kV BNC S/s
35	400KV LS 3 Main Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV LS 3 share with dia with 400kV LS 4 at 400kV BNC S/s
36	132 KV ICT 1 Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements.
37	132 kv ICT 2 Main Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements.
38	400KV Filter 1 Main Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. Subject to NLDC Consent.
39	400KV Filter 2 Sub Bank 4 Bay at HVDC BNC SS																																0900 Hrs to 1600 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. Subject to NLDC Consent.
40	200MVA,400/132kV ICT-1 AT B'CHARIALI																																0800 Hrs to 1500 Hrs	AMP of bay equipment	Normal Maintenance related shutdown.	SD may be availed subject to the availability of ICT 2, Considering N-1 of ICT 2, the 132 kV Panyor-Pare, 132 kV Panyor-Lekhi and 132 kV Panyor - Itanagar - BNC (PG) line are to be in
	400KV MARIANI SS																																			
42	400KV MISA-1 AND ICT-2 TIE BAY(408) AT MARIANI SS																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. 400kV Misa 1 is connected with 400kV Bus 1 & 400kV ICT 2 is connected with Bus 2 at 400kV Mariani (PG) SS
43	220KV FUTURE-1 BAY(211) AT MARIANI SS																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements.
44	220KV FUTURE-2 BAY(212) AT MARIANI SS																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements.
45	20MVAR,BUS REACTOR-1 AT MARIANI SS																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	Subject to real time grid condition.
	400KV IMPHAL SS																																			
46	315MVA,400/132kV ICT-1 AT IMPHAL																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	SD may be availed subjected to availability of 400/132kV ICT 2.
47	400KV BUS-1 AT IMPHAL																																0800 Hrs to 1600 Hrs	AMP of 400 kV BUS BAR -1 and Testing of PU Relay	Normal Maintenance related shutdown.	SD may be availed subjected to availability of all other elements via Bus 2. The followng duas: *1. 400 New Kohima 1 & 315 MVA ICT 1 and 2. 400 Silchar 2 & 315 MVA ICT 2 are to be in*
	400KV SILCHAR SS																																			
48	132kV BUS 2 at Silchar SS																																0800 Hrs to 1600 Hrs	•AMP of BUS and BUS CVT •Cleaning and Tightening works (All elments will be in service through Bus-2)	Normal Maintenance related shutdown.	Shutdown may be availed subject to no outage of elements. All elements shall be transferred to Bus 1 before availing the shutdown. Considering the N-1 contingency of Bus 1, the following elements
49	132kV BUS 1 at Silchar SS																																0800 Hrs to 1600 Hrs	•Rectification of Bus Isolator in Hailakandi-2,Badrapur-1 & Srikona-1 lines and replacement of bus jumpers	Normal Maintenance related shutdown.	Shutdown may be availed subject to no outage of elements. All elements shall be transferred to Bus 1 before availing the shutdown. Considering the N-1 contingency of Bus 2, the following elements
50	132KV BUS COUPLER BAY 108																																0800 Hrs to 1600 Hrs	•AMP of Bay Equipment •CB CRM, CT Tandelta Testing	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements.
51	63MVAR,BUS REACTOR-2 AT SILCHAR																																0800 Hrs to 1600 Hrs	•AMP of Reactor •Bushing tandelta, cleaning and tightening works	Normal Maintenance related shutdown.	Subject to real time grid condition. Subject to real-time grid conditions, a voltage rise of approximately 1.9 kV has been observed
52	50MVAR,SWLR OF PALLATANA-1 AT SILCHAR																																0800 Hrs to 1600 Hrs	•AMP of Reactor •Bushing tandelta, cleaning and tightening works	Normal Maintenance related shutdown.	Subject to real time grid condition. Subject to real-time grid conditions, a voltage rise of approximately 1.9 kV has been observed
	400 KV BONGAIGAON SS																																			
53	400KV ICT-2 MAIN 2 BAY (426 BAY) at BONGAIGAON SS																																0800 Hrs to 1600 Hrs	AMP of Bay equipments	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV ICT 2 share with dia with 400kVBus Reactor 5 at 400kV Bongaigaon (PG) SS
54	400kV Bus Reactor-2 and Balipara-2 T/L with Tie Bay (411) at BONGAIGAON SS																																CSD 0800 Hrs to 1600 Hrs	Replacement of old electromechanical LBB relay with numerical relay Micom P442 in 411 Bay and for wiring and Testing works	Existing system improvement related shutdown.	SD may be availed subject to no outage of elements. 400kV Balipara 2 is connected with 400kV Bus 2 & 400kV Bus Reactor 2 is connected with Bus 1 at 400kV Bongaigaon (PG)
55	400KV,50MVAR BR-2 AT Bongaigaon SS																																0900 Hrs Hrs to 1600 Hrs	Replacement of old electromechanical LBB relay with numerical relay Micom P442 in 411 Bay and for wiring and Testing works	Existing system improvement related shutdown.	Subject to real time grid condition. Subject to real-time grid conditions, a voltage rise of approximately 1.4 kV has been observed

SN	Name of Element	Mar-25																													Time	Reason	Category	Study Comments
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
	400 KV Misa SS																																			
56	400KV Balipara-Misa-1 Main-2 bay no.405 at Misa SS																																0800 Hrs to 1600 Hrs	AMP work	Normal Maintenance related shutdown.	SD may be availed subject to no outage of elements. The 400kV Balipara 1 share with dia with both Bus I & II at 400kV Misa (PG) SS
	132KV Badarapur SS																																			
57	132KV BUS at Badarapur SS (All elements connected to Bus will be out of service)																																0800 Hrs to15:00Hrs	For conducting bus bar stability test and testing of Bus bar Trip after Replacemnet of existing CTs with higher CT ratings in 132KV Badarapur Khelrihat line at Badrapur SS under NERES-XX Project	Construction activities related shutdown.	The shutdown may be availed: 1. Subject to availability of 132kV Kumarghat – Karimganj. Intimation to Assam. 2. Subject to the availability of the 132kV Hailakandi – Panchgram line, the loading should be maintained such that it keeps the line within 40 MW (operational limit). Subject to Assam and Meghalaya consent. 3. Subject to the availability of the 132KV Jiribam – Haflong - Umrangsho –Khandong - Khandong - Khleihriat (PG), 132kV Kopili – Khleihriat and 220kV Killing – Mawngap D/C, 132kV Khleihriat (ME) - Lumshnong, 132kV Kopili - Khandong are to be in service. Subject to the availability of the 132KV Aizawl - Kolasib. Intimation to Mizoram
	132KV Khelrihat SS																																			
58	132KV BUS at Khelrihat SS (All elements connected to Bus will be out of service)																																0800 Hrs to16:00Hrs	For conducting bus bar stability test and testing of Bus bar Trip after Replacemnet of existing CTs with higher CT ratings in 132KV Khelrihat-Khelrihat line(both ends) at Khelrihat SS under NERES-XX Project	Construction activities related shutdown.	SD may be availed subjected to availability of 132kV Badarpur - Panchgram- Lumshnong-Khleihriat link. Considering N-1 of 132kV Panchgram - Lumshnong, the 132kV Umiam - Umiam St-I line loading need to be maintain below 65 MW and interned connection of Meghalaya need to
	132KV Nirjuli SS																																			
59	50MVA,132/33kV ICT-2 AT NIRJULI SS																																0800 Hrs to16:00Hrs	AMP works	Normal Maintenance related shutdown.	SD may be availed subject to availability of 132/33kV ICT 1. Subject to AP consent.
	Under NERSS-XV Project, extension works of existing switchyard at Kathalguri S/S (NEEPCO), along with commissioning of 220kV Numerical Bus Bar Relay at Kathalguri is in progress.																																			
	PHASE-I: For dismantling of existing scheme																																			
60	220kV Kathalguri-Mariani (PG) TL																																01/03/2025 (08:00:00 - 08:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		**S/D shall not be availed. Same work is planned to be optimised and carried out along with main bus shutdown in phase 2**
61	220/132kV ICT-1 at Kathalguri																																01/03/2025 (09:00:00 - 09:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
62	220/132kV ICT-2 at Kathalguri																																01/03/2025 (10:00:00 - 10:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
63	220kV Kathalguri-Mariani (AEGCL) TL																																01/03/2025 (11:00:00 - 11:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
64	220kV Kathalguri-Tinsukia #1 TL																																01/03/2025 (12:00:00 - 12:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
65	220kV Kathalguri-Tinsukia #2 TL																																01/03/2025 (13:00:00 - 13:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
66	220kV Kathalguri - Deomali TL																																01/03/2025 (15:00:00 - 15:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
67	220kv Bus Coupler Bay																																01/03/2025(16:00:00 - 16:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
68	220kV Gas Turbine-1 at Kathalguri																																02/03/2025 (06:30:00 - 07:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
69	220kV Gas Turbine-2 at Kathalguri																																02/03/2025 (09:30:00 - 10:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
70	220kV Gas Turbine-3 at Kathalguri																																02/03/2025 (12:30:00 - 13:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
71	220kV Gas Turbine-4 at Kathalguri																																03/03/2025 (06:30:00 - 07:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
72	220kV Gas Turbine-5 at Kathalguri																																03/03/2025 (09:30:00 - 10:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
73	220kV Gas Turbine-6 at Kathalguri																																03/03/2025 (12:30:00 - 13:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
74	220kV Steam Turbine-1 at Kathalguri																																04/03/2025 (06:30:00 - 07:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
75	220kV Steam Turbine-2 at Kathalguri																																04/03/2025 (10:00:00 - 11:15:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
76	220kV Steam Turbine-3 at Kathalguri																																04/03/2025 (13:30:00 - 14:45:00 hrs.)	Disconnection of CT cores used in existing Bus Bar Scheme		
	PHASE-II: For stability Test & Check for extension fo Trip command **Feeders with Main Bus 1**																																			
77	220kV Main Bus-1 at Kathalguri																																15.03.2025 (07:00:00) to 19.03.2025(17:00:00 hrs.)	For Main Bus-1 Primary injection and Stability Test		All other elements needs to be shifted to 220kV Main Bus-2 before availing the shutdown. 220kV Samaguri - Mariani (AS) - Mariani (PG) and 220kV Mariani (AS) - Amguri - NTPS lines are to be in service. In N-1 of Bus II, the 220kV Kathalguri - Mariani (PG), 220kV Kathalguri - Mariani (AS), 220kV D/C Kathalguri - Tinsukia I & II and 220kV Kathalguri - Deomali will be out of service.
78	Bus Coupler Bay	There shall be repeated open-close operation during the period as a part of the testing.																															15.03.2025 (07:00:00) to 19.03.2025(17:00:00 hrs.)	For Main Bus-1 Primary injection and Stability Test		SD may be availed.
79	220kV Kathalguri - Deomali TL																																15.03.2025 (07:00:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of ICT-1 with Main bus -1		132kV Deomali S/s will be Blackout. Subject to AP consent
80	220kV Kathalguri-Mariani (PG) TL																																15.03.2025 (09:30:00 - 11:30:00 hrs.)	For Primary injection and Stability Test of line with Main bus -1		S/D may be availed. At present, the Upper Assam power system is connected with 220 kV Samaguri-Mariani(AS) line, 220 kV Mariani(AS) - Mariani (PG) line, 220 kV AGBPP-Mariani(PG) line and 132 kV Mariani - Golaghat - Sarupathar - Bokajan - Dimapur link. Under N-1 condition, Gate flow should be monitored and shall be maintained below 260 MW(during solar period) and 245 MW (durng non-solar period) for safe and reliable grid operation. RELIABILITY OF THE SYSTEM IS REDUCED.

81	220kV Kathalguri-Mariani (AEGCL) TL	15.03.2025 (12:00:00 - 14:00:00 hrs.)	For Primary injection and Stability Test of line with Main bus -1		S/D may be availed. At present, the Upper Assam power system is connected with 220 kV Samaguri-Mariani(AS) line, 220 kV Mariani(AS) - Mariani (PG) line, 220 kV AGBPP-Mariani(PG) line and 132 kV Mariani - Golaghat - Sarupathar - Bokajan - Dimapur link. Under N-1 condition, Gate flow should be monitored and shall be maintained below 260 MW(during solar period) and 245 MW (durng non-solar period) for safe and reliable grid operation. RELIABILITY OF THE SYSTEM IS REDUCED. Assam consent required
82	220kV Kathalguri-Tinsukia #1 TL	15.03.2025 (14:30:00 - 16:30:00 hrs.)	For Primary injection and Stability Test of line with Main bus -1		S/D may be availed subject to availability of 220 kV Tinsukia-Kathalguri 2.
83	220kV Kathalguri-Tinsukia #2 TL	16.03.2025 (07:00:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of line with Main bus -1		S/D may be availed subject to availability of 220 kV Tinsukia-Kathalguri 1.
84	220/66kV ICT-1 at Kathalguri	16.03.2025 (09:30:00 - 11:30:00 hrs.)	For Primary injection and Stability Test of ICT-1 with Main bus -1		S/D may be availed subject to availability of 220/66 kV ICT 2
85	220kV Gas Turbine-5 at Kathalguri	16.03.2025 (12:30:00 - 14:30:00 hrs.)	For Primary injection and Stability Test ofGT-5 with Main bus -1		S/D may be availed
86	220kV Gas Turbine-1 at Kathalguri	17.03.2025 (06:30:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GT-1 with Main bus -1		
87	220kV Gas Turbine-3 at Kathalguri	17.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of GT-3 with Main bus -1		
88	220kV Steam Turbine-1 at Kathalguri	17.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of STG-1 with Main bus -1		
89	220kV Gas Turbine-4 at Kathalguri	18.03.2025 (06:30:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GT-4 with Main bus -1		
90	220kV Gas Turbine-2 at Kathalguri	18.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of GT-2 with Main bus -1		SD may be availed. Subject to consent from NER utilities.
91	220kV Steam Turbine-2 at Kathalguri	18.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of STG#2with Main bus -1		
92	220kV Gas Turbine-6 at Kathalguri	19.03.2025 (06:00:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GT-6 with Main bus -1		
93	220/66kV ICT-2 at Kathalguri	19.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of ICT-2 with Main bus -1		
94	220kV Steam Turbine-3 at Kathalguri	19.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of ST-3 with Main bus -1		
	PHASE-II: For stability Test & Check for extension fo Trip command Feeders with Main Bus 1				
95	220kV Main Bus-2 at Kathalguri	20.03.2025 (07:00:00 Hr) to 24.03.2025(17:00:00 Hr.)	For Main Bus-2 Primary injection and Stability Test		All other elements needs to be shifted to 220kV Main Bus-1 before availing the shutdown. 220kV Samaguri - Mariani (AS) - Mariani (PG) and 220kV Mariani (AS) - Amguri - NTPS lines are to be in service. In N-1 of Bus II, the 220kV Kathalguri - Mariani (PG), 220kV Kathalguri - Mariani (AS), 220kV D/C Kathalguri - Tinsukia I & II and 220kV Kathalguri - Deomali will be out of service.
96	Bus Coupler Bay	20.03.2025 (07:00:00 Hr) to 24.03.2025(17:00:00 Hr.)	For Main Bus-2 Primary injection and Stability Test		SD may be availed.
97	220kV Kathalguri - Deomali TL	20.03.2025 (07:00:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of ICT-1 with Main Bus -2		132kV Deomali S/s will be Blackout. Subject to AP consent
98	220kV Kathalguri-Mariani (PG) TL	20.03.2025 (09:30:00 - 11:30:00 hrs.)	For Primary injection and Stability Test of line with Main Bus -2		S/D may be availed. At present, the Upper Assam power system is connected with 220 kV Samaguri-Mariani(AS) line, 220 kV Mariani(AS) - Mariani (PG) line, 220 kV AGBPP-Mariani(PG) line and 132 kV Mariani - Golaghat - Sarupathar - Bokajan - Dimapur link. Under N-1 condition, Gate flow should be monitored and shall be maintained below 260 MW(during solar period) and 245 MW (durng non-solar period) for safe and reliable grid operation. RELIABILITY OF THE SYSTEM IS REDUCED.
99	220kV Kathalguri-Mariani (AEGCL) TL	20.03.2025 (12:00:00 - 14:00:00 hrs.)	For Primary injection and Stability Test of line with Main Bus -2		S/D may be availed. At present, the Upper Assam power system is connected with 220 kV Samaguri-Mariani(AS) line, 220 kV Mariani(AS) - Mariani (PG) line, 220 kV AGBPP-Mariani(PG) line and 132 kV Mariani - Golaghat - Sarupathar - Bokajan - Dimapur link. Under N-1 condition, Gate flow should be monitored and shall be maintained below 260 MW(during solar period) and 245 MW (durng non-solar period) for safe and reliable grid operation. RELIABILITY OF THE SYSTEM IS REDUCED. Assam consent required
100	220kV Kathalguri-Tinsukia #1 TL	20.03.2025 (14:30:00 - 16:30:00 hrs.)	For Primary injection and Stability Test of line with Main Bus -2		S/D may be availed subject to availability of 220 kV Tinsukia-Kathalguri 2.
101	220kV Kathalguri-Tinsukia #2 TL	21.03.2025 (07:00:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of line with Main Bus -2		S/D may be availed subject to availability of 220 kV Tinsukia-Kathalguri 1.
102	220/66kV ICT-1 at Kathalguri	21.03.2025 (09:45:00 - 11:45:00 hrs.)	For Primary injection and Stability Test of ICT-1 with Main Bus -2		S/D may be availed subject to availability of 220/66 kV ICT 2
103	Gas Turbine Generator #5 at Kathalguri	21.03.2025 (12:45:00 - 14:45:00 hrs.)	For Primary injection and Stability Test ofGT-5 with Main bus -1		S/D may be availed
104	220kV Gas Turbine-1 at Kathalguri	22.03.2025 (06:30:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GT-1 with Main Bus -2		SD may be availed. Subject to consent from NER utilities.
105	220kV Gas Turbine-3 at Kathalguri	22.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of GT-3 with Main Bus -2		SD may be availed. Subject to consent from NER utilities.
106	Steam Turbine Generator #1 at Kathalguri	22.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of STG-1 with Main bus -1		SD may be availed. Subject to consent from NER utilities.
107	220kV Gas Turbine-4 at Kathalguri	23.03.2025 (06:30:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GT-4 with Main Bus -2		SD may be availed. Subject to consent from NER utilities.
108	Gas Turbine Generator #2 at Kathalguri	23.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of GT-2 with Main bus -1		SD may be availed. Subject to consent from NER utilities.
109	Steam Turbine Generstor#2 at Kathalguri	23.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of STG#2with Main bus -1		SD may be availed. Subject to consent from NER utilities.
110	220kV Gas Turbine-6 at Kathalguri	24.03.2025 (06:30:00 - 09:00:00 hrs.)	For Primary injection and Stability Test of GTG-6 with Main bus -1		SD may be availed. Subject to consent from NER utilities.
111	220/6.6kV ICT-2 at Kathalguri	24.03.2025 (10:00:00 - 12:30:00 hrs.)	For Primary injection and Stability Test of ICT-2 with Main bus -1		S/D may be availed subject to availability of 220/66 kV ICT 1
112	220kV Steam Turbine-3 at Kathalguri	24.03.2025 (13:30:00 - 16:00:00 hrs.)	For Primary injection and Stability Test of STG-3 with Main bus -1		SD may be availed. Subject to consent from NER utilities.



SN	Name of Element	Mar-25																													Time	Reason	Category	Study Comments
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
	SHUTDOWNS PROPOSED BY Indigrid																																			
1	400kV Silchar-Misa Ckt-1																																10:00 Hrs to 14:00 Hrs	Rectification of SD defects in line		SD may be availed subjected to availability of 400kV Silchar-Misa Ckt-2. Intimation to Nerts
2	400kV Silchar-Misa Ckt-2																																10:00 Hrs to 14:00 Hrs	Rectification of SD defects in line		SD may be availed subjected to availability of 400kV Silchar-Misa Ckt-1. Intimation to Nerts
3	400kV SM Nagar-PK Bari CKT-1																																06:00 hrs to 16:00 Hrs	To change the PID/EFD defective insulator and hence other SD type defect will also attended at the same time.		SD may be availed subjected to availability of 132kV AgGBPS - PK Bari ckt-2, 400kV Silchar-PK Bari Ckt-2, 132kV PK Bari - PK Bari (TSECL), 132kV SM Nagar (ISTS) - SM Nagar (TSECL) and 132kV SM Nagar (ISTS) - Bodhjunnagr. In present scenario considering N-1 of 132kV AgGBPS - PK Bari ckt 1, the 132kV PK Bari - PK Bari (TSECL) line loading observed around 78 MW. **Intimation to Indigrid and Tripura.**
4	132 KV AgGBPS (NEEPCO)- PK Bari line-1																																06:00 hrs to 16:00 Hrs	To change the PID/EFD defective insulator and hence other SD type defect will also attended at the same time.		
5	400kV SM Nagar-PK Bari CKT-2																																06:00 hrs to 16:00 Hrs	To change the PID/EFD defective insulator and hence other SD type defect will also attended at the same time.		SD may be availed subjected to availability of 132kV AgGBPS - PK Bari ckt-2, 400kV Silchar-PK Bari Ckt-2, 132kV PK Bari - PK Bari (TSECL), 132kV SM Nagar (ISTS) - SM Nagar (TSECL) and 132kV SM Nagar (ISTS) - Bodhjunnagr. In present scenario considering N-1 of 132kV AgGBPS - PK Bari ckt 2, the 132kV PK Bari - PK Bari (TSECL) line loading observed around 78 MW. **Intimation to Indigrid and Tripura.**
6	132 KV AgGBPS (NEEPCO)- PK Bari line-2																																06:00 hrs to 16:00 Hrs	To change the PID/EFD defective insulator and hence other SD type defect will also attended at the same time.		
	SHUTDOWNS PROPOSED BY Nagaland																																			
1	132 KV Dimapur-Dimapur D/C																																05:30Hrs to 08:30 Hrs	substation maintenance		Dimapur (Nagaland) area will be black out during the shutdown period.
	SHUTDOWNS PROPOSED BY NEEPCO																																			
1	Unit#2 at PHPS(Pare)																																00:00 hrs to 23:59 hrs	Annual Planned Maintenance		SD may be availed
2	132kV Pare-North Lakhimpur and 132kV Pare-Nirjuli Line																																06:00 hrs to 14:00 hrs	Vegetation Clearance in LILO Portion of 132kV Pare-North Lakhimpur and 132kV Pare-Nirjuli Line (Previously LILO-I portion)		SD may be availed subject to availability of 132kV Panyor - Lekhi, 132kV Panyor - Itanagar, 132kV Panyor - Pare - Itanagar and both 220/132kV ICTs at BNC S/s.
3	Unit#1 at Kopili 4x50 MW PS				To be availed after return of Kameng U#3																										00:00 hrs to 23:59 hrs	Annual Planned Maintenance .		Subject to consent from NER utilities.
4	Kameng 400/132KV switch yard at KaHPS (along wth units)																														09:00 hrs to 15:30 hrs	Pre-monsoon preventive maintenance works.		Subject to consent from NER utilities. Intimation to Powergrid
5	Unit - 3, KaHPS																														00:00 hrs to 23:59 hrs	Annual Planned Maintenance .		Subject to consent from NER utilities.
6	Gas Turbine Unit # 5 at AGBPS																														00:00 hrs to 23:59 hrs	To carry out Boroscopic Inspection to view the Cracks in Nozzle stage#1 as per OEM recommendation.		Subject to consent from NER utilities.
7	GTG#4 at AgGBPS (RC Nagar)																														00:00 hrs to 23:59 hrs	1. Installation of Generator Control Protection (GCP) Panel. 2. Combustion Inspection & Barroscopic Inspection (CI & BI). 3. Inspection of Load Gear Box (LGB). 4. Re-align High Speed (Turbine) and Low Speed (Generator) Shaft.		Subject to consent from NER utilities.

	SHUTDOWNS PROPOSED BY Tripura				
1	132 KV Surjamaninagar - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 KV Surjamaninagar - Agartala line II
2	132 KV Baramura - Jirania Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Budhjungnagar - Jirania & 132kV Ambasa - Gamaitila - Baramura lines
3	132 KV Gamaitilla S/S (132 KV Bus)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
4	132 KV Udaipur - Palatana Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Monarchak - Udaipur and 132kV Monarchak - Rokhia and 132kV Rokhia - Agartala D/C. Monarchak generation to be maintained depending on the line flow of 132kV Monarchak - Rokhia
5	132 KV Kamalpur - PK Bari Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the avialability of 132 kV Agartala-Mohanpur-Dhalabil-Kamalpur link
6	132 KV Surjamaninagar (TSECL) - Surjamaninagar (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. The loading of 132 kV SM Nagar (ISTS) - Bodhjungnagar line is to be restriced within 65 MW after availing the S/D. The loading will be maintained by SLDC Tripura. All adjacent lines in Bodhjungnagar & 132 KV P.K Bari (TSECL) - P.K Bari (ISTS) and 132 KV Surjamaninagar (TSECL)- Palatana Line are kept to be in service
7	132 KV P.K Bari - KGT Power Grid Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		All other adjacent lines at 132kV Agartala S/s are to be in service
8	132 KV Rokhia - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt II, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
9	132 KV Baramura - Gamaitilla Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Budhjungnagar - Jirania - Baramura & 132kV Ambasa -Gamaitila lines
10	132 KV P.K Bari - Dharmanagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 KV Hailakandi - Durllavchrra - Dharmanagar line
11	132 KV Rokhia - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt II, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
12	132 KV Gamaitilla - Ambassa Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Budhjungnagar - Jirania - Baramura - Gamaitila lines
13	132 KV Rokhia - Agartala Line II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt I, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
14	132 KV Ambassa - PK Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Ambasa - Kamalpur and 132kV Budhjungnagar - Jirania - Baramura - Gamaitila - Ambasa link. Intimation to INDIGRID.
15	132 KV Monarchak - Udaipur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Generation of Monarchak is to be kept within 70 MW. SPS at Monarchak to be kept off before availing SD.
16	132 KV P.K. Bari (TSECL) - P.K. Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. The loading of 132 kV SM Nagar - SMNagar line to be restricted within 70 MW after availing the S/D. The loading will be maintained by SLDC Tripura.
17	132 KV Bodhjungnagar - Jirania line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
18	132 KV Mohanpur S/S (132 KV Bus)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur - Dhalabil lines
19	132 KV Gamaitilla - Ambassa Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Budhjungnagar - Jirania - Baramura - Gamaitila lines
20	132 KV Surjamaninagar - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 KV Surjamaninagar - Agartala line II
21	132 KV Bus (Section-3) of Agartala S/S with Agartala - Bodhjungnagar Line, Agartala - SM Nagar Line I & II, Agartala - RC Nagar Line II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to 132kV AgGBPS - PK Bari D/C and 132kV AgGBPS - Kumarghat, 132kV Monarchak - Udaipur - Palatana. In the base case, after the outage of the aforementioned shutdown, the line loading of the 132 kV Monarchak – Udaipur line reached approximately 104 MW. To prevent such a scenario, the generation at Rokhia and Monarchak is limited to 80 MW, depending on the load at these stations, so that the line loading of the 132 kV Monarchak – Udaipur line remains within 65 MW post-shutdown. Intimation to NEEPCO.
22	132 KV Bodhjungnagar S/S (132 KV Bus)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 kV Surjamaninagar (ISTS) - Surjamaninagar (TSECL) and 132 kV PK Bari - PK Bari (ISTS). The loading of 132 kV SM Nagar - SMNagar line to be restricted within 70 MW after availing the S/D.
23	132 KV Rokhia - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt II, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
24	132 KV Kamalpur - Dhalabil Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Agartala - Mohanpur Dhalabil and 132kV PK Bari - Kamalpur
25	132 KV Ambassa - PK Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
26	132 KV Kamalpur - Dhalabil Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Agartala - Mohanpur Dhalabil and 132kV PK Bari - Kamalpur
27	132 KV Rokhia - Monarchak Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Monarchak - Udaipur- Palatana. Generation of Monarchak is to be kept within 70 MW. SPS at Monarchak to be kept off before availing SD.
28	132 KV Agartala - Mohanpur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur - Dhalabil - Mohanpur
29	132 KV Surjamaninagar - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. The loading of 132 kV SM Nagar - SMNagar line to be restricted within 70 MW after availing the S/D. The loading will be maintained by SLDC Tripura.
30	132 KV Baramura - Gamaitilla Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Budhjungnagar - Jirania - Baramura and 132kV Ambasa - Gamaitila.
31	132 KV P.K. Bari (TSECL) - P.K. Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
32	132 KV Rokhia - Agartala Line I	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt II, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
33	132 KV Bus of Surjamaninagar S/Stn.(Bus-2)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		Subject to all element to be in service Bus I.
34	132 KV Monarchak - Udaipur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Palatana - Udaipur and 132kV Monarchak - Rokhia. Generation of Monarchak is to be kept within 70 MW. SPS at Monarchak to be kept off before availing SD.
35	132 KV Agartala - Mohanpur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur - Dhalabil - Mohanpur
36	132 KV Ambassa - PK Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
37	132 KV P.K Bari - Dharmanagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Hailakandi - Durllavchrra - Dharmanagar lines
38	132 KV Ambassa - PK Bari (ISTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
39	132 KV Rokhia - Agartala Line II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt I, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.

40	132 KV Monarchak - Udaipur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Palatana - Udaipur and 132kV Monarchak - Rokhia. Generation of Monarchak is to be kept within 70 MW. SPS at Monarchak to be kept off before availing SD.
41	132 KV Agartala - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of all adjacent lines from Agartala SS.
42	132 KV Ambassa - Kamalpur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Ambasa - Gamaitilla - Baramura - Jirania link.
43	132 KV Dharmanagar - Durllavcherra Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Hailakandi - Durllavchrra and 132kV PK Bari - Durllavchrra. Tripura consent require.
44	132 KV Kamalpur - P.K Bari Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Agartala - Mohanpur - Dhalabil - Kamalpur lines
45	132 KV Bodhjungnagar - Jirania Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Ambasa - Gamaitilla - Baramura - Jirania link.
46	132 KV Rokhia - Agartala Line II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed. Considering N-1 of ckt I, Monarchak and Rokhia generation is to be kept such that 132kV Monarchak - Udaipur line loading to be maintain within 70 MW. SPS at Monarchak to be kept off before availing SD.
47	132 KV Agartala - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of all adjacent lines from Agartala SS.
48	132 KV Surjamaninagar (TSECL) - Surjamaninagar (BSTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
49	132 KV Baramura - Jirania Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
50	132 KV Udaipur - Palatana Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Monarchak - Udaipur and 132kV Monarchak - Rokhia and 132kV Rokhia - Agartala D/C.
51	132 KV Dhalabil S/S (132 KV Bus)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur and 132kV Agartala - Mohanpur
52	132 KV Bus -I of Agartala S/S with Agartala - Rokhia Line I & II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
53	132 KV P.K Bari - KGT Power Grid Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		All other adjacent lines at 132kV Agartala S/s are to be in service
54	132 KV Dharmanagar S/S (132 KV Bus)	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Hailakandi - Dullavcherra
55	132 KV Surjamaninagar (BSTS) - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
56	132 KV Baramura - Gamaitilla Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
57	132 KV Agartala - Mohanpur Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur - Dhalabil - Mohanpur
58	132 KV P.K Bari - KGT Power Grid Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of all adjacent lines from 132kV Kumarghat SS.
59	132 KV Mohanpur - Dhalabil Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur and 132kV Agartala - Mohanpur
60	132 KV Surjamaninagar - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
61	132 KV Surjamaninagar (BSTS) - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
62	132 KV Mohanpur - Dhalabil Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur and 132kV Agartala - Mohanpur
63	132 KV Baramura - Gamaitilla Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
64	132 KV Dharmanagar - Durllavcherra Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV Hailakandi - Durllavchrra and 132kV PK Bari - Durllavchrra. Tripura consent require.
65	132 KV Surjamaninagar (TSECL) - Surjamaninagar (BSTS) Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
66	132 KV Baramura - Jirania Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
67	132 KV Surjamaninagar - Agartala Line II	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 KV Surjamaninagar - Agartala line I
68	132 KV Mohanpur - Dhalabil Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of 132kV PK Bari - Kamalpur and 132kV Agartala - Mohanpur
69	132 KV Agartala - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		S/D may be availed subject to availability of all adjacent lines from 132kV Agartala SS.
70	132 KV Kamalpur - Ambassa Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed.
71	132 KV Surjamaninagar (BSTS) - Bodhjungnagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		**Sd deferred**
72	132 KV P.K Bari - Dharmanagar Line	09:00 to 16:00 Hrs	Pre-Monsoon Shutdown work 2025.		SD may be availed subject to the availabitiy of 132 KV Hailakandi - Durllavchrra - Dharmanagar line
	SHUTDOWNS PROPOSED BY NHPC				
1	Unit#1 of Loktak PS	06:00 Hrs to 23:59 hrs	Annual Maintenance		Subject to consent from NER utilities.

	SHUTDOWNS PROPOSED BY Assam				
1	220kV AMGURI- MARIANI	8:00 - 16:00	PREVENTIVE MAINTENANCE		SD may be availed subject to availability of 220kV AMGURI-NTPS line.
2	220kV SAMAGURI-MARIANI- II	8:00-16:00	PREVENTIVE MAINTENANCE		S/D may be availed. At present, the Upper Assam power system is connected with 220 kV Samaguri-Mariani(AS) line, 220 kV Mariani(AS) - Mariani (PG) line, 220 kV AGBPP-Mariani(PG) line and 132 kV Mariani - Golaghat - Sarupathar - Bokajan - Dimapur link. Under N-1 condition, Gate flow should be monitored and shall be maintained below 260 MW(during solar period) and 245 MW (durng non-solar period) for safe and reliable grd operation. RELIABILITY OF THE SYSTEM IS REDUCED.
3	220kV AMGURI-NTPS	8:00-16:00	PREVENTIVE MAINTENANCE		SD may be availed subject to availability of 220kV AMGURI-MARIANI line.
4	132kV GOLAGHAT-MARIANI	8:00-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed. 132 kV Dimapur - Bokajan - Sarupathar - Golaghat link to be kept in service.
5	132kV GOLAGHAT-SARUPATHAR	8:00-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may availed. 132 kV Mariani - Golaghat line and 132 kV Dimapur - Bokajan - Sarupathar link to be kept in service.
6	220kV TINSUKIA-KATHALGURI-I	10:00-16:00	CORRIDOR CLEARANCE		SD may be availed subject to availability of 132kV Tinsukai - Kathakguri ckt II
7	220kV TINSUKIA-KATHALGURI-II	10:00-16:00	CORRIDOR CLEARANCE		SD may be availed subject to availability of 132kV Tinsukai - Kathakguri ckt I
8	220kV TINSUKIA-NTPS	10:00-16:00	CORRIDOR CLEARANCE		S/D may be availed. 220 kV Tinsukia - NRPP line and 220 kV NTPS - NRPP line to be kept in service.
9	220kV TINSUKIA-NRPP	10:00-16:00	CORRIDOR CLEARANCE		S/D may be availed. 220 kV Tinsukia - NTPS line and 220 kV NTPS - NRPP line to be kept in service.
10	132kV BOKAJAN-DIMAPUR	9:00-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed. 132 kV Mariani - Golaghat - Sarupathar - Bokajan link to be kept in service.
11	132kV BOKAJAN-SARUPATHAR	9:00-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed. 132 kV Dimapur -Bokajan line and 132 kV Mariani - Golaghat - Sarupathar link to be kept in service
12	132kV TINSUKIA- RUPAI	9:00-16:00	CORRIDOR CLEARANCE		SD may be availed subject to availability of 132kV Tinsukia-Margherita-Rupai link. The loading of Tinsukia - Rupai to be Margherita below 300A during the shutdown period. SPS related to overloading of Tinsukia-Rupai to be kept in ON condition. SPS related to tripping of 132kV Panyor-Ziro to be kept in ON condition.
13	132kV PAILAPOOL-JIRIBUM	9:00-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed subject to availability of 132 kV Srikona - Pailapool.
14	220kV SAMAGURI-JAWAHARNAGAR	7:00-16:00	HEIGHT RISING OF CONDUCTOR SPAN BETWEEN LOC 224 AND LOC 236		S/D may be availed subject to availability of 220 kV Sarusajai-Sonapur-Samaguri link, 220 kV Sarusajai - Jawaharnagar line and 220 kV Sarusajai-Azara DC.
15	220kV SAMAGURI-SONAPUR	7:00-16:00	HEIGHT RISING OF CONDUCTOR SPAN BETWEEN LOC 224 AND LOC 236		S/D may be availed subject to availability of 220 kV Sarusajai-Jawaharnagar-Samaguri link, 220 kV Sarusajai - Sonapur line and 220 kV Sarusajai-Azara DC.
16	220 kV SALAKATI-RANGIA-II	7:00-16:00	PREVENTIVE MAINTENANCE		S/D may be availed subject availability of 220 kV BTPS-RANGIA CKT I. SPS at Rangia should be kept in ON condition.
17	220 kV SALAKATI-RANGIA-I	7:00-16:00	PREVENTIVE MAINTENANCE		S/D may be availed subject availability of 220 kV BTPS-RANGIA CKT II. SPS at Rangia should be kept in ON condition.
18	132kV GOHPUR-NALKATA-I	7:00-14:00	CORRIDOR CLEANING & LINE MAINTENANCE		S/D may be availed subject to availability of 132 kV Gohpur - Nalkata ckt 2
19	132kV GOHPUR-NALKATA-II	7:00-14:00	CORRIDOR CLEANING & LINE MAINTENANCE		S/D may be availed subject to availability of 132 kV Gohpur - Nalkata ckt 1
20	220kV BTPS-AGIA-I	8:00HRS OF 8.3.2025 TO 16:00HRS OF 17.3.2025	STRINGING OF BROKEN R PHASE CONDUCTOR FROM LOC NO. 143 TO LOC NO. 151 OVER BRAHMAPUTRA RIVER		The S/D may be availed subject to availability of 220kV Agia-BTPS 2 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.
21	220kV BTPS-AGIA-II	8:00HRS OF 21.3.2025 TO 16:00HRS OF 22.3.2025	ERECTION OF ERS TOWER IN BETWEEN LOC NO. 140 AND 142		The S/D may be availed subject to availability of 220kV Agia-BTPS 1 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.
22	220kV BTPS-AGIA-I	8:00HRS OF 2.4.2025 TO 16:00HRS OF 4.4.2025	ERECTION OF ERS TOWER AT LOC NO. 140 AND 142 & STRINGING OF CONDUCTOR IN BETWEEN LOC NO. 140 AND 143		The S/D may be availed subject to availability of 220kV Agia-BTPS 2 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.
23	220kV BTPS-AGIA-II	8:00HRS OF 2.4.2025 TO 16:00HRS OF 4.4.2025	DISMANTLING OF ERS TOWER & STRINGING OF CONDUCTOR IN BETWEEN LOC NO. 140 TO 143		The S/D may be availed subject to availability of 220kV Agia-BTPS 1 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.
24	220kV AGIA-BTPS-I	9:00-16:00	CORRIDOR CLEANING		The S/D may be availed subject to availability of 220kV Agia-BTPS 2 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.

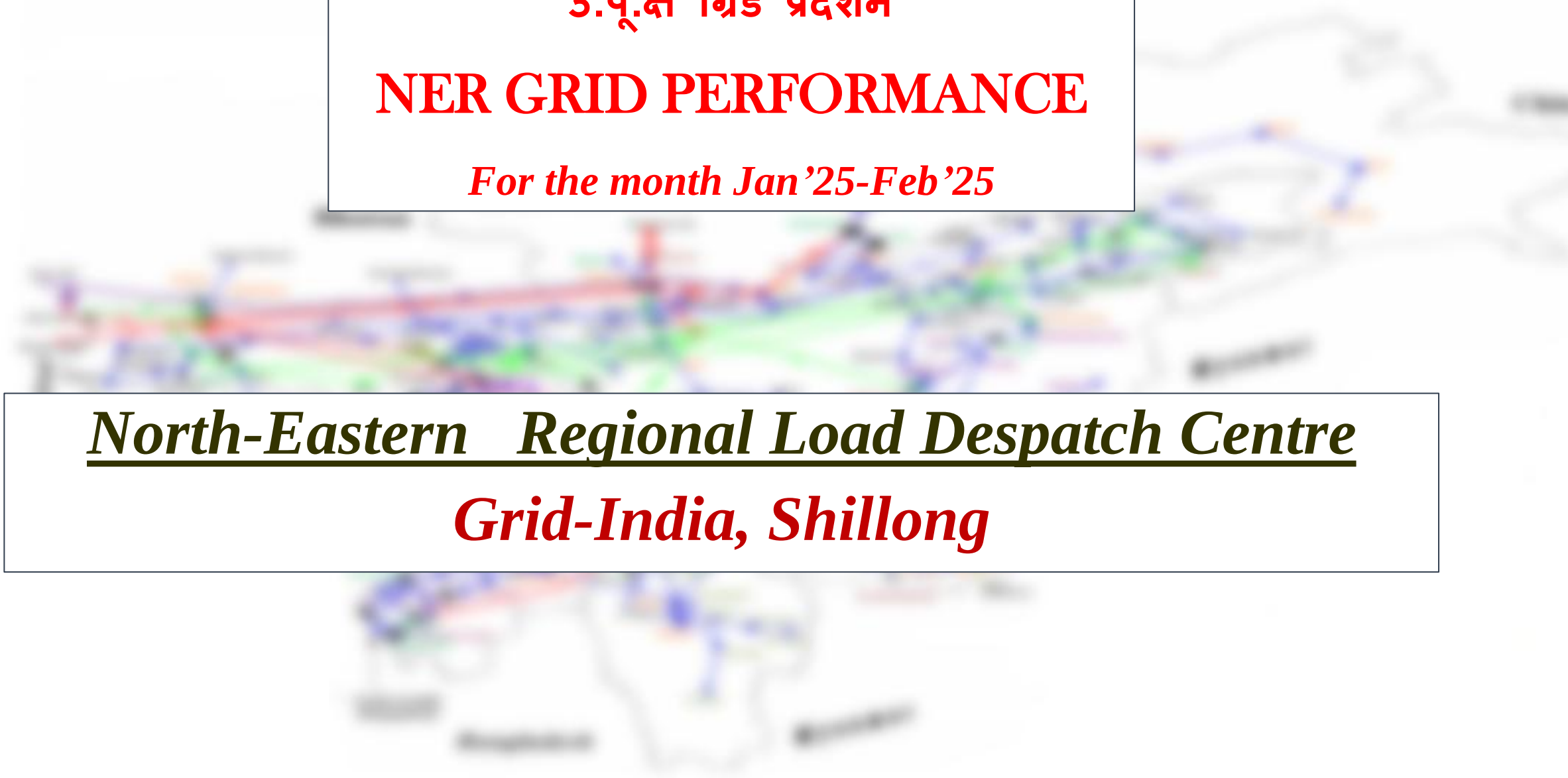
SN	Name of Element	Mar-25	Time	Reason	Category	
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				
	SHUTDOWNS PROPOSED BY NTPC					
25	220kV AGIA-BTPS-II		9:00-16:00	CORRIDOR CLEANING		The S/D may be availed subject to availability of 220kV Agia-BTPS 1 line (which line loading to be maintained below 500A). 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s should be kept in service.
26	220kV AGIA-BOKO		9:00-16:00	CORRIDOR CLEANING		S/D may be availed. 220 kV Mirza - Boko line and 220 kV Agia - Mirza line to be kept in service.
27	220kV MIRZA-AGIA		9:00-16:00	CORRIDOR CLEANING		S/D may be availed. 220 kV Agia - Boko - Mirza link to be kept in service. Also, 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s, 220kV Balipara - Sonabil D/C
28	220/132kV 100MVA TRAFO-II AT AGIA		9:00-16:00	ROUTINE TESTING		The S/D may be availed subject to availability of 220/132 kV ICT I & III.
29	220/132kV 200MVA TRAFO-IV AT SARUSAJAI		10:00-13:00	PREVENTIVE MAINTENANCE		SD may be availed subjected to availability of other ICTs
30	220/132kV 200MVA TRAFO-II AT SARUSAJAI		10:00-13:00	PREVENTIVE MAINTENANCE		The S/D may be availed subject to availability of 220/132 kV ICT I & III.
31	200kV SAMAGURI-JAWANAGAR		8:30-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		SD may be availed subject to availability of 220kV Samaguri-Sonapur-Sarusajai link, 220kV Jawaharnagar-Samaguri line.
32	220kV SARUSAJAI-JAWAHARNAGAR GIS		8:30-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		SD may be availed subject to availability of 220kV Samaguri-Sonapur-Sarusajai link, 220kV Jawaharnagar-Samaguri line.
33	220kV SARUSAJAI- SONAPUR		8:30-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		SD may be availed subject to availability of 220kV Samaguri-Sonapur line, 220kV Samaguri-Jawaharnagar-Sarusajai-Azara link.
34	220kV MIRZA-BOKO		8:30-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed. 220 kV Agia - Boko line and 220 kV Agia - Mirza line to be kept in service.
35	220kV MIRZA-AGIA		8:30-16:00	CORRIDOR CLEANING & PREVENTIVE MAINTENANCE		S/D may be availed. 220 kV Agia - Boko - Mirza link to be kept in service. Also, 400kV Bongaigaon - Azara, 400/220kV ICTs at Azara S/s, 220kV Balipara - Sonabil D/C
36	132 KV SRIKONA-PAILAPOOL		9:00-16:00	PREVENTIVE MAINTENANCE & CORRIDOR CLEANING WORK		SD may be availed subject to availability of 132kV Jiribam (PG) - Pailapool
37	132 KV PANCHGRAM-HAILAKANDI		9:00-16:00	PREVENTIVE MAINTENANCE & CORRIDOR CLEANING WORK		SD may be availed. subject to availability of 132 kV Badarpur-Panchgram line.
38	132 KV PANCHGRAM-LUMSHNONG		9:00-16:00	PREVENTIVE MAINTENANCE & CORRIDOR CLEANING WORK		S/D may be availed.132 kV Badarpur-Khleihriat line, 132 kV Kopili-Khandong- Khliehriat link, 132 kV Jiribam - Halfong - Khandong - Khliehriat links shall be kept in service.
39	132 KV HAILAKANDI-DULLAVCHERRA		9:00-16:00	PREVENTIVE MAINTENANCE & CORRIDOR CLEANING WORK		SD may be availed subject to availabilty of 132kV PK Bari - Dharmanagar-Dullavcherra link
40	132 KV DULLAVCHERRA-DHARMANAGAR		9:00-16:00	PREVENTIVE MAINTENANCE & CORRIDOR CLEANING WORK		SD may be availed subject to availabilty of 132kV PK Bari - Dharmanagar and 132kV Dullavcherra – Hailakand. Tripura consent required.
41	132 KV PANCHGRAM-HAILAKANDI		8:00-16:00	CONDUCTOR RESTRINGING WORK IN BETWEEN LOC. NO. 70 & 77 OF THE 132 KV PANCHGRAM-HAILAKANDI LINE		SD may be availed. subject to availability of 132 kV Badarpur-Panchgram line.
1	400 kV BAY 11 Unit #3 GT Bay		0900 Hrs 01.03.2025 to 1600 Hrs 10.04.2025	UNIT#3 under O/H		SD may be availed subjected to no outage of elements
2	400KV Bus-1		0800 Hrs 03.03.2025 to 1600 Hrs 03.03.2025	For PM 4-1189A Isolator & buscouple bay breaker PM		SD may be availed subjected to no outage of elements. All eleemnts to be transferred to other bus before SD
3	400KV Bus-2		0800 Hrs 04.03.2025 to 1600 Hrs 04.03.2025	For PM 4-1189B Isolator & buscouple bay breaker PM		SD may be availed subjected to no outage of elements. All eleemnts to be transferred to other bus before SD
4	400kV Bay-3 Tie Transformer -1 400/33kv 100Mva		0900 Hrs 06.03.2025 to 1800 Hrs 12.03.2025(continuous basis)	PM of bay Equipments		Sd amy be availed
5	400kV/33kv Tie Transformer-1		0900 Hrs 06.03.2025 to 1800 Hrs 12.03.2025(continuous basis)	Replacement of 400KV Bushings		Sd amy be availed

Annexure 2.2

उ.पू.क्षे ग्रिड प्रदर्शन

NER GRID PERFORMANCE

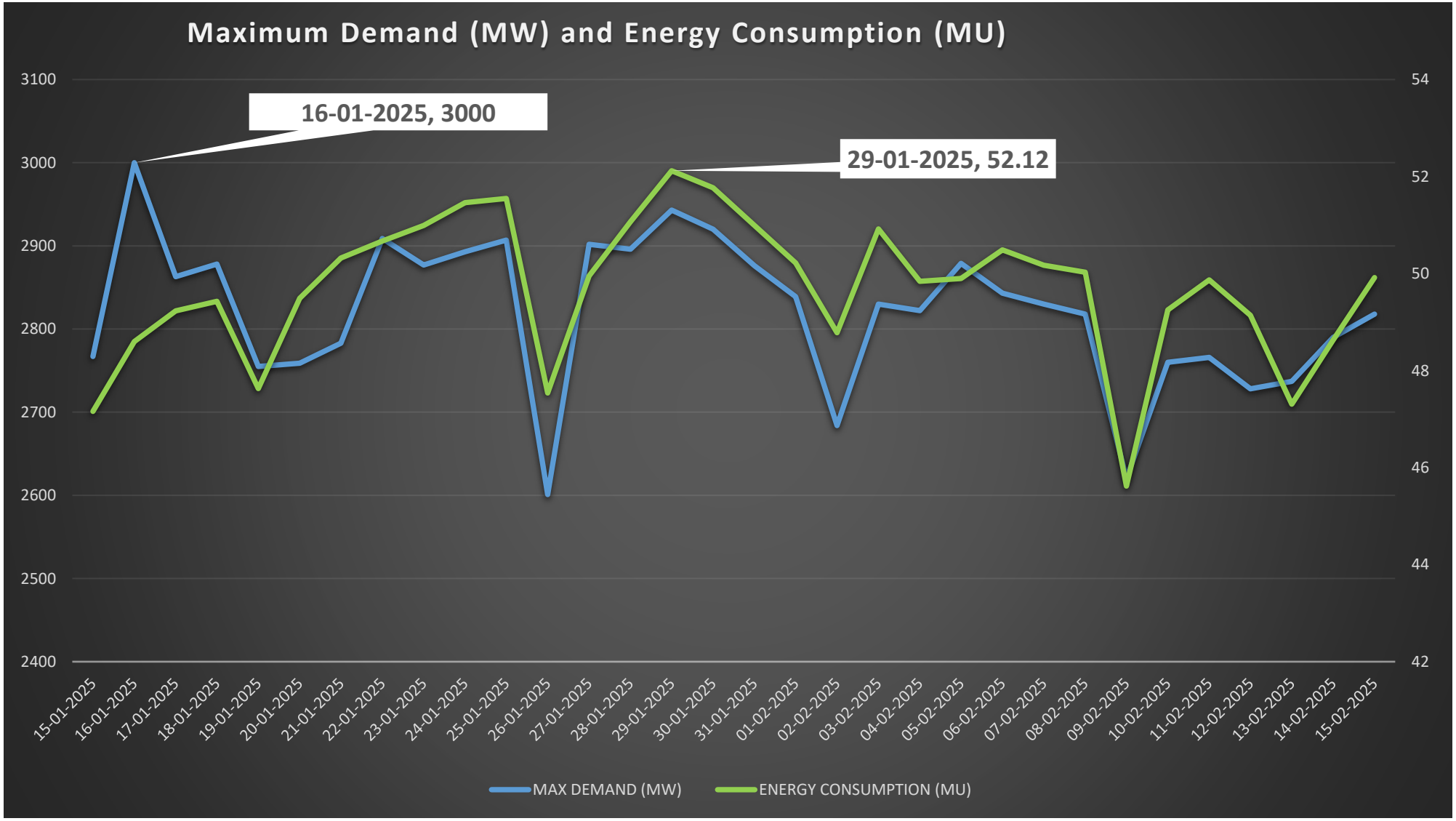
For the month Jan'25-Feb'25



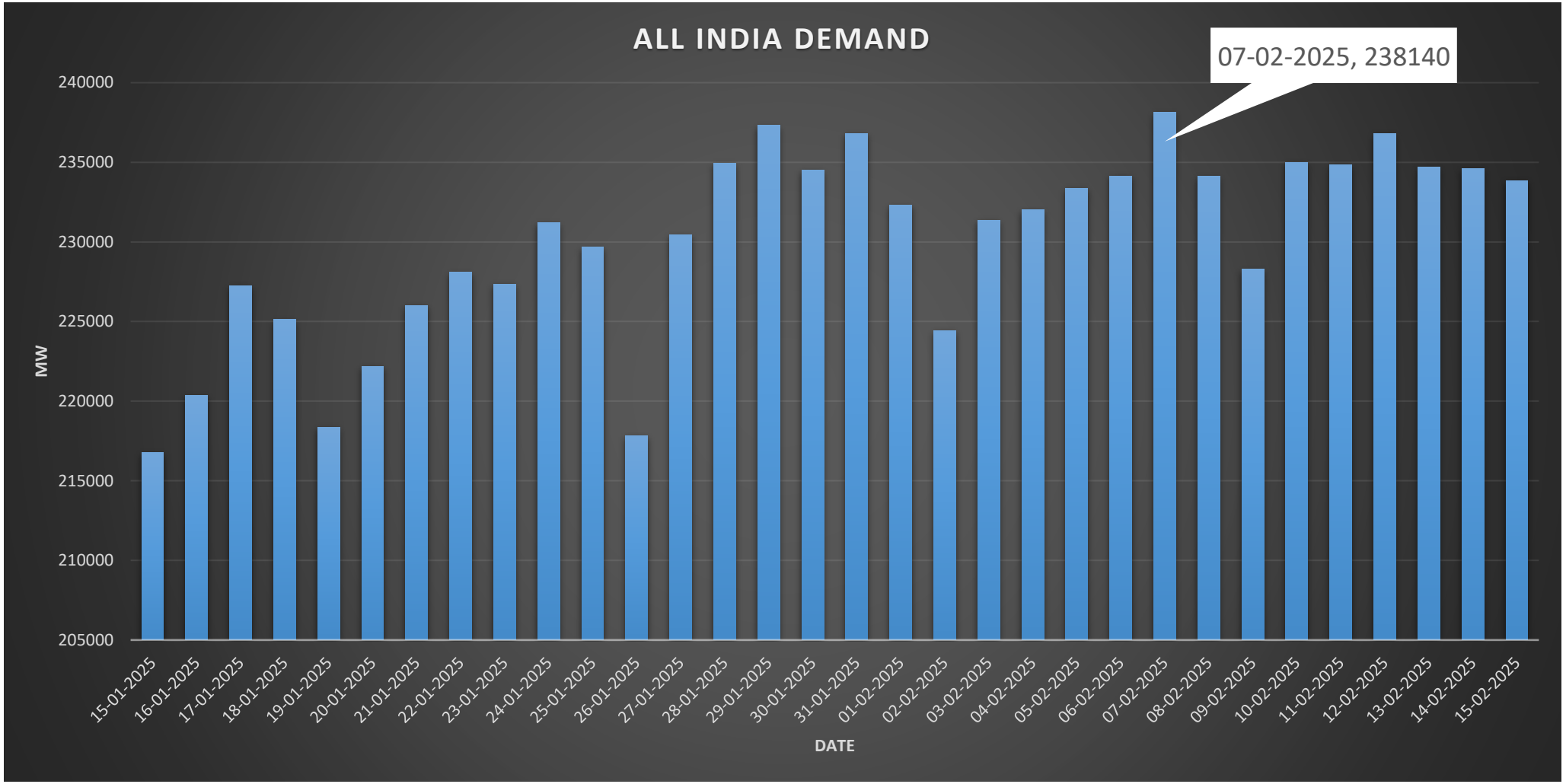
North-Eastern Regional Load Despatch Centre

Grid-India, Shillong

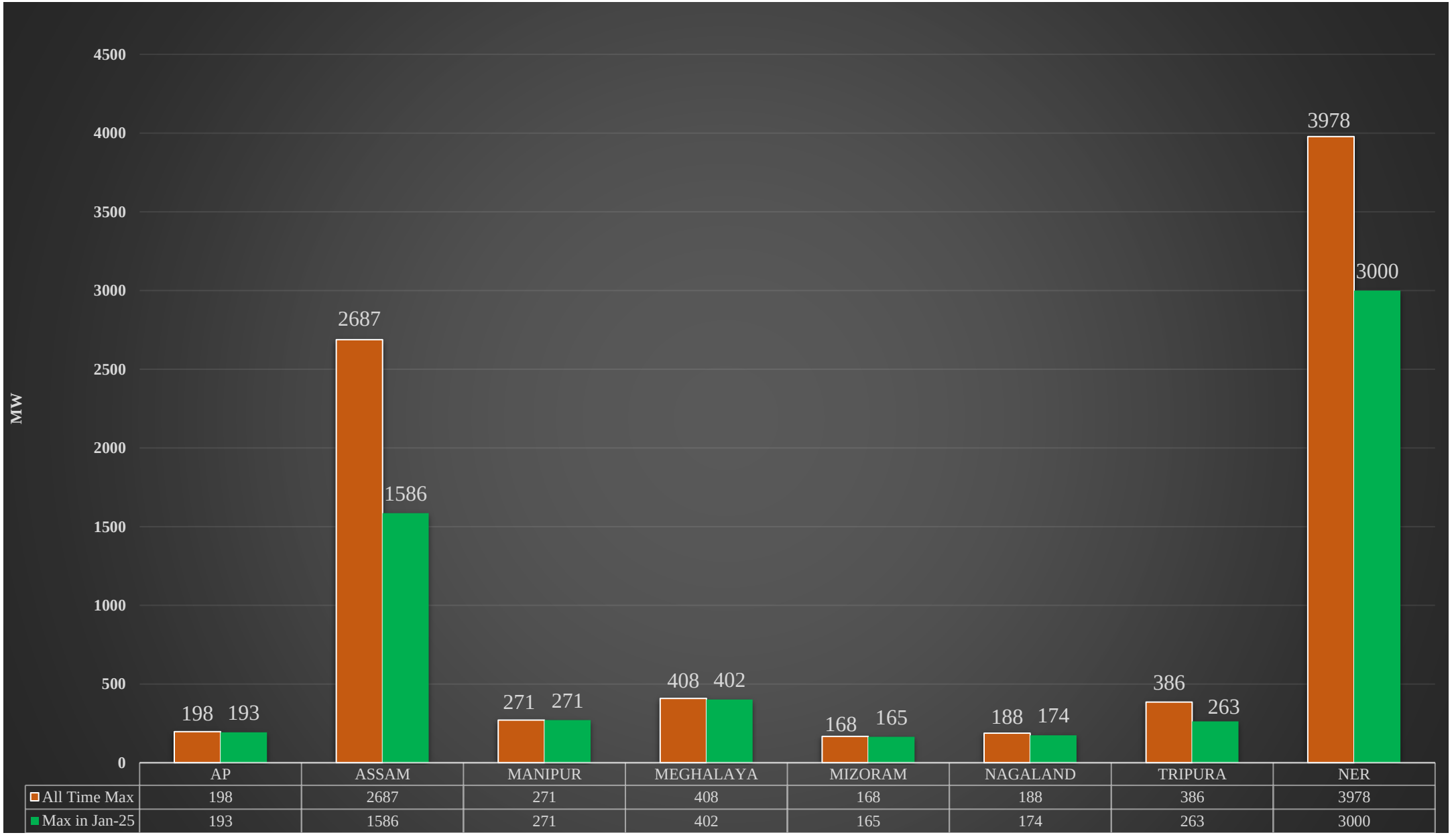
Maximum MW and MU in NER: 15th Jan'25– 15th Feb'25



Maximum All India Demand: 15th Jan'25– 15th Feb'25

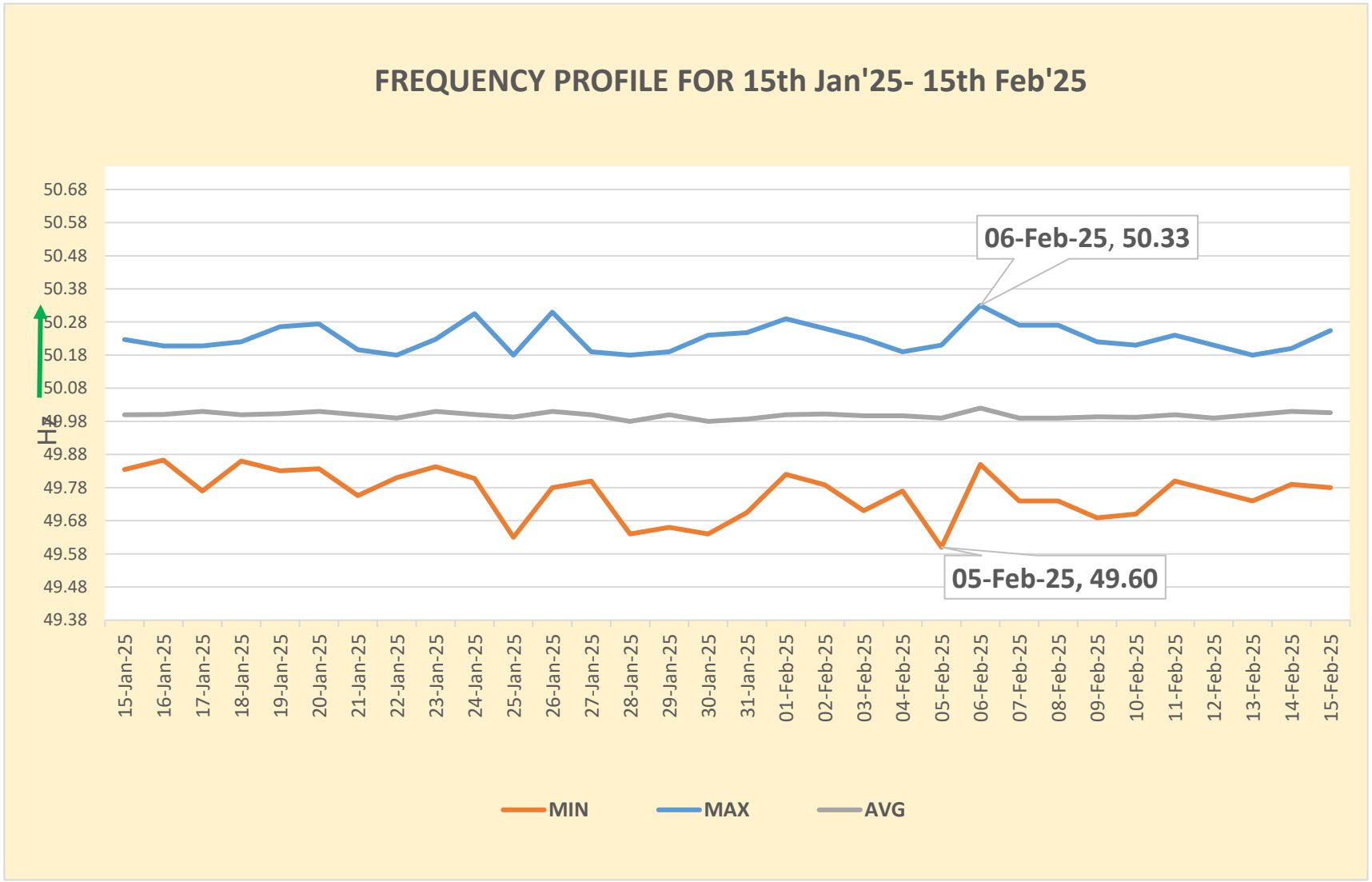


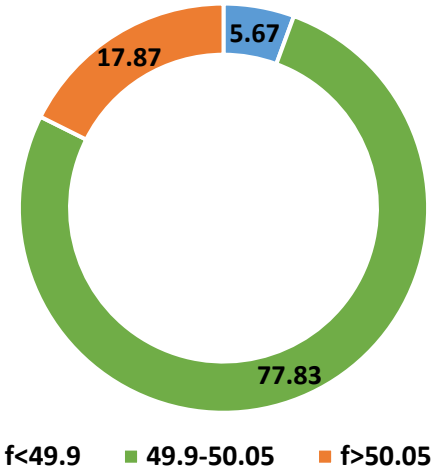
DEMAND MET COMPARISON



	AP	ASSAM	MANIPUR	MEGHALAYA	MIZORAM	NAGALAND	TRIPURA	NER
All Time Max	198	2687	271	408	168	188	386	3978
Max in Jan-25	193	1586	271	402	165	174	263	3000

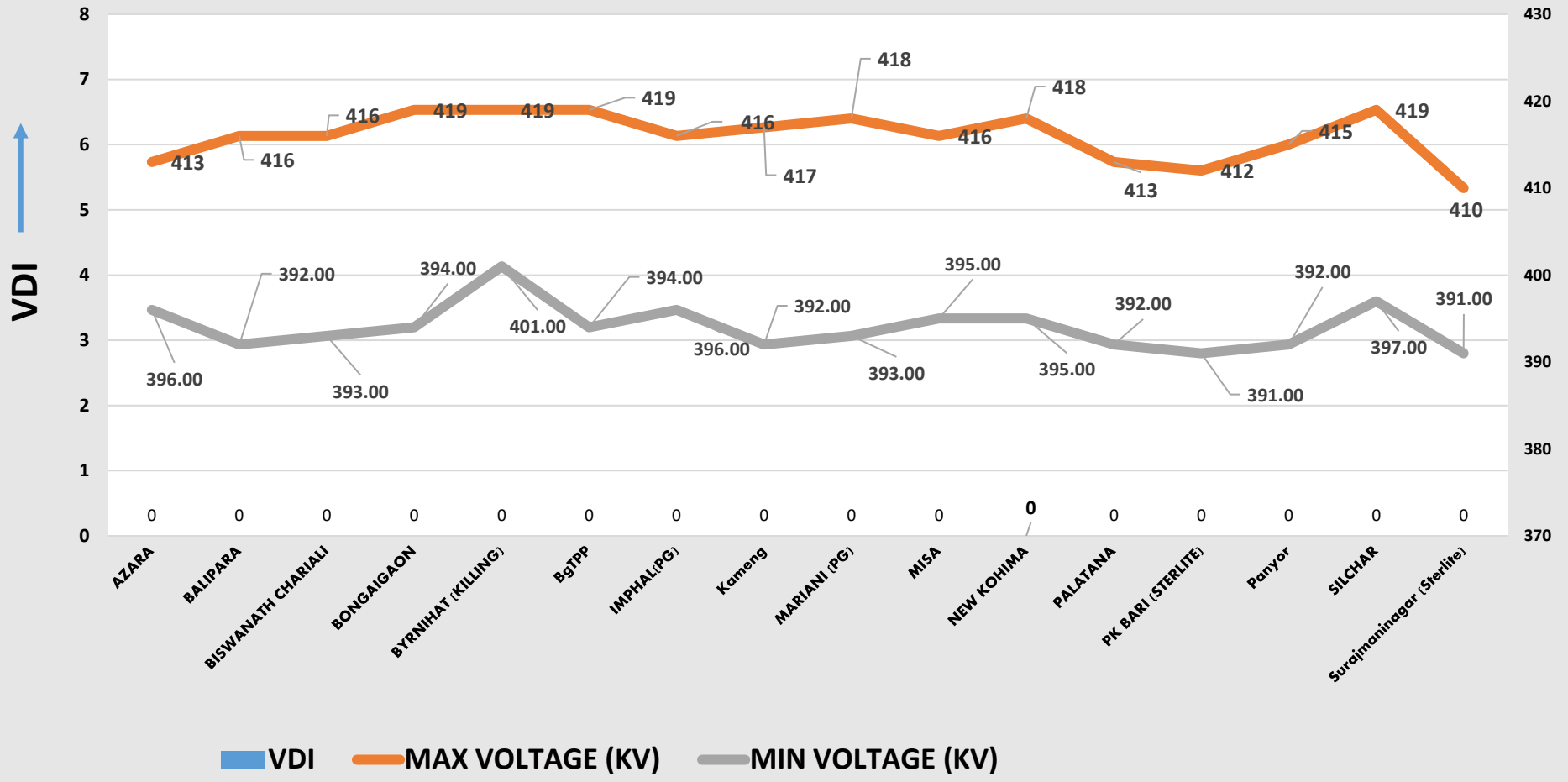
Frequency Profile



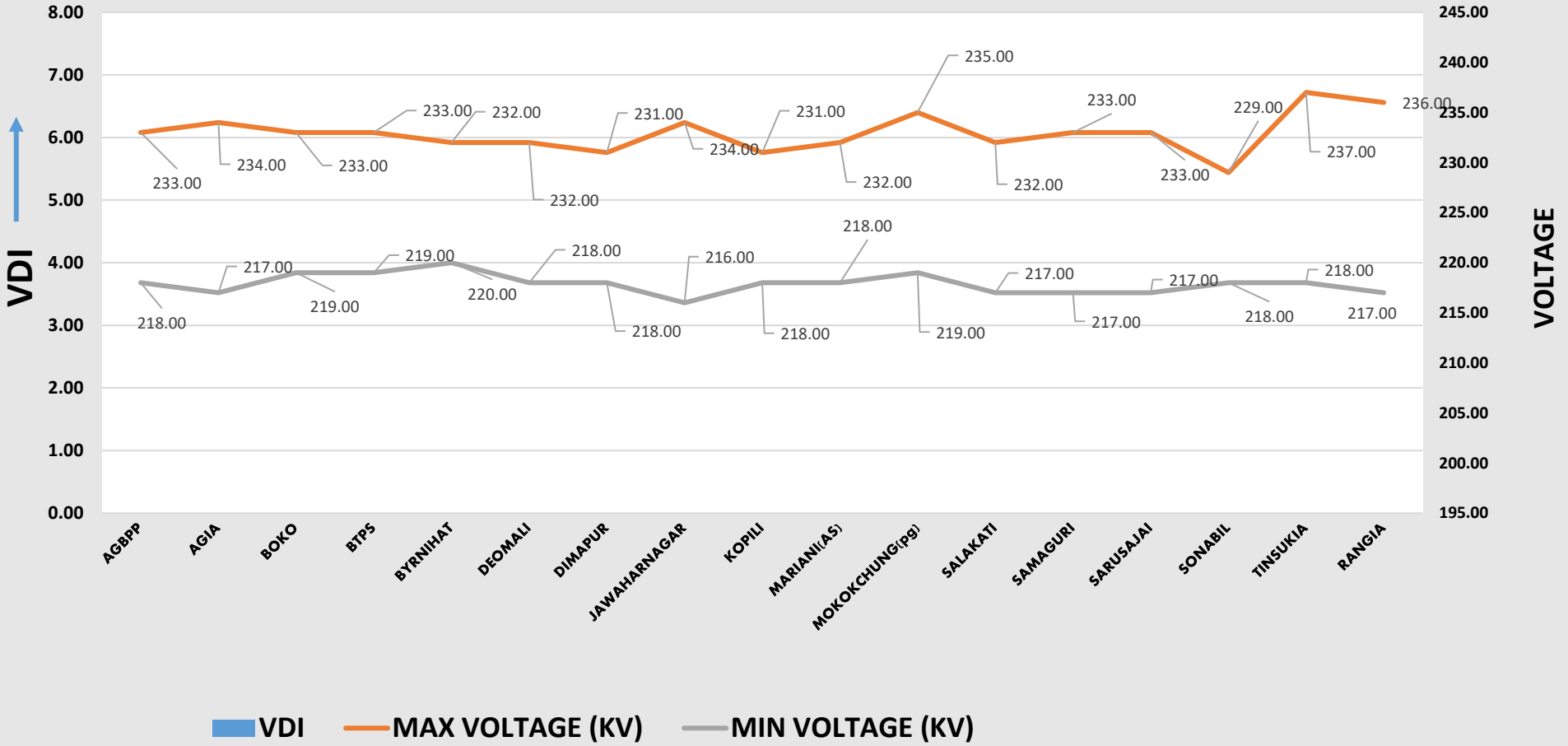


VDI (400 KV) for January 2025

No. of 400 kV lines kept open for over voltage : 0



VDI (220 KV) for January 2025



Projected Hydro Generation Availability

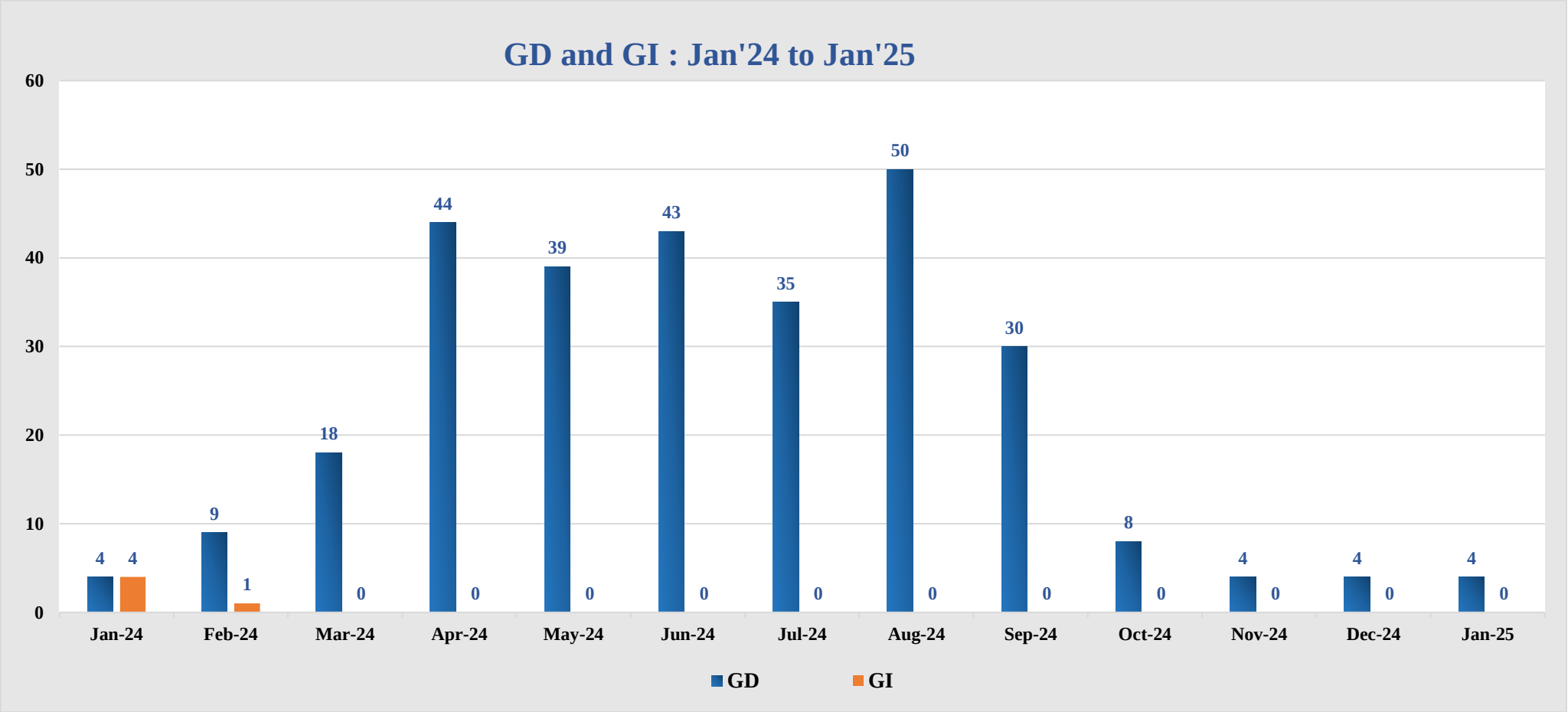
Plants	Reservoir Level in meters (as on 28/02/2025)	MU Content	Present DC (MU)	No of days as per current Generation
Khandong STG II	716.63	21.93	Under S/D	
Kopili	607.65	86	1.60	54
Doyang	314.3	12	0.16	75
Loktak	767.02	30	1.00	30

Grid Disturbance during January'25

No. of GD	4
No. of GI	0

Sl No	Area Affected	GD	Date & Time
1	Napit and Niglok areas of Arunachal Pradesh Power System	GD-I	07-01-2025 22:25 hrs
2	Daporijo area of Arunachal Pradesh Power System	GD-I	13-01-2025 15:45 hrs
3	Leshka HEP of Meghalaya Power System	GD-I	20-01-2025 09:16 hrs
4	Along area of Arunachal Pradesh Power System	GD-I	23-01-2024 18:36 hrs

Grid Disturbance/Incidences for last 12 Months



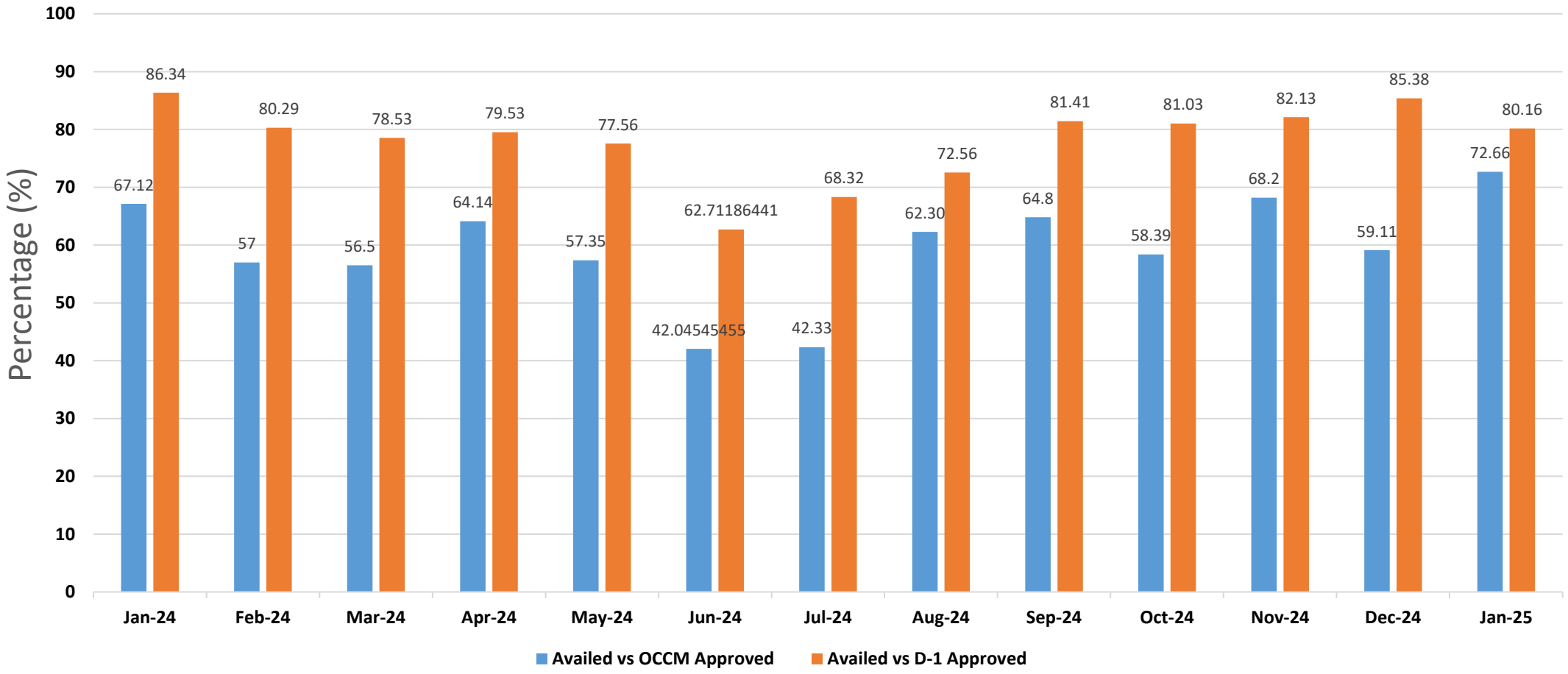
OCC approved shutdown availing status for the month of Jan 2025

SUMMARY OF NER OUTAGE							
MONTH	PLANNED IN OCC	APPROVED IN D-1	AVAILED IN REAL TIME	NOT AVAILED	AVAILED Vs PLANNED %	AVAILED Vs APPROVED %	DEFFERED BY RLDC DUE TO SYSTEM CONSTRAINT
January 25	139	126	101	24	72.66	80.16	1

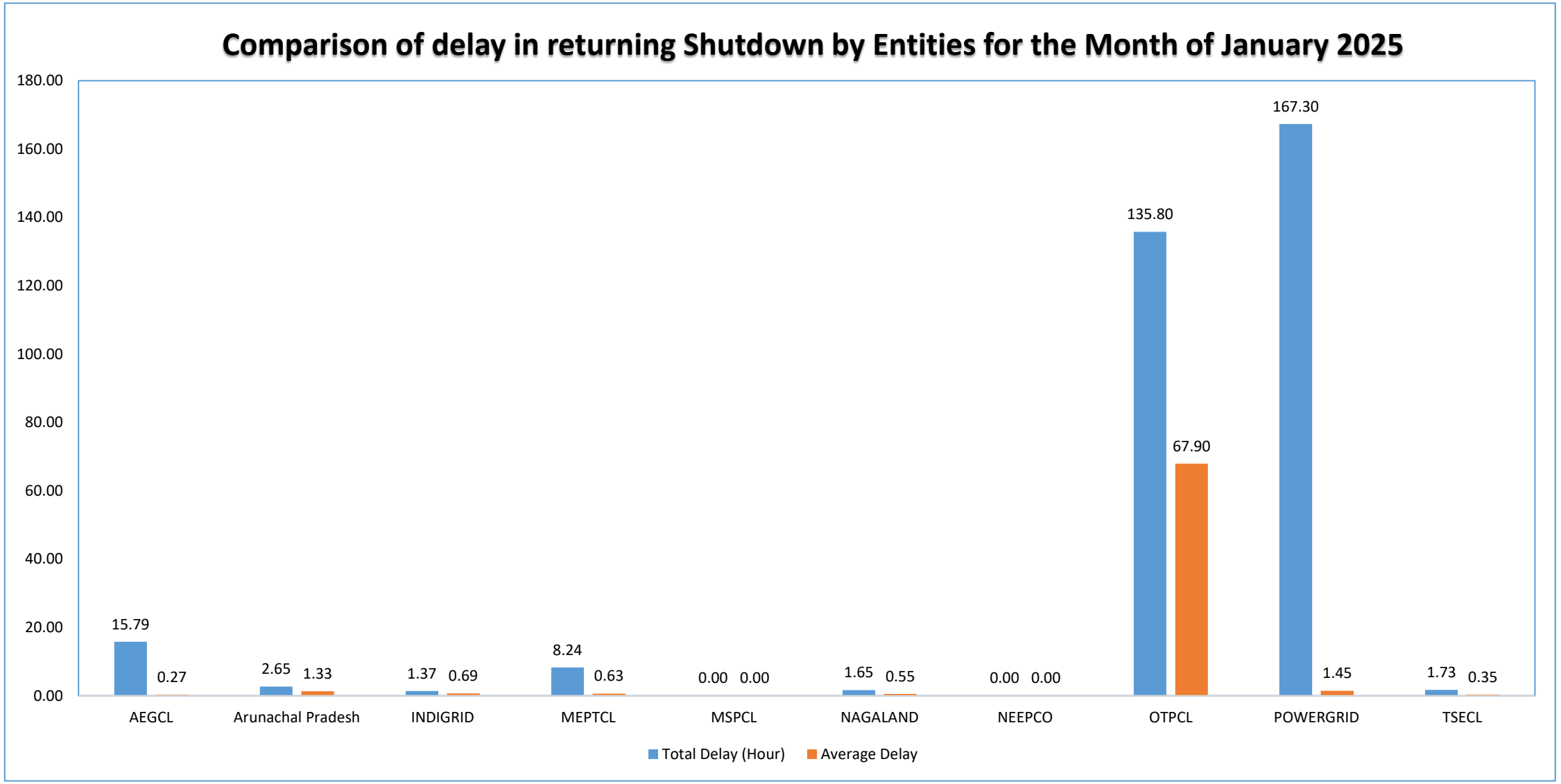
Shutdown Statistics

	OCC Approved	D-1 Approved	Availed	Not Availed	RLDC Deferred
NER	139	126	101	24	1
NERTS	77	68	55	13	0
ASSAM	42	41	33	7	1
MANIPUR	0	0	0	0	0
MEGHALAYA	6	6	6	0	0
NAGALAND	4	2	2	0	0
MIZORAM	0	0	0	0	0
TRIPURA	0	0	0	0	0
Arunachal Pradesh	0	0	0	0	0
NETC	0	0	0	0	0
KMTL	0	0	0	0	0
NEEPCO	9	9	5	4	0
NTPC	0	0	0	0	0
OTPC	0	0	0	0	0
INDIGRID	1	0	0	0	0
NHPC	0	0	0	0	0
Sterlite	0	0	0	0	0

Approved Shutdown availing trend in percentage



Shutdown Delay statistics



Shutdown Delay statistics

Availing Utility	Total Delay (Hour)	Average Delay
AEGCL	15.79	0.27
Arunachal Pradesh	2.65	1.33
MEPTCL	1.37	0.69
NAGALAND	8.24	0.63
NEEPCO	0.00	0.00
NTPC	1.65	0.55
OTPCL	0.00	0.00
POWERGRID	135.80	67.90
RPCOTHER	167.30	1.45
TSECL	1.73	0.35

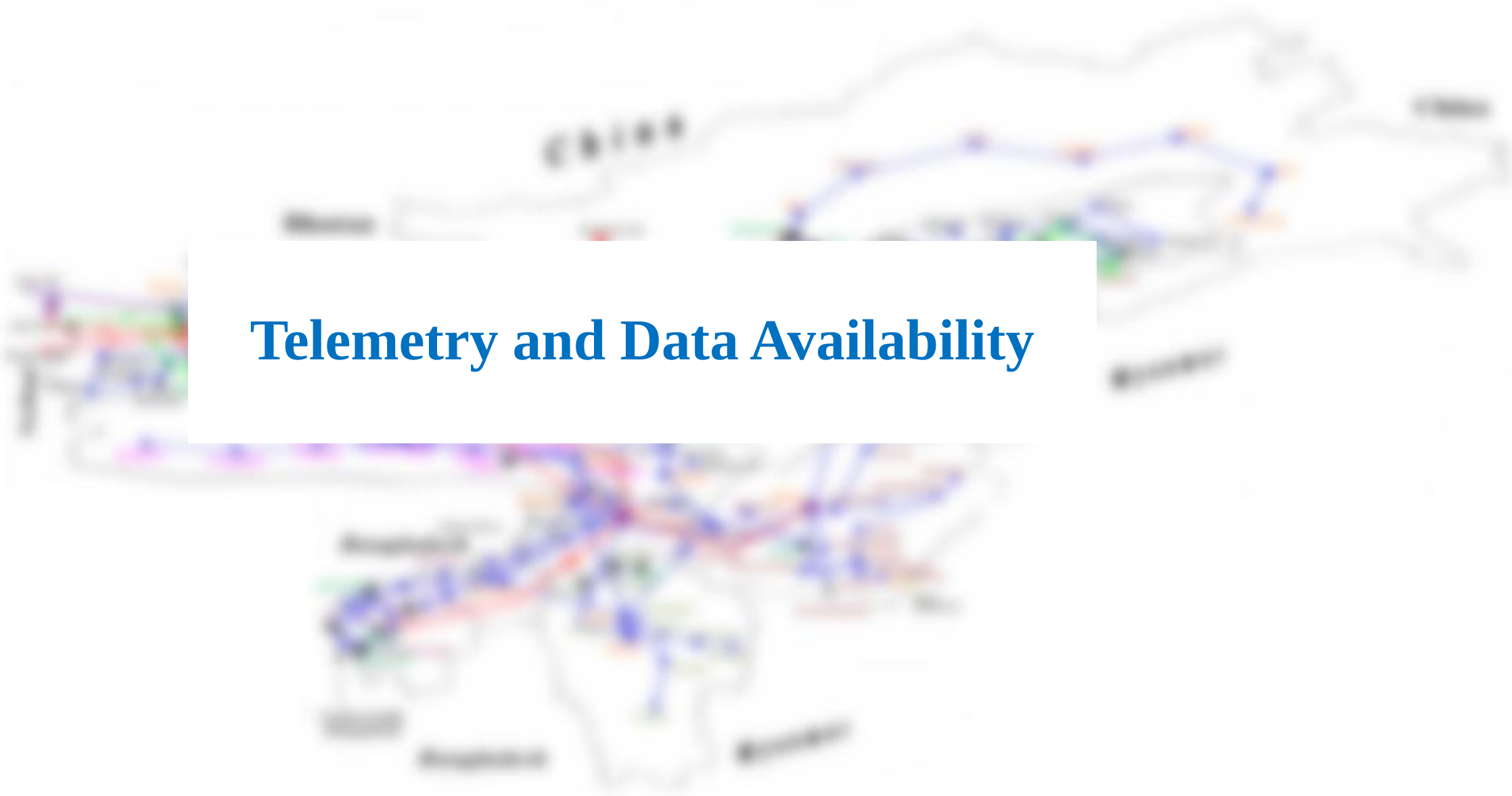
RMSE of Load forecast for January 25

RMSE of the forecasted Demand by SLDCs Vs Actual Demand met as per IEM by SLDCs :

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} (Predicted_i - Actual_i)^2}{N}}$$

Where,
Predicted$_i$ = Forecasted Value
Actual$_i$ = Actual value
N = Total number of observations.

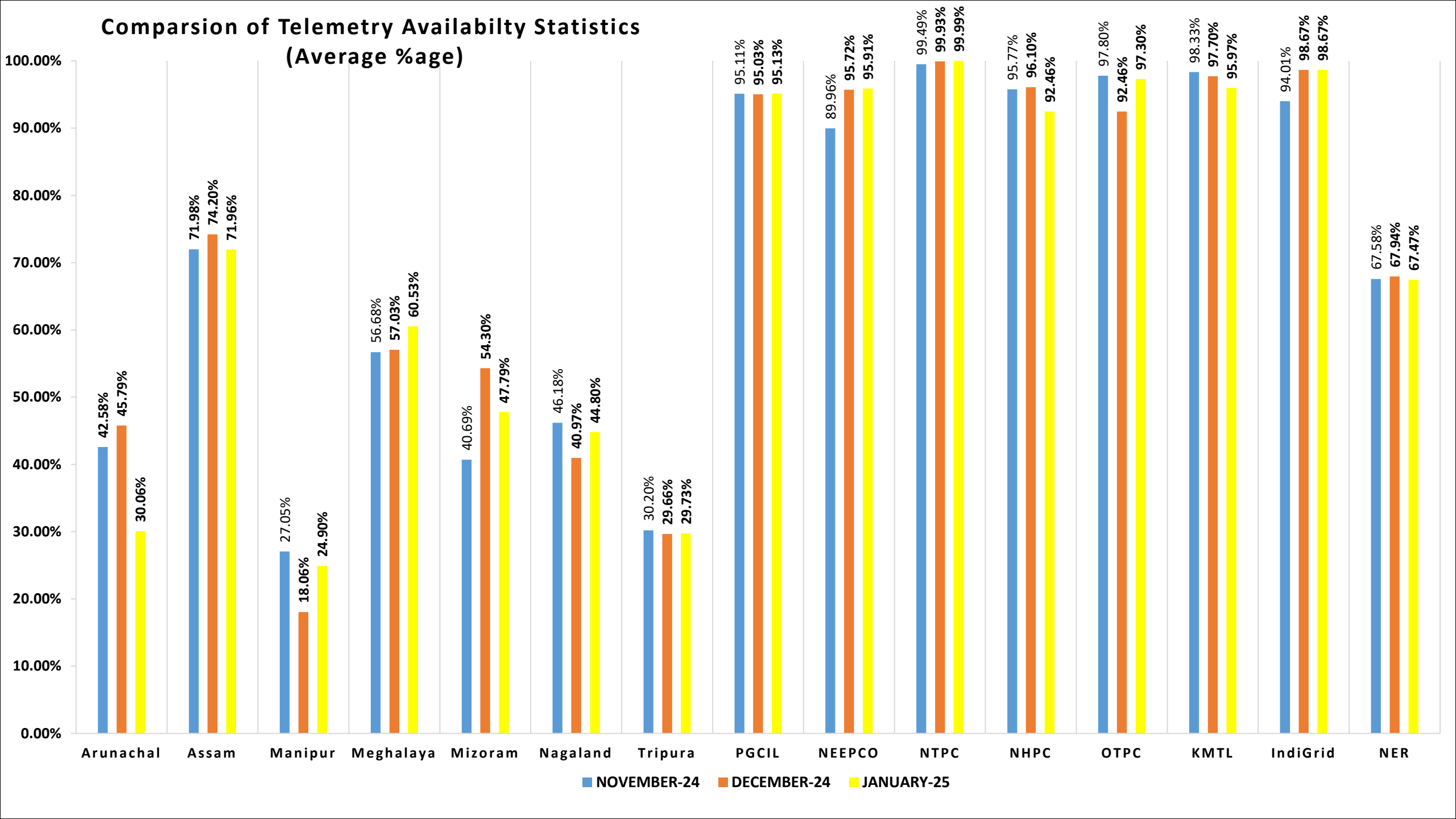
	Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Tripura
Median	10	7	10	6	11	21	11



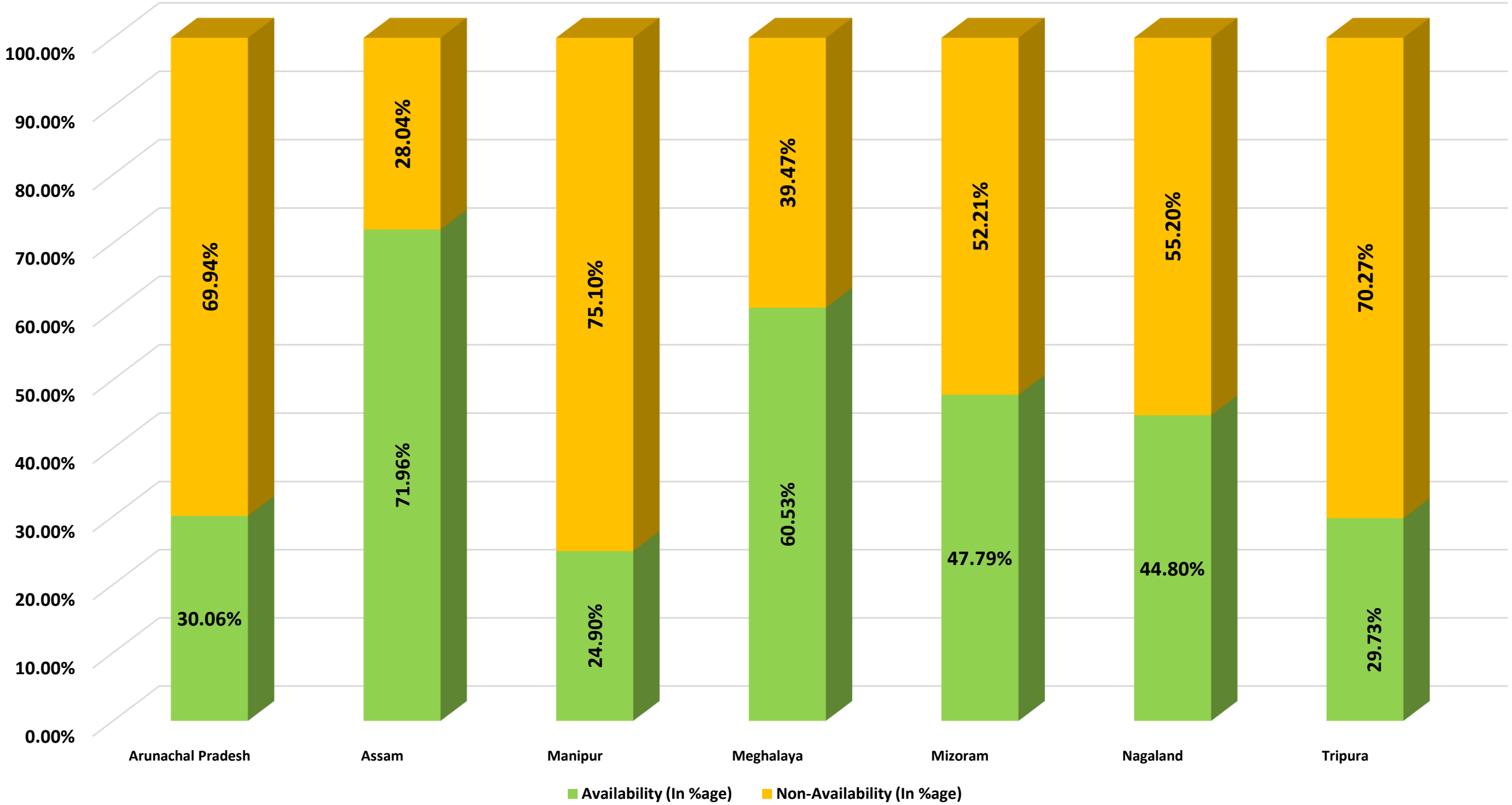
Telemetry and Data Availability

Telemetry Statistics for the month of January 2025

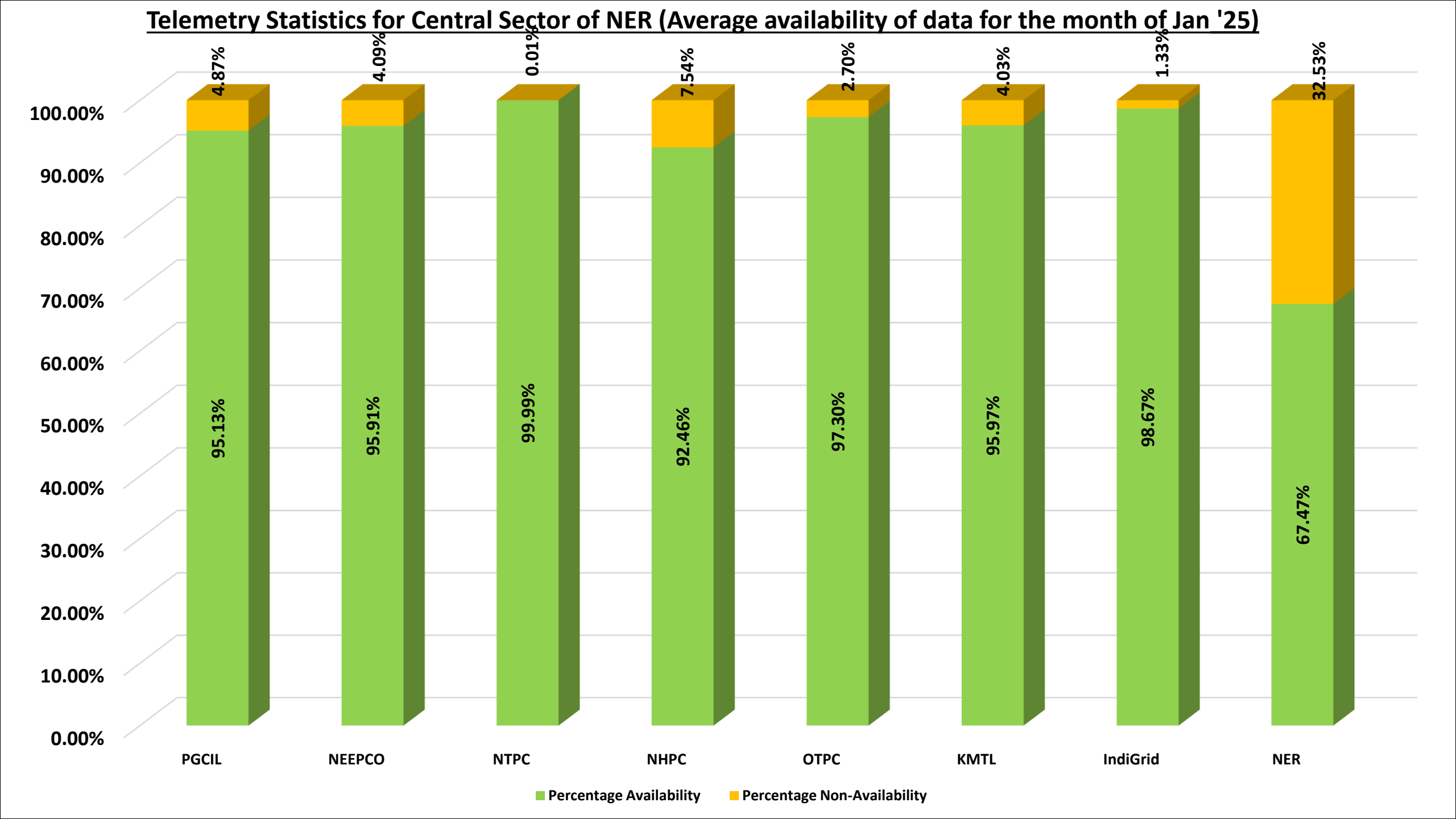
Sl. No.	Utility	Average Total Percentage	Average Analog Percentage	Average Digital Availability	Average RTU Availability
1	PGCIL	95.13	95.34	95.03	92.83
2	NEEPCO	95.91	95.09	96.4	99.66
3	NTPC	99.99	99.98	100	99.98
4	NHPC	92.46	95.68	90.71	95.68
5	OTPC	97.3	95.72	98.03	99.1
6	KMTL	95.97	96.31	95.81	99.7
7	Indi-Grid	98.67	96.1	99.74	99.99
8	Arunachal Pradesh	30.06	33.3	27.97	54.35
9	Assam	71.96	70.73	72.86	78.09
10	Manipur	24.9	26.31	24.06	37.3
11	Meghalaya	60.53	79.13	46.51	86.48
12	Mizoram	47.79	52.07	44.22	74.66
13	Nagaland	44.8	40.07	48.04	38.07
14	Tripura	29.73	33.56	27	41.96
	NER	67.47	67.8	67.26	70.64


Comparsion of Telemetry Availabilty Statistics
(Average %age)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
42.58%
45.79%
30.06%
71.98%
74.20%
71.96%
27.05%
18.06%
24.90%
56.68%
57.03%
60.53%
40.69%
54.30%
47.79%
46.18%
40.97%
44.80%
30.20%
29.66%
29.73%
95.11%
95.03%
95.13%
89.96%
95.72%
95.91%
99.49%
99.93%
99.99%
95.77%
96.10%
92.46%
97.80%
92.46%
97.30%
98.33%
97.70%
95.97%
94.01%
98.67%
98.67%
67.58%
67.94%
67.47%
Arunachal
Assam
Manipur
Meghalaya
Mizoram
Nagaland
Tripura
PGCIL
NEEPCO
NTPC
NHPC
OTPC
KMTL
IndiGrid
NER
NOVEMBER-24
DECEMBER-24
JANUARY-25

Telemetry Statistics for NER States(Average availability of data for the month of Jan '25)



Telemetry Statistics for Central Sector of NER (Average availability of data for the month of Jan '25)



Methodology of Day-ahead Demand Forecast

Assam

Forecasting for Assam is done by the commercial team (APDCL). The steps for day ahead block-wise forecasts are:

The day-ahead forecasting process begins with gathering time block-wise availability data for the upcoming day. Detailed power availability reports are taken from:

1. Day ahead NERLDC WBES schedule
2. Assam Power Generation Corporation Limited (APGCL) provide the projected availability of power for the next day from the State Sector generating stations.
3. Independent Power Producers (IPPs) provide data on regarding their projected generation.

These reports provide an overview of the available power from Long-Term Agreements and Short-Term agreements and sets the foundation for demand-supply matching for the next day.

Each of the previous days scheduled versus actual power drawl for each time block are compared to assess the deviations and patterns. Such deviations and patterns are then incorporated with the day ahead generation availability to arrive to a forecast for the whole state.

In addition to the above forecast, experience based factors are incorporated during special occasions for increasing/ decreasing the forecast:

1. Weather forecasts available in public domain
2. Forced generator outages, maintenance shutdowns, or system constraints that could affect supply availability.
3. Significant events like holidays, festivals, or elections, which tend to influence typical consumption behavior, are carefully considered in our forecasts. We maintain a comprehensive dataset on load pattern shifts observed during these events, allowing us to incorporate historical consumption trends and adjustments specific to each type of event.

Meghalaya

1. The block-wise average of the past 3 days is taken as the base data.
2. Additional load of new consumers which will be given clearance on the next day (if any) is then incorporated in the demand forecast.
3. The planned and forced outages were also incorporated in the demand forecast for the day ahead.
4. Before finalization of the Demand forecast, SLDC is collecting information from the NERLDC/IMD website about the weather prediction for the next day and the same was incorporated in the demand forecast of the next day.

Mizoram

For day ahead forecast during week days, previous day actual SCADA data is taken to know the demand trend along with the previous week's similar day block wise data to compare. In case of weekends and Sundays, previous weeks corresponding days' demand is taken as the forecast.

Manipur

For day ahead forecast, previous 2-3 days' block-wise actual SCADA data is used. In case of any major outages/ disturbances occurred in the past days, slot-wise affected load is estimated and is

added or a different day is chosen for reference. In addition, the affected load for the upcoming planned shutdowns are also accounted for the specified slots of shutdowns. As per weather reports in public domain, a day with the similar weather conditions is chosen for the forecasts. For weekends and holidays, previous adjacent holiday drawl pattern is also considered above the normal procedures. If required, the values are changed on experience basis to meet the current trends.

Tripura

For day ahead forecasting previous 3 days' block-wise demand is averaged. For weekends and per the weather reports in public domain, the averaged data is then increased/decreased on experience basis with a suitable factor.

Nagaland

For day ahead forecasting, last 6 days' block-wise demand as well as average is compared with the demand of previous day and the best fit is given as forecast for the next day. For weekends and as per the weather reports in public domain, the forecast data is then increased/decreased on experience basis with a suitable factor.

Arunachal Pradesh

SCADA data of previous 4 days' load pattern are usually referred for the preparation of day ahead load forecast.

Following factors are taken care while preparing Load Forecast.

1. Weather prediction by IMD
2. Plan SD proposed
3. Festival, Mage Event, VVIP programs, weekend and etc.
4. State Generation scheduled.

Methodology of Week-ahead Demand Forecast

Assam

For week-ahead forecasts, the past weeks historical data are examined to check the consumption patterns observed over the past weeks. Patterns related to similar days of the week are particularly compared, as consumption behavior tends to follow weekly cycles.

For the upcoming week, weather data, especially forecasts of extreme temperatures or rainfall is incorporated to adjust the baseline demand predictions. The weather forecast is available from the public domain.

Any known events, such as public holidays, festivals, or special regional occasions, are factored into the forecast, as they may lead to deviations in usual demand patterns.

Meghalaya

1. Actual Demand of the previous week is taken as the base data.
2. Additional load of new consumers which was connected during the week (if any) is then incorporated in the demand forecast.
3. The planned and forced outages were also incorporated in the demand forecast.

4. Finally, depending on the trends of weather forecast by IMD available at the public domain is also considered for the entire state demand forecasting.

Mizoram

The past week data is studied to find the demand trend for the upcoming week.

Manipur

The previous week data is taken as the base data for the forecast. However, on the basis of experience, changes during the winter peak, summer peak is calculated by a suitable factor.

Tripura

The forecast for the next week is calculated by taking the change of demand from the previous 2 to 3 weeks and incorporating the factor in the previous week demand.

Nagaland

The last 6 days' block-wise demand as well as average is compared with the demand of previous day and the best fit is given as forecast for the next week. For weekends and as per the weather reports in public domain, the forecast data is then increased/decreased on experience basis with a suitable factor.

Arunachal Pradesh

The last 7 days' actual demand data is studied to find the demand trend for the upcoming week.

Methodology of Month-ahead Demand Forecast

Assam

For month-ahead forecasts, demand patterns for the same month in previous years are reviewed to identify recurring consumption trends.

Monthly weather trends like anticipated high temperatures in summer or cooler months in winter are incorporated into the demand estimate, as these factors strongly influence the demand for an extended period.

Any pre-planned major events, known holidays, are considered. Additionally, maintenance schedules of major plants or transmission lines are factored in, as these may impact power availability and thus affect supply-demand balancing.

Meghalaya

1. Actual Demand of the same month in previous year is taken as base data.
2. Additional load of new consumers was then incorporated in the Monthly demand forecast.
3. Finally, the actual demand met of the previous month was incremented depending on the seasonal change of demand.

Mizoram

The past month demand data as well as monthly peak demand met data is used to find out the probable demand met during peak hours for the upcoming month.

Manipur

Month ahead demand forecast is calculated by looking at the previous 3 years' average demand for the month and applying a suitable increase as per the yearly increase percentage. In case of any major outages/ disturbances occurred in the specified month in past years, slot-wise affected load is accounted and adjustments are made in the forecast.

Tripura

Month ahead demand forecast is calculated by looking at the previous year demand for the month and applying a suitable % age increase as per the yearly increase in demand percentage.

Nagaland

Based on the Load analysis for the preceding 2 Years Load forecasting is done. Weather forecasting is also taken into account which is available in the public demand. Shutdown or outages of the lines are also taken into account.

Arunachal Pradesh

Average value of SEM data of last five years are taken and added 5% to 10% as spike load. In addition, expected bulk load with the expansion of transmission network and its sanction loads are accounted.

Others factors are same as in Day ahead load forecast.

ग्रिड कंट्रोलर ऑफ इंडिया लिमिटेड
(भारत सरकार का उद्यम)
GRID CONTROLLER OF INDIA LIMITED
(A Government of India Enterprise)
[formerly Power System Operation Corporation Limited (POSOCO)]
राष्ट्रीय भार प्रेषण केन्द्र / National Load Despatch Centre
कार्यालय : बी-9, प्रथम एवं द्वितीय तल, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110016
Office : 1st and 2nd Floor, B-9, Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
CIN : U40105DL2009GOI188682, Website : www.grid-india.in, E-mail : gridindiacc@grid-india.in, Tel.: 011- 42785855

संदर्भ: NLDC/SO/DYNAMICS/HVDC/FACTS/ **दिनांक:** 17th Sep 2024

To,

Sh. Rajesh Wadhwa
Chief General Manager (I/C), Asset Management
Power Grid Corporation of India Limited,
Saudamini, Plot No.2, Sector-29
Gurugram 122001, Haryana

विषय: Requirement of HVDC and FACTS devices model data for simulation of power system stability and dynamics – Regarding

Ref: a) NLDC communication dated 22nd July 2021 regarding Requirement of HVDC and FACTS devices model data for simulation of power system stability and dynamics
b) NLDC communication dated 19th Sep 2019 regarding HVDC and FACTS devices model submission

Dear Sir,

Grid-India (RLDCs/NLDC) is responsible for secure and reliable operation of the India power system. Simulation of power system stability conditions is an important operational planning activity in this regard for taking advance measures to ensure the security of the grid. For carrying out these studies, all the stakeholders shall submit the modelling data to respective load dispatch centers as per Central Electricity Authority (CEA, Technical Standards for Connectivity to the Grid, Regulations quoted below:

General Connectivity Conditions, Clause 6 (4):

"The requester and user shall cooperate with the Regional Power Committees, and Appropriate Load Despatch Centres in respect of the matters listed below, but not limited to:

*...furnish **data** as required by Appropriate Transmission Utility or Transmission Licensee, Appropriate Load Despatch Centre, Appropriate Regional Power Committee, and any committee constituted by the Authority of appropriate Government for **system studies or for facilitating analysis of tripping or disturbance in power system**;..."*

General Connectivity Conditions, Clause 6 (6):

*" ...Provided that in order to carry out the said study, the requester shall present the **mathematical model of the equipment** in accordance with the requirements as stipulated by the Appropriate Transmission Utility or distribution licensee, as the case may be."*

In this regard, the status of submission of dynamic modelling data for grid elements owned by POWERGRID is provided below.

S. No.	Equipment	Total	Dynamic Model Received		Dynamic Model Pending	
			RMS	EMT	RMS	EMT
1.	HVDC (LCC)	**10**	4	0	**6**	**10**
2.	HVDC (VSC)	**1**	1	0	**0**	**1**
3.	STATCOM	**19**	14	11	**5**	**8**
4.	SVC	**4**	0	0	**4**	**4**

The detailed list in this regard is enclosed at **Annexure – I**.

Apart from the pending model submission, the RMS models submitted are user defined models compatible with a specific PSS/E version (V33 or 34). These models can't be used with latest PSS/E versions due to dependency on version specific library files. It is to inform that from PSSE V36 onwards, the version specific dependency of the UDM library files has been removed. This means that if an UDM is prepared/converted for compatibility with PSSE V36, then it will work with subsequent versions also.

In respect of submission of modelling, a meeting was also convened by Central Electricity Authority (CEA) in 2023. The minutes of the meeting are enclosed at **Annexure-II** for reference. Further, it is pertinent to mention here that Grid-India uses the dynamic models

collected from utilities only for the purpose of system studies and preserves the confidentiality of submitted data.

A functional dynamic model would significantly help Grid-India in ascertaining the true dynamic behavior of the Indian power system and managing the present and future grid in a reliable manner. Therefore, the following is requested from you end:

a) Submission of dynamic simulation models (RMS and EMT both) of HVDCs and FACTS (STATCOMs/SVCs) devices owned by POWERGRID as per the detailed list provided in **Annexure – I.**

b) One-time conversion of 08 nos. user defined models (RMS) of FACTS and HVDCs to PSSE Version 36. Once these UDMs are converted to V36, they can be used with subsequent versions also (V37 and beyond) without any conversion.

The templates and model compatibility guidelines specified by Grid-India in its updated *'Detailed Procedure covering modalities for First Time Energization and Integration of new or modified power system element"* - https://posoco.in/wp-content/uploads/2023/09/Final-draft-NLDC-FTEI-Procedure-submitted-to-CERC-for-kind-approval.pdf may be referred for model submission.

Thanking you,

Yours faithfully,

19/9/24

(S Usha)

Chief General Manager (I/C), NLDC

Encl: As above

Copy to:

1. Member (GO&D), CEA
2. Member (Power System), CEA
3. Director (Operations), POWERGRID
4. Director (SO), Grid-India
5. Chief Engineer (PSP&A – I & II), CEA
6. Chief Operating Officer, CTUIL
7. Heads of RLDCs, Grid-India

Annexure-I

Region wise list of STATCOMs owned by POWERGRID and Model Submission Details											
Region	Name	VSC	MSC	MSR	Make	MSC / MSR Switching Logic	RMS Model Details		EMT Model Details		Action Required
							Submission Status	Model Type - Generic or UDM (PSSE version)	Submission Status	EMT Model Version and Compiler	
Eastern Region	Rourkela	2X150	Nil	2X125	Siemens	Current Based	Pending	-	Pending	-	Submission of pending RMS (PSS/E V36) and EMT models (V5.0)
	Kishanganj	2X100	Nil	2X125	Siemens		Pending	-	Pending	-	
	Ranchi (New)	2X150	Nil	2X125	Siemens		Pending	-	Pending	-	
	Jeypore	2X100	2X125	2X125	Siemens		Pending	-	Pending	-	
Western Region	Satna	2X150	1X125	2X125	RXPE	Bus Voltage Based	Submitted	Generic	Submitted	PSCAD V4.5, 32 bit, Visual studio 2010, Intel® Visual Fortran Compiler for Windows 13.x	-
	Aurangabad	2X150	1X125	2X125	RXPE		Submitted	Generic	Submitted		
	Solapur	2X150	1X125	2X125	RXPE		Submitted	Generic	Submitted		
	Gwalior	2X100	1X125	2X125	RXPE		Submitted	Generic	Submitted		
Southern Region	NP Kunta	2x50	-	-	Hyosung	Bus Voltage Based	Pending	-	Pending	-	Submission of pending RMS (PSS/E V36) and EMT models (PSCAD V5.0) Conversion of PSS/E V33 UDMs to PSS/E V36
	Trichy	2x100	1 x 125	2 x 125	Hyosung		Submitted	UDM (V33)	Pending	-	
	Hyderabad	2x100	1 x 125	2 x 125	Hyosung		Submitted	UDM (V33)	Pending	-	
	Udumalpet	2x100	1 x 125	2 x 125	Hyosung		Submitted	UDM (V33)	Pending	-	
Northern Region	Nallagarh	2X200	2 x 125	2 x 125	RXPE	Bus Voltage Based	Submitted	Generic	Submitted	PSCAD Ver. 4.6 / G Fortran compiler 8.1 (64 bit)	-
	Lucknow	2X300	2 x 125	2 x 125	RXPE		Submitted	Generic	Submitted		
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens	Current Based	Submitted	Generic	Submitted	PSCAD Ver. 5.0.1 / Intel® Visual Fortran Compiler (64 bit)	
	Fatehgarh-II	2X150	2 x 125	1 x 125	Siemens		Submitted	Generic	Submitted		
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens		Submitted	Generic	Submitted		
	Bhadla-II	2X150	2 x 125	1 x 125	Siemens		Submitted	Generic	Submitted		
	Bikaner-II	1x300	2 x 125	1 x 125	Siemens		Submitted	Generic	Submitted		
North Eastern	No Statcom										

Region wise List of SVCs Owned by POWERGRID and Model Submission Status					
Region	**Name**	**Rating**	**RMS Model Submission**	**EMTP Model Submission**	**Action Required**
Northern Region	KANPUR	2x +140 / - 140	**Pending**	**Pending**	**Submission of pending RMS (PSS/E V36) and EMT models (PSCAD V5.0)**
	Ludhiana	+600 /-400	**Pending**	**Pending**	
	Kankroli	+400 /-300	**Pending**	**Pending**	
	New Wanpoh	+300 /-200	**Pending**	**Pending**	

List of HVDCs owned by POWERGRID and Model Submission Details							
S. No.	Name	Type	Make	RMS Model Details		EMT Model Details	Action Required
				Submission Status	Model Type - Generic or UDM (PSS/E version)	Submission Status	
1.	Champa Kurukshetra Bipole – I & II	LCC	GE	**Submitted**	**UDM (PSSE V34)**	**Pending**	**Conversion of PSS/E V33 UDM (RMS model) to V36 Submission of pending EMT model (PSCAD V5.0)**
2.	MTDC BNC-APD-Agra	LCC	ABB	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
3.	Rihand Dadri Bipole	LCC	ABB	**Submitted**	**UDM (PSSE V35)**	**Pending**	**Conversion of PSS/E V35 UDM (RMS model) to V36 Submission of pending EMT model (PSCAD V5.0)**
4.	Balia - Bhiwadi Bipole	LCC	Siemens	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
5.	Vindhyachal B2B	LCC	Siemens	**Submitted**	**UDM (PSSE V34)**	**Pending**	**Conversion of PSS/E V34 UDM (RMS model) to V36 Submission of pending EMT model (PSCAD V5.0)**
6.	Talcher - Kolar Bipole	LCC	Siemens	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
7.	Gazuwaka Back to Back	LCC	Pole-1: GE (ALSTOM) Pole-2: ABB	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
8.	Sasaram Back to Back	LCC	GE	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
9.	Raigarh – Pugalur Bipole – I & II	LCC	ABB	**Submitted**	**UDM (PSSE V34)**	**Pending**	**Conversion of PSS/E V34 UDM (RMS model) to V36 Submission of pending EMT model (PSCAD V5.0)**
10.	Bhadrawati B2B	LCC	GE (ALSTOM)	**Pending**	-	**Pending**	**Submission of pending RMS (V36) and EMT model (V5.0)**
11.	Pugalur – Trichur (VSC based) Bipole	VSC	Siemens	**Submitted**	**UDM (PSSE V34)**	**Pending**	**Conversion of PSS/E V34 UDM (RMS model) to V36 Submission of pending EMT model (PSCAD V5.0)**

CEA-PS-11-16(11)/1/2018-PSPA-I Division

Annexure-II

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
विद्युत प्रणाली योजना एवं मूल्यांकन- प्रभाग
Power System Planning & Appraisal - I Division

सेवा में / To,

1. Chief Engineer, PSETD Division, CEA, Sewa Bhawan, New Delhi-110066
2. COO, CTUIL, Saudamini, Plot no. 2, Sector -29, Gurgaon-122001
3. CMD, Grid Controller of India limited, B-9 (1st Floor), Qutab Institutional Area, Katwaria Sarai, New Delhi -110016
4. CEO, REC Power Development and Consultancy Limited, D Block, Plot No. 1-4, Sector-29, Gurugram, Haryana-122 001
5. Vice President, Hitachi Energy India Limited, Kodigehalli Main Road, Bengaluru-560092
6. Vice President, Siemens Limited, Birla Aurora, Level 21, Plot No. 1080, Dr. Annie Besant Road, Worli, Mumbai – 400030

विषय/ Subject: Minutes of Meeting regarding Signing of Non Disclosure Agreement (NDA) for Rajasthan Phase-III - Part C1 & Part F Transmission schemes

Madam/Sir,

Please find enclosed minutes of meeting held on 21.07.2023 under the Chairmanship of Member (Power Systems), CEA on the above mentioned subject.

भवदीय / Yours faithfully

2/8/2023

(कोमल दुपारे / Komal Dupare)
सहायक निदेशक /Assistant Director

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेली:011-26732305, ईमेल:cea-pspa1@gov.in वेबसाइट:www.cea.nic.in
Sewa Bhawan, R.K Puram-I, New Delhi-110066 Tele: 011-26732305, email: cea-pspa1@gov.in Website: www.cea.nic.in

Minutes of the Meeting regarding Signing of Non Disclosure Agreement (NDA) for Rajasthan Phase-III - Part C1 & Part F Transmission schemes

List of Participants is enclosed as **Annexure-I.**

For the transmission schemes under Phase-III, Part C1 and Part F, additional clarifications pertaining to STATCOM were provided by the Bid Process Coordinator (BPC) dated 10.07.2023. As per the clarification, it was mentioned that the "Bidder will share STATCOM models with CTU and Grid-India along with detailed documentation for above study purposes and simulations without any conditions/agreement. CTU & Grid-India will not sign any agreement in this regard."

In view of above, Hitachi and Siemens have informed that they are in receipt of letters from OEMs (Original Equipment Manufacturer) of STATCOM, wherein OEMs are in disagreement to submit the STATCOM models and other project related detailed documentation with other entities including CEA/CTU/STU/GRID-INDIA/external consultants/project engineer etc. other than the customer without signing the Non-Disclosure Agreement (NDA).

In view of above, RECPDCL, the Bid Process Coordinator of the transmission schemes vide their letter dated 20.07.2023 has requested to convene a meeting to sort out the issue, as the Bid submission date for both the projects were scheduled on 25.07.2023. Accordingly, a meeting was scheduled on 21.07.2023 under the chairmanship of Member (Power Systems), Central Electricity Authority (CEA), along with officials from Central Transmission Utility of India (CTUIL), Grid India, REC Power Development and Consultancy Limited (RECPDCL), Hitachi Energy and Siemens.

Based on the deliberations held in the meeting, it was decided that further extension on the bid submission date for Part C1 and Part F transmission schemes would not be given, as this would affect the implementation of other interlinked Phase-III transmission schemes. Accordingly, it was decided to issue the following amendment to the bidders:

Original para	Amended para
PSS/E files may be used for developing RTDS files/ models. For simulation of STATCOM in PSS/E file (load flow & dynamic) and PSCAD/EMTP-RV (Transient) model for STATCOM is required for study. Bidder will share STATCOM models with CTU & Grid-India along with detailed documentation for above study purposes and simulations without any conditions/ agreement. CTU & Grid-India will not sign any agreement in this regard.	PSS/E files may be used for developing RTDS files/ models. For simulation of STATCOM in PSS/E file (load flow & dynamic) and PSCAD/EMTP-RV (Transient) model for STATCOM is required for study. **TSP** will share STATCOM models with CEA, CTU & Grid-India along with detailed documentation for above study purposes and simulations. **For PSS/E, both Generic & User-defined models shall be shared by the TSP with the CEA, CTU & Grid-India. Generic model response shall be benchmarked with user-defined model to the extent possible by the**

Original para	Amended para
	TSP. Generic models can be shared by the CEA, CTU & Grid-India with the concerned stakeholders e.g. STUs etc. For User Defined model, confidentiality shall be maintained by the CEA, CTU & Grid-India. **For PSCAD/EMTP-RV, User Defined model shall be provided by the TSP for which confidentiality shall be maintained by the CEA, CTU & Grid-India.**

Meeting ended with thanks to the chair.

****

CEA-PS-11-16(11)/1/2018-PSPA-I Division

Annexure-I

List of Participants

I	**CEA**	
	Ashok Kumar Rajput	Member (Power Systems)
	Ishan Sharan	Chief Engineer (PSPA-I)
	Bhanwar Singh Meena	Director (PSETD)
	Komal Dupare	Assistant Director (PSPA-I)
II	**CTUIL**	
	K. K. Sarkar	Sr. General Manager
	Kashish Bhambhani	General Manager
III	**GRID INDIA**	
	Surajit Banerjee	HOD, System Operations
	Rahul Shukla	Chief Manager
	Priyam Jain	Manager
IV	**RECPDCL**	
	P S Hariharan	Chief General Manager
	Amit Chatterjee	Chief Manager
V	**Hitachi Energy**	
	Aishwarya Dixit	Business Development
VI	**Siemens**	
	Alok Sharma	General Manager
	Ankit Pandey	

Procedure for Infirm Power Injection by Generators in NERLDC Control Area

1. Objective:

the purpose of this procedure is to establish a systematic process for the injection of infirm power into the grid by generators within the NERLDC (North Eastern Regional Load Dispatch Centre) Control Area, ensuring compliance with relevant regulations, standards, and roles.

2. Scope:

This procedure applies to all generating stations and captive generating plants that have been granted connectivity to the inter-State Transmission System (ISTS) under the GNA Regulation, within the NERLDC Control Area.

3. Definitions and relevant regulatory provisions:

- Definition of Infirm Power **(IEGC 2023, Clause 3.69)**: "*means the electricity injected into the grid prior to the date of commercial operation of a unit of the generating station*"
- **(IEGC 2023, Clause 19.1) :** " *A unit of a generating station including unit of a captive generating plant that has been granted connectivity to the inter-State Transmission System in accordance with GNA Regulations shall be allowed to inter-change power with the grid during the commissioning period, including testing and full load testing before the COD, after obtaining prior permission of the concerned Regional Load Despatch Centre: Provided that the concerned Regional Load Despatch Centre while granting such permission shall keep grid security in view."*
- **(IEGC 2023, Clause 19.7): "***The onus of proving that the interchange of infirm power from the unit(s) of the generating station is for the purpose of pre-commissioning activities, testing and commissioning, shall rest with the generating station, and the concerned RLDC shall seek such information on each occasion of the interchange of power before COD. For this, the generating station shall furnish to the concerned RLDC relevant details, such as those relating to the specific commissioning activity, testing, and full load testing, its duration and the intended period of interchange. The generating station shall submit a tentative plan for the quantum and time of injection of infirm power on day ahead basis to the respective RLDC."*

4. Procedure:

4.1 Notification and Application for Infirm Power Injection:

- **Advance Notification**:
    - The generator shall provide information regarding the tentative first-time unit synchronization time and their intention to inject infirm power in the NERPC OCC forum.

- **Application Submission**:
    - The generator shall intimate NERLDC about the injection of infirm power with tentative data at least **30 days** before the tentative synchronization date.
    - The generator shall apply to NERLDC for approval of infirm power injection at least **15 days** before the synchronization date. The application must include but not limited to:
        - synchronization date.
        - Type of test (e.g., commissioning, full load testing).
        - Estimated period for infirm power injection.
        - Quantum of power to be injected into the grid.
- **Approval Process:**
    - Upon receipt of the application, NERLDC's Reliability/Study/Operation Group will review the request, considering grid conditions and overall system safety.
    - NERLDC will issue **provisional consent** for the infirm power injection at least **7 days** before the synchronization date.

4.2 Documentation and Communication for Infirm Power Injection:

- **Day-Ahead Reporting**:

    - The generator must submit a day-ahead plan detailing the following for each unit undergoing the infirm power injection test:
        - The test to be conducted, including the expected duration and specific time frame of the activity.
        - The quantum and timing of the infirm power injection.

    - This plan must be submitted to the NERLDC Control Room using the format specified in **Annexure I** for review and approval.

- **Real-Time Communication with NERLDC**:

    - The generator is required to communicate with the NERLDC Control Room prior to each test or activity and obtain a code.
    - The generator shall not proceed with any infirm power injection without obtaining the code from NERLDC Control Room.
- **End-of-Day Reporting:**
    - At the end of each operational day, the generator must provide the following details to the NERLDC Control Room:
        - Net and gross generation (in MUs).
        - A summary of the activity or test conducted, including the period of infirm power injection.
- **Record Retention:**

    - The generator shall retain comprehensive records of all communications related to infirm power injection.
    - These records must be readily available for review upon request by relevant authorities.

4.3 Monitoring and Real-Time Updates:

- NERLDC will monitor the infirm power injection through SCADA or other real-time monitoring systems. The generator is expected to provide periodic updates on the status of the unit and the power being injected.
- Any deviation from the approved injection plan shall be immediately informed to NERLDC control room by the Generator.
- NERLDC may direct the plant to modify the schedule or injection of infirm power based on any situation deemed necessary by NERLDC.

4.4 Termination of Infirm Power Injection:

- NERLDC reserves the right to direct the termination of infirm power injection at any time if it is deemed necessary for maintaining grid security or stability, or if the generator fails to comply with the established procedures or fails to comply NERLDC instructions.

5. Conclusion:

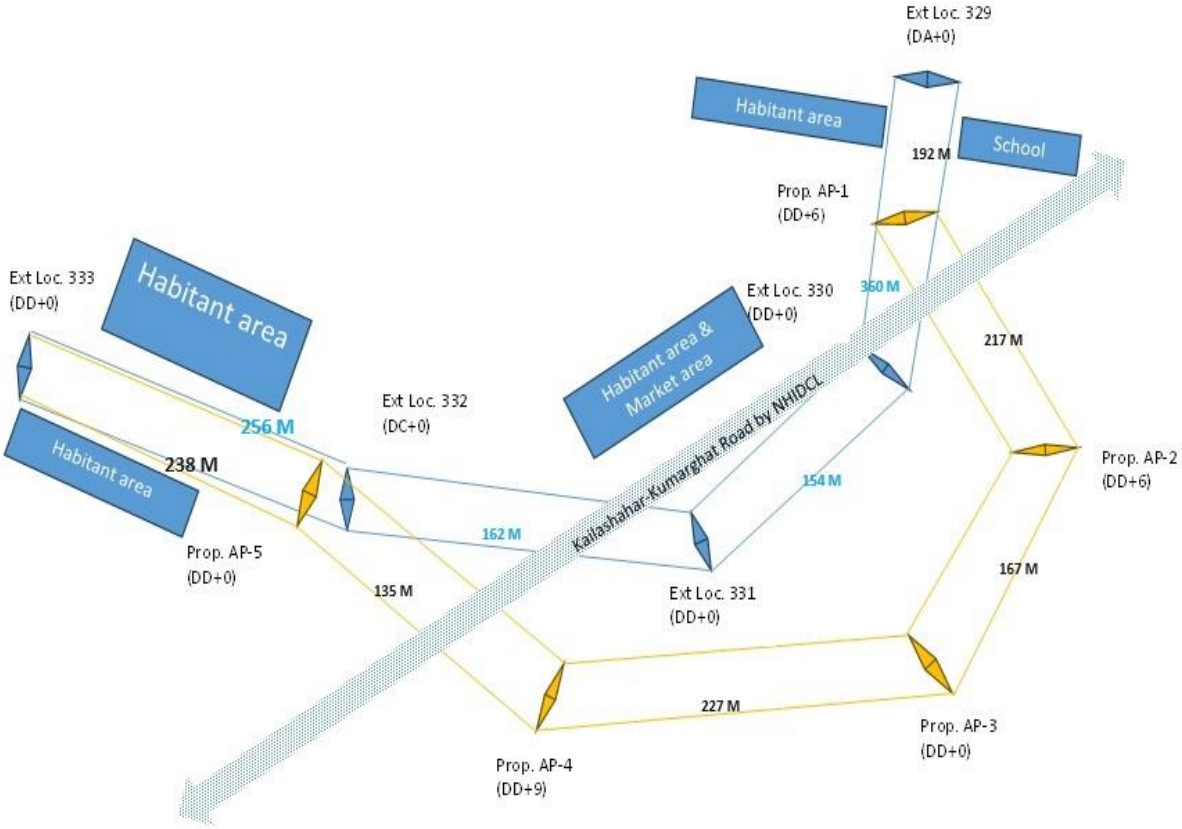
- The generator must follow the procedure for each unit's first-time synchronization and infirm power injection.
- Regular reviews and updates to this procedure may be made based on operational experience, regulatory changes, or any other circumstances deemed necessary by NERLDC or relevant authorities.

****

Annexure -I

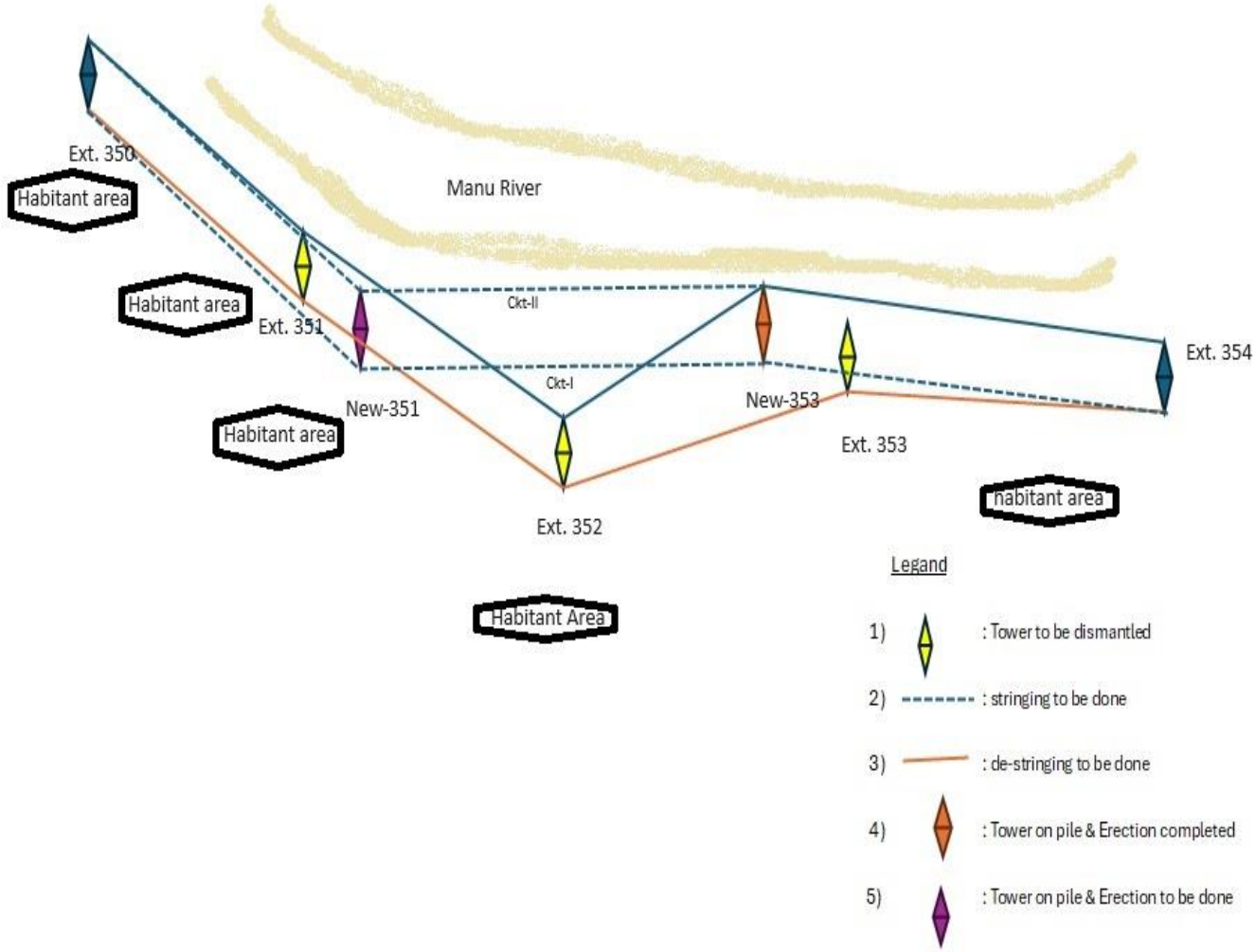
S. No	Name of the Generating Station	Category (Thermal/ Hydro/RE)	Capacity of the Generating Station (in MW)	Period of injection of infirm power (Date and Time)	Purpose of injection of infirm power	Details of specific tests carried out during injection of infirm power	Reference of communication made by the generator (e-mail/letter date)	Quantum of infirm power injection (in MW)	Maximum quantum of infirm power injection (in MW)

Annexure- 400 KV D/C SILCHAR- P.K.BARI T/L: DIVERSION WORKS DUE TO ROAD WIDNING OF KUMARGHAT-KAILASHAHAR ROAD BY NHIDCL



Diversion of line section of 400 KV D/C Silchar-P K Bari Transmission line for road widening of Kailashahar-Kumarghat road by M/S, NHIDCL

Annexuer :400 KV D/C SILCHAR- P.K.BARI T/L: DIVERSION WORKS DUE TO VULNERABLE TOWER LOC. 351 & 353 :-



Diversion of Loc. 351 & 353 of 400 KV D/C Silchar-P K Bari T/L

NERPC sub-group Report on the vulnerable tower locations of 400 kV Palatana-Silchar transmission line.

A. Background

The state of Tripura witnessed very heavy rainfall and unprecedented floods in the month of August 2024, causing loss of human lives and extensive damage, destruction and loss of both public and public infrastructure & properties and subsequently the state of Tripura was declared as **"Natural Calamity Affected Area"** vide notification dated 27th August 2024 by the Relief, Rehabilitation and Disaster Management, Government of Tripura. A copy of the notification & relevant newspaper clippings is placed as **Annexure-1** for reference.

218th OCC Meeting Held on 12th September 2024

NETC submitted an agenda (item no. C.5 – copy enclosed at **Annexure-2** for reference) in the 218th OCC meeting held on 12th September 2024 in Guwahati informing about the status of the damages caused and also requesting that NETC being a single project organization with limited resources, will find it difficult to bear such major financial implications for these protection works and tower shifting necessitated due to Force Majeure and proposed that the financial implications incurred on this account may be considered. The agenda was deliberated by the sub-committee and the deliberation of the sub-committee is presented hereunder;

"NETC informed the forum that due to heavy rain in Tripura massive landslides had occurred which left some towers of the line vulnerable and prone to collapse. NETC also informed the forum that immediate action needed to be taken to restore the condition of the affected tower. NETC further requested that a sub-group under aegis of NERPC may be formed so that the same might visit the affected locations and suggest the immediate and long-term solution to the problem. NERTS suggested that on the basis of study and suggestion of the sub-group, some guidelines may be framed for future references.

After detailed deliberation, the forum opined to form a sub-group consisting of representatives of CEA, NERPC, NERLDC, Powergrid, IIT Guwahati, Assam, Meghalaya and Tripura."

NERPC order No.: No. NERPC/SE(O)/OCC/2024/3642-3649 dated 09th January 2025

NERPC vide order No.: No. NERPC/SE(O)/OCC/2024/3642-3649 dated 09th January 2025 (copy enclosed as **Annexure-3** for reference) informed the formation of NERPC sub-group to visit the vulnerable towers of the 400 kV Palatana-Silchar TL with the following members to visit and inspect the vulnerable tower locations and suggest remedial measures. The sub-group visit was scheduled for 20th January 2025 & 21st January 2025.

Sl. No	Name	Designation	Organization
1.	Sh. Vikash Shankar	Asst. Director	NERPC
2.	Sh. Sunil Singha	Manager	NERLDC
3.	Sh. Arindam Dam	DGM	PowerGrid
4.	Sh. Asif Iqbal Jahan Mazumder	DGM	AEGCL
5.	Sh. G V Diengdoh, EE (T&T)	EE (T&T)	MePTCL
6.	Sh. Dulal Chakraborty.	DGM	TSECL
7.	Prof. Vivek Padmanabha.	Prof. Civil Engg. Department	IIT Guwahati

It is to mention that the nominated members from MePTCL (Sl no. 5 above) could not join the sub-group during the visit. Further, the representative from TSECL (Sl No. 6 above) requested NERPC to consider the nomination of Sh. Bathe Jamatia, Manager (Civil) in place of himself and the same was concurred by NERPC.

B. **Sub-group visit on 20th & 21st January 2025** (photographs of the sub-group visit is enclosed as **Annexure-4**).

Day-1 (20th January 2025)

The committee visited and inspected 6 tower locations on 20th January 2025 (tower nos. 200, 205, 209, 211, 217 & 222).

Day-2 (21st January 2025)

The committee visited and inspected 6 tower locations on 21st January 2025 (tower nos. 137, 182, 357, 385, 393 & 430).

Sub-group methodology for inspection & recommendation.

The sub-group while inspecting the 12 nos. tower locations considered the profile of the soil, topography of the area, proximity of the tower legs to edge of slope, extent of soil movement and slope failure caused by the extensive rain that occurred in Aug'24, vegetation in the proximity of tower legs etc... and recommended the following measures:

Sub-group recommendations:

	Date of Visit/ Day	Tower No	Observation & Recommendations
1	20.01.2025	200	**Observation:** • The tower is located on a hilltop connecting forward and backward spans, both of which cross NH-08. The C leg is situated just 8 meters horizontally from the hillock edge, followed by a gradient slope of height approximately 4 meters, and then a steep slope of 18 meters height from NH-08. The slope appears to consist of loose soil with low shear strength, indicating a risk of landslides and further deterioration of the existing slope. **Recommendation:** • It is recommended to construct an 8-meter high RRM (Random Rubble Masonry) protection wall along the NH side to protect the existing slope and soil erosion. • Further Based on the soil report, a platform for the construction of the 2nd RRM protection wall is proposed by step-cutting the soil slope along the edge of the hill and gradient sloped areas. The soil test report should be shared with Prof. Vivek Padmanabha by NETC. • The soil area after the RRM wall should be secured by covering it with geo net.
2	20.01.2025	205	**Observation:** • The B leg is located just 7 meters horizontally from the hillock edge, with a slope of 11 meters height from NH-08. **Recommendation:** • It is recommended to adopt a "wait and watch" approach without disturbing the existing soil conditions for the time being.
3	20.01.2025	209	**Observation:** • Heavy soil erosion and landslides have occurred on the downhill side of Leg C. The erosion started approximately 8 meters from Leg C. Temporary protection using bamboo palisading and soil-filled

			gunny bags has been provided in 9 steps along the affected areas. **Recommendation:** • While the temporary measure may help stabilize the soil to some extent, however the tower is not fully stable. Considering the condition of loose soil and low bearing strength It is recommended to construct a 3-step Random Rubble Masonry (RRM) wall along with geo textile reinforcement to provide long-term stability and protection.
4	20.01.2025	211	**Observation:** • Soil erosion and landslides have been observed near Legs A and D. Erosion has started approximately 9 meters from both legs. Runoff from the uphill side of the tower flows through a natural channel near Leg D, which has formed into a drain. Temporary protection using bamboo palisading and soil-filled gunny bags has been provided in 4 steps along the affected areas. **Recommendation:** • The temporary measure may offer partial stabilization of the soil, the tower is not fully stable. It is recommended to construct a 3-step Random Rubble Masonry (RRM) wall to ensure long-term stability and protection. • Additionally, two independent stone-pitched /brickbat / cement grout drainage systems should be constructed on both sides of the RRM walls to facilitate natural drainage from the uphill side.
5	20.01.2025	217	**Observation:** • The tower is approximately 25 meters horizontally from NH-08, with a 20-meter vertical difference between the tower and NH. • The tower foundation has been compromised due to cracking and sinking of the adjacent National Highway (NH-08) and the uphill slope near the tower. This has led to severe structural issues, including bending in some of the tower's bracing members and legs. **Recommendation:** • A feasibility study should be conducted to assess the possibility of shifting the tower, as the soil in the area is highly susceptible to further movement. During the survey, options should be explored, including replacing the current tower with a suitable monopole structure or relocating the tower at position 216 to a specialized tower and directly connecting it to tower 218, bypassing tower 217.

			• A Random Rubble Masonry (RRM) wall with an integrated drain should be immediately constructed on the uphill side (towards highway) to prevent the slope failure and redirect the drain water from accumulation the tower foundation area and further avoid sinking. • A profile study of the downstream side of the tower should also be conducted.
6	20.01.2025	222	**Observation:** • The tower is located adjacent to NH-08, with Legs C and D facing NH. These legs are situated just 8 and 9 meters horizontally from the hillock edge, followed by a steep slope of 15 meters in height from NH-08. The tower connects the forward span (loc 222-223) and backward span (loc 222-221), both of which cross NH-08. **Recommendation:** • It is recommended to adopt a "wait and watch" approach without disturbing the existing soil conditions for the time being.
7	21.01.2025	137	**Observation:** • The landslide occurred approximately 10 meters from both Leg A and Leg D. A permanent protection wall was constructed at Leg D during the construction phase. Temporary bamboo palisading has been provided in five steps, and the tower is currently stable. **Recommendation:** • It is recommended to adopt a "wait and watch" approach without disturbing the existing soil conditions for the time being. Proper drainage for runoff water should also be ensured.
8	21.01.2025	182	**Observation:** • Soil erosion and landslides have been observed near Legs A and B. Erosion has started approximately 10 meters from both legs, with a 60-degree slope and a height of 25 meters from the foothill level. Temporary bamboo palisading has been provided in 3 steps, and the tower remains stable. **Recommendation:** • It is recommended to adopt a "wait and watch" approach without disturbing the existing soil conditions for the time being.

9	21.01.2025	357	**Observation:** • The tower is located on a hillock, with an uphill slope on the A-D leg side, while the B-C and C-D leg sides are situated on a downhill terrain. Soil erosion and landslides have been observed near Leg C. Temporary protective measures consisting of bamboo palisading and soil-filled gunny bags have been provided in five steps along the affected areas. **Recommendation:** • While the temporary measure may provide partial stabilization, the tower is not fully stable. It is recommended to construct a 2-step Random Rubble Masonry (RRM) wall, along with a dressing platform, to ensure long-term stability with a geotextile layer at the end of each step which would further offer protection of the tower foundation. • Additionally, stone-pitched or brickbat drainage systems, or a cement grout drainage system, should be constructed to divert water away from the tower and prevent further erosion.
10	21.01.2025	385	**Observation:** • Soil erosion and landslides have been observed on the downhill side of Leg D at a distance of 5 meters, and soil erosion has occurred at a distance of 12 meters from Leg C. Temporary protective measures consisting of bamboo palisading and soil-filled gunny bags have been provided in 5 steps along the affected areas. • **Recommendation:** While the temporary measure may help stabilize the soil to some extent, the tower is not yet fully stable. • It is recommended to construct a 1-step Random Rubble Masonry (RRM) wall, along with a dressing platform, and to backfill the area with compacted soil. The slope near Leg D should be properly maintained. • Additionally, an additional RRM wall should be constructed along Leg C to provide further stabilization.

			• Stone-pitched or brickbat drains, or a cement grout drainage system, should be installed to effectively divert water away from the tower and prevent further erosion.
11	21.01.2025	393	**Observation:** • Soil erosion and landslides have been noticed near Leg A. The A leg is situated just 7 meters horizontally from the hillock edge, followed by a steep slope of 18 meters height from ground level. Temporary protection using bamboo palisading and soil-filled gunny bags has been provided in three steps along the affected areas. **Recommendation:** • While the temporary measure may offer partial stabilization of the soil, the tower is not yet fully stable. It is recommended to construct a 1-step RRM wall, along with a dressing platform. • Further the soil area after the Random Rubble Masonry (RRM) wall should be secured by covering it with geo net.
12	21.01.2025	430	• **Observation:** Soil erosion and landslides have been noticed near Legs B and C. Erosion started at a distance of 9 meters from Leg C and 14 meters from Leg B. Temporary protective measures consisting of bamboo palisading and soil-filled gunny bags have been provided in 9 steps along the affected areas. **Recommendation:** While the temporary measure may provide partial stabilization, the tower is not yet fully secured. It is recommended to construct a 2-step Random Rubble Masonry (RRM) wall, along with a dressing platform. Additionally, the wall should be reinforced with geo grid in the exposed areas to ensure long-term stability and protection. Further Stone-pitched or brickbat drains, or a cement grout drainage system, should be installed to effectively divert water away from the tower and prevent further erosion.

Other observations & recommendations of the sub-group.

NETC also informed the sub-group that a total of 25 tower locations have been affected due to floods & landslides caused due to the heavy rainfall in the month of August 2024 (photographs & profile details enclosed as **Annexure-5**), however, due to paucity of time, the other 13 affected locations could not be visited by the sub-group. NETC also informed the sub-group members that NETC has undertaken immediate temporary protection measures at 14 affected tower locations and is continuously monitoring the affected locations through extensive patrolling routines. The sub-group appreciated the NETC for its prompt and dedicated action to provide immediate protection measures to the affected towers.

The sub-group after assessing the topography /terrain of the Palatana-Silchar transmission line, general soil characteristics of Tripura and the monsoon rains in the state, also viewed / recommended the following:

1. The sub-group, after assessing the mentioned locations, is of the view that considering the geographical terrain and soil profile of the Palatana-Silchar section in Tripura, similar landslide issues may occur at other tower locations in the future. Given the importance of the 400 kV Palatana-Silchar transmission line for the stability of the entire northeastern grid, the sub-group recommends that, during the monsoon season, if such situations arise, an immediate site assessment by an expert consultant should be conducted. Necessary follow-up remedial measures should then be implemented promptly, with prior intimation to NERPC, to prevent any disruption to the power network.

2. Sub-group advised NETC to continuously monitor the conditions of vulnerable towers in the area adopt a general approach of stabilizing the slopes around the affected towers with geo-mats or geo textiles and ensure vegetation on the slopes.

3. The sub-group emphasized the critical role of the 400 kV Silchar-Palatana transmission line in evacuating power from the Palatana generation and highlighted the vulnerability of its towers, especially during the upcoming monsoon season. Given the risk of landslides in the hilly terrain, any

failure of these towers could severely impact power evacuation and grid stability. To mitigate this risk, the sub-group recommended continuous monitoring of vulnerable towers by NETC and immediate site assessments by expert consultants if instability is detected. Necessary measures should be implemented promptly to ensure the secure evacuation of Palatana generation and prevent major grid disturbance.

04/02/2025 **Name: Sh. Vikash Shankar** **Designation: Asst. Director.** **Organization: NERPC**	01/02/25 **Name: Sh. Arindam Dam** **Designation: DGM** **Organization: Powergrid.**
04/02/2025 **Name: Sh. Sunil Singha** **Designation: Manager.** **Organization: NERLDC**	01/02/25 **Name: Sh. Asif Iqbal Jahan Mazumder** **Designation: DGM** **Organization: AEGCL**
01/02/25 **Name: Sh. Bathe Jamatia.** **Designation: Manager, Civil** **Organization: TSECL**	04/02/25. **Name: Prof. Vivek Padmanabha, PhD** **Designation: Asst.Professor, Civil Engg. Department** **Organization: IIT Guwahati, INDIA.**

ASSAM ELECTRICITY GRID CORPORATION LIMITED
OFFICE OF THE MANAGING DIRECTOR
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Annexure 2.20

Azadi Ka Amrit Mahotsav

No. AEGCL/MD/Tech-998/OCC Meeting/2022/19 **Dtd.** 5 **.02.2025**

To,

The Member Secretary,
NERPC, Shillong,
Lawpalang, 793006

Sub: Agenda item for 223nd OCC meeting.

Sir,

With reference to the subject mentioned above, please find enclosed herewith the agenda item from AEGCL for the forthcoming OCC meeting.

This is for your kind information and necessary action.

Thanking You.

Encl: i)As Above

Yours Faithfully,

5/2/25

Chief General Manager (PP&D)
AEGCL,Bijulee Bhawan

Memo No: AEGCL/MD/Tech-998/OCC Meeting/2022/19(a) **Date: .02.2025**

Copy to:
1) PS to Managing Director, AEGCL, Bijulee Bhawan, Ghy-01, for appraisal to MD.

Chief General Manager (PP&D),
AEGCL, Bijulee Bhawan

Agenda item for 223nd OCC meeting

NERPSIP (NORTH EASTERN REGION POWER SYSTEM IMPROVEMENT PROJECT)

Background

The NERPSIP scheme is a major step towards economic development of North Eastern Region through strengthening of Intra – State Transmission and Distribution Power systems. Implementation of the scheme will create a reliable power grid and improve NER's connectivity to the upcoming load centres and thus extend the benefits of the grid connected power to all categories of consumers in North Eastern Region.

The initial total sanctioned cost of the scheme for all the North Eastern State was Rs. 5111.33 crore comprising of Project Cost of Rs. 5022.33 Crore including consultancy fee @ 12 % of the executed cost and capacity building expenditure of Rs. 89.00 Crore. The scheme was approved to be funded by the Government of India through the Budget of Ministry of Power and The World Bank on 50:50 basis. The Capacity Building expenditure of Rs. 89.00 crore was approved to be funded entirely by Government of India through the Budget of Ministry of Power.

The project cost was then subsequently revised to **Rs.6700 crore** by Govt. of India in Dec-2021. The total revised project cost for Assam is **Rs.1914.58 Cr (AEGCL-Rs.1388.16 Cr, APDCL-Rs.526.43 Cr).**

Project Implementation

The project is being implemented by **Power Grid Corporation of India Ltd. (PGCIL)**, which is appointed as the Implementing Agency by the Government of India (GoI). After commissioning, the assets created under the project will be transferred to, owned, operated and maintained by the respective state power utilities and departments. Details of projects in Assam are as follows.

Enhancement/Augmentation of Transmission System (AEGCL part):

- Setting up of **11 new EHV Substations** and associated **12 EHV Transmission Lines**. An additional **1198 MVA** of power handling capacity would be added to the AEGCL's network after completion of the projects.
- Augmentation/Extension of **9 Existing EHV Substations** which includes increase in the capacity of Power transformers at Samaguri GSS and Dhaligaon GSS by **470 MVA**.
- Installation of **548 km Optical Ground Wire (OPGW),** which will enhance the communication link between the grid substations.

Project Cost :

- AEGCL part: Total revised project cost: **Rs 1388.16 Cr**.(including Capacity Building)
- APDCL part: Total revised project cost: **Rs 526.43 Cr.** (including Capacity Building)

Current status of the substations under NERPSIP

All the elements constructed under NERPSIP have been commissioned and are currently in operation. Out of the **11 new EHV Substations**, the following substations had already been taken over by AEGCL:

1. 132/33 kV Silapathar GSS
2. 132/33 kV Tezpur GSS
3. 132/33 kV Chapkahowa GSS
4. 132/33 kV Sarupathar GSS
5. 132/33 kV Teok GSS

6. 132/33 kV Tangla GSS

Although, the aforementioned substations have been taken over, many of the civil/electrical works that were listed in the punch points during signing of TOC are pending. The major list of pending works at all the completed elements are listed in **Annexure-I.**

Furthermore, due to some of the technical issues that have not been undertaken by POWERGRID, the following substations have not been taken over:

1. 220/132 kV Behiating GSS (Many issues are yet to be addressed)
2. 132/33 kV Hazo GSS
3. 220/132 kV Amingaon GIS GSS
4. 132/33 kV GMCH GIS GSS
5. 132/33 kV Paltanbazar GIS GSS

However it may be noted that the aforementioned substations are also commissioned and are currently under operation by AEGCL officials. The detailed lists of pending works at these substations are enclosed as **Annexure I.**

Current Status of the Transmission lines under NERPSIP

Out of the **13 new EHV Transmission lines**, all the transmission lines are in operation and the following transmission lines have been taken over by AEGCL:

1. 132 kV Rupai-Chapakhowa D/C Transmission line.
2. 220 kV Tinsukia-Behiating D/C Transmission line.
3. 132kV S/C on D/C Tower Dhemaji-Silapathar Transmission Line.
4. 132kV S/C on D/C Tower Rupai-Chapakhowa Transmission Line.
5. LILO of 132kV S/C Golaghat-Bokajan TL for 132kV Saruathar GSS(New).
6. LILO of 132kV S/C Jorhat-Nazira TL for 132kV Teok GSS(New).
7. Multi circuit LILO of 132kV S/C Kamalpur-Kamakhya and Kamalpur Sishugram TL for 220kV Amingaon GIS(New).
8. LILO of 132kV S/C Rangia-Rawta TL for 132kV Tangla GSS(New).
9. 132kV D/C Sonabil-Tezpur Transmission Line.

It may be mentioned here that although aforementioned transmission lines have been taken over by AEGCL, there are various major issues in the 220 kV Tinsukia-Behiating D/C Transmission line that have not been addressed by POWERGRID. Intimations regarding the same has been made several times and POWERGRID is expected to resolve the issues at the earliest.

The following 4 Nos Transmission lines have not yet been taken over by AEGCL due to some pending works that have not been resolved by POWERGRID.

1. 132 kV Amingaon-Hajo Transmission line.
2. 220 kV Rangia-Amingaon Transmission line.
3. 132 kV Paltanbazar-Kamakhya (UG cable) Transmission line.
4. 132 kV GMCH-Kahilipara (UG cable) D/C Transmission line.

Major issues for booking of asset by AEGCL against elements constructed under NERPSIP

The financial documents that are necessary for capitalization of assets, have not been handed over to AEGCL by POWERGRID. And as such the commissioned elements constructed under NERPSIP (Already handed over and yet to be handed over to AEGCL) have not been booked under AEGCL's asset. This has resulted to financial loss of AEGCL as the commissioned elements could not be reflected in AEGCL's Tariff.

In addition, majority of the list of pending works that were recorded in the punch points during signing of TOC have also not been addressed by POWERGRID. The matter regarding the same has been informed to POWERGRID several times both from AEGCL (HQ) and AEGCL field officials and although some of the issues have been resolved, majority of the issues are yet to be resolved. The list of pending works that have not been resolved are enclosed as **Annexure I.**

Intervention sought

The elements constructed under NERPSIP have already been commissioned in phase manner and are in operation. As the assets have not been capitalized and also pending works in the commissioned elements have not been completed, AEGCL request intervention of OCC forum so that the elements constructed under NERPSIP may be booked under AEGCL's asset and also the pending works as well as major issues are resolved.

Annexure-I

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
1	132/33 kV Hajo GSS (NECCON power & Infra Ltd.)	**Test Charged on 19.10.2023 Commissioned / Commercial load: 01.10.2024**	**Completed** **TOC under progress**	**1.** Boundary wall near pond side not yet completed which is compromising security of the installation. **2.** Transit camp yet to be handed over. **3.** Construction of buildings shifted from 132 kV Hajo GSS to 220 kV Sarusajai GSS after due approval is yet to be started. Land ready for handover to PGCIL. **4.** 1 Nos Station Transformer yet to be installed.
2	132 kV Amingaon - Hajo Line M/S KEC	**Commissioned on 19.10.2023 Total Tower - 32, Stringing - 8.837 km**	**Completed** **TOC under progress**	No major issues
3	132/33KV Paltanbazar GIS (JV of Techno & Seiyuan)	**Test charged on 17/07/2024 Commissioned on 20.09.2024**	**Completed** **TOC under progress**	**1.** Problem in Relay settings in 132kV Kamakhya Feeder, MOG of 50MVA Transformer-II and SCADA PCs **2.** The SAS PCs are also getting disconnected in frequent intervals which lead to increase in restoration time of the feeders. **3.** The metering data are not coming properly in the SAS PCs. **4.** Refilling of fire extinguishers **5.** Refilling and servicing of all Air conditioners.
4	132 kV Paltanbazar-Kamakhya UG cable (JV of Techno & Seiyuan)	**Completed** **Total UG cable length: 4.5 km Test charged on 04.07.2024**	**Completed** **TOC under progress**	

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
5	220/132 kV Behiating GSS (NECCON power & Infra Ltd.)	**Commissioned on 07.03.2024 Test charged on 05.03.2024**	**Completed** **TOC under progress**	**1.** Unhealthy PLCC communication link of 220kV Behiating-Tinsukia D/C line-1&2 **2.** Energy reports are not generated since date of commissioning of the new 220/132kV extension portion. **3.** Both main and redundant SAS HMI frequently becomes out of service creating immense difficulties for operational work. **4.** Positive(+) DC earth fault is observed at the 220V DC system.(+ve to ground=0 value) **5.** Severe SF6 gas leakage issue from R-phase CB pole of 220kV Behiating-Tinsukia Line-1(bay-205). **(The issue was attended on dtd. 05-10-2024, but the SF6 loss alarm again initiated since dtd. 23/11/2024)** **6.** 220kV Behiating-Tinsukia line-2 was commissioned through the Bus coupler CB due to defective Y-phase CB pole of the bay-204(Tsk line-2), **The same needs to be rectified and the CB should be brought to service at the earliest.** **7. Circuit Breaker of 220kV Bus coupler (Bay 202) is out of service since dtd. 13.06.2024 following its consecutive tripping showing pole discrepancy. As such currently the 220kV behiating-Tinsukia line-2 is out of service. The issue related to BC CB should be rectified at the earliest.** **8. Issue related to battery cell and battery bank:** The 48V battery bank-1 is out of service since dtd. 04-11-2024 following malfunctioning of 48V DC system due to excessive heating of battery cells. Moreover Damaged battery cells (08 nos and 05nos respectively) of 48V & 220V battery banks should be replaced at the earliest. **9.** Mismatch in energy import-export data of 220/132kV portion. Export from 100MVA ICT is more than the import from the 220kV Transmission lines. **10.** Only Station service transformer-2, connected to 100MVA ICT-2 was commissioned. Station service transformer-1 (connected to 100MVA ICT-1) is not commissioned yet. **11.** DG set is installed but not commissioned

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
				yet. **12.** Fire Hydrant system is not commissioned yet. **13.** Air conditioners of the SPR1&2 are non-functioning prior to commissioning of the 220/132kV extension portion. **14.** 20V FCBC-1 & FCBC-2 boost mode alarm signal is not reporting on SAS **15. ICT-I :** ODS-1 HMI is found to be defective, WTI IV and LV CCU for ICT-1 is not reporting on RTCC panel. **16.** Conservator aircel rupture relay alarm is not reporting for ICT 1&2 on SAS. **17.** Bus Bar CT circuitry fail alarm is frequently received. **18.** As built drawings/documents, Manuals etc., not handed over. **19.** Mandatory spares to be supplied as per BOQ. **20.** Supply of furniture for SAS & DR PCs and printers. **21.** 203 bay(ICT-2):Closing issue related to isolator 89B is to be attended.
6	220 kV D/C Tinsukia-Behiating TL(Power Mech Projects Ltd.)	**Commissioned on 07.03.2024 Test charged on 10.10.2023Total Tower - 203, Stringing - 52.863 km, ROW issue** : Nil	**Completed** **TOC under progress**	**1.** Missing tower members at Loc. No. 49, 51, 52 and 54. **2.** Vibration Damper has not been fitted at Loc. 60/0 and 51A/0. **3.** Sag adjustment works at sections 28/0 to 28/1,34/2 to 35/0,64/0 to 65/0,54/0 to 55/0,59/0 to 65/0 and 27A/0 to 28/0 are still pending. **4.** The construction of RRM/Guard wall at location 13/0 (DD+9) near Tingrai river has not been completed. **5.** The necessary tower protection work at loc 17/0 (DA+0) is still pending. **6.** Replacement of conductor at the section 52A/0-53A/0. **7.** Mis-alignment of conductor & insulator at locations 36A/1,55/0-55/1-55/2,36B/0-36B/1-36B/2. **8.** As built drawings/documents and other documents to be submitted.

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
7	132/33 kV Silapathar GSS (NECCON power & Infra Ltd.)	**Commissioned successfully on 23.03.2023**	**Completed** **TOC signed on 15.11.2023**	**1.** Transit camp 70% work completed. **2.** Staff Quarter 40% work completed. **3.** Security room 20% completed. **4.** Water drainage system. **5.** 3 Nos cooling fan of ICT-1 and 4 Nos Cooling fan of ICT-2 not working. **6.** Unable to changed Tap position through RTCC Panel and SAS. **7.** ODS-1 signals not reporting to SAS (RTCC ODS tab/taskbar) **8.** OTI not reporting to Bay 102 ICT-1 and Bay 104 in SAS. **9.** Tap Position not reporting to SAS (Bay 102 ICT-1) and Bay 104 ICT-2
8	132 kV Dhemaji-Silapathar TL (Teems India Towerlines Private Ltd.)	**Commissioned on 01.06.2023** Total Tower - 123, Stringing - 35.88 km	**Completed** **TOC signed on 19.06.2023**	No major issues.
9	132/33 kV Chapakhowa GSS (NECCON power & Infra Ltd.)	**Commissioned successfully on 04.10.2021**	**Completed** **TOC signed on 21.02.2023**	**1.** **Civil works:** Finishing work of Main entrance gate, Drainage system, Doors of CRB, Store room, Conference room, Transit camp, Security Toilet etc. **2.** Boundary wall painting. **3.** Earth filling works at Transit camp, Boundary wall. **4.** 3 Nos 33 kV LA not installed. **5.** PT, CT, LA not give for both HV and LV side. **6.** SF6 gas filling kit not given for both HV and LV side. **7.** CTR FD of Trf-2 is damaged. **8.** Solar System not installed yet.. **9.** Mandatory spares as per BoQ not handed over. **10.** 132 kV Roing 1 and 2 line isolator motor is not functioning. **11.** HT 132 kV Bus and Line Isolator are not operational through SAS. **12.** 5 Nos AC in Control room not working properly.

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
10	132 kV Rupai-Chapkhowa TL (Power Mech Projects Ltd.)	**Commissioned successfully on 11.06.2021.**	**Completed** **TOC signed on 07.03.2022**	No major issues
11	132/33 kV Teok GSS(NECCON power & Infra Ltd.)	**Commissioned successfully on 07.06.2021**	**Completed** **TOC signed on 24.02.2023**	**Control Room Building** 1. Aluminium door windows locks and rollers to be replaced/ repaired. 2. Installation of Exit boards, AC controller panel commissioning of Battery room, Supply & Installation of Inverter for Relay Panel Room and conference room lighting & laying of cable from ELP. 3. SAS Auxiliary signals. **Switchyard** 1. Solar lighting pole installed but not yet commissioned. 2. Commissioning of DTPC panels for Jorhat-Teok & Nazira-Teok Link. 3. Installation of FFPH hydrant box at backside of CRB. 4. Construction of approx. 342 m boundary walls on the backside of switchyard. **Mandatory Spares** 50% Supply of Mandatory spares and testing equipments as per BOQ. **Drawings/Documents** Electrical and Civil drawings, related necessary documents.
12	LILO of 132 kV Jorhat-Nazira at Teok (Simplex was terminated & Power Mech Projects Ltd was engaged)	**Commissioned successfully on 07.06.2021**	**Completed** **TOC signed on 31.01.2023**	No major issues.

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
13	132/33 kV Sarupathar GSS (NECCON power & Infra Ltd.)	**Commissioned successfully on 02.05.2022**	**Completed** **TOC signed on 10.03.2023**	**<u>Control Room Building</u>** **1.** Commissioning of Bulkhead lights, Exit boards, and Occupancy sensors. Emergency panel. **2.** Damaged tiles or false ceiling to be replaced. **3.** CRB Porch area road and ramp road construction. **4.** Main entrance door of ACDB & Battery Room to be provided wilh handle and locking arrangement. **5.** Flooring works in front of battery room door. **<u>Switchyard</u>** **1.** Sub-stalion drain construction **2.** Switchyard PCC along the 132 kV line Gantry side, 132 kV PT side upto fencing. **3.** Stone spreading in switchyard. **4.** 132 kV CB ladder foundation and installation. **5.** Installation of dewatering pump at both the transformers pit, sump pit.. **6.** Switchyard road RCC works **7.** Solar lamps yet to be installed. **<u>Mandatory Spares</u>** Supply of remaining Mandatory spares and Test equipments Minor Civil and Electrical works at FFPH, Security Booth, RE office, Pantry room etc.,
14	LILO of 132 kV Golaghat-Bokajan at Sarupathar GSS (Power Mech Projects Ltd)	**Commissioned successfully on 11.09.2021**	**Completed** **TOC signed on 25.11.2022**	No major issues

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
15	132/33KV Tangla GSS(NECCON power & Infra Ltd.)	**Commissioned on 08.06.2022**	**Completed** **TOC signed on 04.05.2023**	**1.** In SAS 132kV SLD HV input and 33kV SLD Load of Transformer's HV and LV Side is showing major mismatch in SAS. The hourly reading reports of SAS are not generated. **2.** DG Set is installed but not commissioned yet. **3.** Street Light Pole Erection is completed but street light yet to be installed. **4.** The Earth wires of the gantry structures are not grounded yet. **5.** 3-Phase stand by connection at Marshalling box of 31.5 MVA Transformer -1 and Transformer-2 need to be connected. **6.** 31.5 MVA Tr-1 WTI meter not working. **7.** 31.5 MVA Tr-1 Fan controller contactor not working. **8.** Fire hydrant system valve not available at the outlet points. **9.** ROW, Land & Zirat compensation details not submitted which is required for capitalization of assets and other judicial purposes. **10.** As built drawings/documents and other necessary documents not handed over. **11.** The Fire extinguishers not handed over yet, some have been found empty in the store.
16	LILO of Rangia-Rowta TL at Tangla (M/S KEC)	**Line Charged on 29.05.2022 and commercially loaded on 19.06.2022 Total Tower - 40, Stringing - 10.658 km**	**Completed** **TOC signed on 06.03.2023**	No major issues.

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
17	132/33KV Tezpur GSS (NECCON power & Infra Ltd.)	**Commissioned on 07.01.2023**	**Completed** **TOC signed on 28.02.2023**	**1.** The Ckt-1 is charged but the Trip Transfer Relay is not supplied yet. Also, some relays in 33kV R&C panels are not supplied. **2.** Illumination issued for CRB & Switchyard is not addressed. **3.** DC illumination is not done yet. **4. On dated 28/02/2024 during routine testing of 132/33kV, 50MVA, ITC-1 at site it was observed that the LV side CT of R-phase & B-phase have undergone significant oil leakage and the neutral bushing clamp of LV side of the transformer has developed a hairline fracture. Also, it was found that the R-phase LV bushing exhibited oil leakage in minor proportions.** **5.** The Nitrogen pressure monitoring device of the NIFPS unit of 50MVA ICT-2 is currently faulty. **6.** One Pump which has been provided is not sufficient for draining of water. **7.** Station service Transformer-1 has undergone significant oil leakage from the bushing despite it being idle charged from the day of commissioning as the incoming breaker trips while charging. **8.** Some issue in SCADA yet to be rectified. **9. ROW, Land & Zirat compensation details not submitted, which is required for capitalization of assets and other judicial purposes.** **10.** As built drawings/documents and other necessary documents not handed over. **11.** The Air Conditioner at Conference room as per BoQ has not been supplied yet. **12.** The AC motor of Transfer Bus isolator of Sonabil-Tezpur Ckt-1 not supplied. **13.** The Breaker Spring charging motor of Y-phase of the Sonabil-Tezpur Ckt-II is to be replaced. **14.** The Fire extinguishers not handed over yet, some have been found empty in the store and required discharged pipes are absent.

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
18	132kV D/C Sonabil-Tezpur TL (M/S KEC)	**Line test charge on 06.08.2022 and commissioned on 07.01.2023** Total Tower - **63 Nos**, Stringing - **16.081 km**	**Completed** **TOC signed on 25.02.2023**	No major issues
19	LILO of 132 kV Kamalpur – Sishugram TL and Kamalpur – Kamakhya TL at Amingaon(M/S KEC)	**Commissioned on 04.03.2023 Total Tower(MCkt:23,DC:8) - 31, Stringing - 9.528 kmROW issue:** Nil	**Completed** **TOC signed on 17.04.2023**	No major issues
20	220/132 kV Amingaon GIS (JV of Techno & Seiyuan)	**Commercially loaded on 08.07.2024**	**Completed** **Handover is in process**	**1.** Two Nos of estimates were submitted for protection of tower locations 51/0 (DD+9) and 52/0 (DD+0) against illegal cutting of hill slopes The cutting of hill slopes has endangered the aforementioned tower locations. Also during rainy seasons, landslides may occur and hence may result in collapse of the towers at any time. **2.** ROW, Land & Zirat compensation details not submitted which is reqired for capitalization of assets and other judicial purpose. **3.** Some drawings, necessary documents & mandatory spare as per BoQ are not submitted/handover which results difficulty in O&M work of AEGCL. **4.** Some issues of Substation Automation System (SAS) yet to be completed. **5.** Oil leakage has been observed from Y-phase IV bushing of 160 MVA ICT-II, fan and other accessories does not work on 160 MVA ICT-I **6.** Problems persists in switchyard illumination system, pole lights at the switchyard campus, 5 nos solar street lights and a few lights at the CRB not working. **7.** DC overvoltage is shown at 48 V DC Charger-II which need to be attended immediately. **8.** Proper labelling of ACDB/DCDB not done and a few cable identifications to be done. **9.** On field training/demonstration of SF6 gas

Major list of pending works in all the completed elements under NERPSIP				
SL No	**Name of Substation / Associated Transmission Line**	**Status of the Projects**	**Current Status**	**Pending works**
				filling machines, fire fighting, safety and LT O&M need to be provided.
21	220 kV D/C Rangia – Amingaon TL (M/S KEC)	**2nd circuit Test charged on 27.05.2024, Commercially loaded on 08.07.2024 1st circuit test charged on 01.06.2024, Commercially loaded on 08.07.2024 Total Tower - 105,Stringing - 28.337 km**	**Completed** **Handover is in process**	**1.** Protection of one number tower at location 51/0 (DD+9) against illegal cutting of hill slopes is required. Tower protection work has started recently. **2.** Protection of tower location no. 45/1 (DA+0) is required against excavation by seasonal flood. **3.** SAS integration of 220kV Rangia-Amingaon Ckt-I and Ckt-II will be required after up gradation of existing SAS at 220/132kV Rangia GSS. **4.** Corridor cleaning is required at multiple locations.
22	132/33KV GMCH GIS (JV of Techno & Seiyuan)	**Test Charged on 27.02.2024 Commercially loaded on 17.03.2024**	**Completed** **Handover is in process**	**1.** Abnormal noise from 33 kV GIS. **2.** Some of the Transformer fans are not working. **3.** Data not reporting to SLDC due to optical fibre break issue (27F) of 132 kV Kahilipara-GMCH UG lines. **4.** Two no of SAS PC are not working. **5.** Urgent requirement of retaining wall near 132kV GMCH-1 and GMCH-2 feeder at 132kV kahilipara GSS due to erosion of hill slope. **6.** ROW,Land & Zirat compensation details not submitted which is required for capitalization of assets & other judicial purpose. **7.** Drawings (Panels and wiring diagram) are not submitted. **8.** Sanitary issue of urinals are not solved yet. **9.** Air Conditioners are no working at KIOSK room for 132kV GMCH-1 and GMCH-2 feeder at 132kV Kahilipara GSS. It should be rectified at the earliest for cooling of the panels. **10.** The 132kV GMCH-1 and GMCH-2 feeder has not been handed over yet.
23	132 kV GMCH-Kahilipara D/C UG cable (JV of Techno & Seiyuan)	**<u>Completed</u>** **Test Charged on 20.02.2024 Commercially loaded on 17.03.2024** Total UG cable length: 5**.6 km** Cable laid **completed: 1.6 km(Lower Portion - Out of 1.6km) and 4 km (Upper portion - Out of 4 km)**	**Completed** **Handover is in process**	

Annexure 2.21

भारत सरकार
Government of India
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
पश्चिम क्षेत्रीय विद्युत समिति
Western Regional Power Committee
एफ -3, एमआयडीसी क्षेत्र, अंधेरी (पूर्व), मुंबई - 400 093
F-3, MIDC Area, Andheri (East), Mumbai - 4000 93

दूरभाष Phone: 022- 28221681; 28209506; 28200194; 195;196 फैक्स Fax : 022 – 28370193
Website : www.wrpc.gov.in E-mail : opc-wrpc@nic.in

संख्याःपक्षेविस/प्रचा. / स्काडा/ 2024-25/ दिनांकः
No: WRPC/Opn/NPC/2024-25/ 10755-10828 Date:24/10/2024

सेवा में / To,

सदस्य सचिव,
The Member Secretary,
राष्ट्रीय विद्युत समिति,
National Power Committee,
केन्द्रीय विद्युत प्राधिकरण,
Central Electricity Authority
नई दिल्ली / New Delhi-110 066

विषयः "स्काडा प्रणाली और एसईएम आँकड़ों के मध्य मिसमैच (बेमेल) संबंधित समस्या हेतु गठित" उप समिति की रिपोर्ट के संबंध में ।

Sub: Report of the "Constitution of Sub-Committee on the issue of mismatch between data of SCADA system and SEM"- reg.

संदर्भःएनपीसी नं. सीईए-जीओ-15-14/2/2020-एनपीसी डिवी./137, दि. 20.03.24.
Ref: NPC No. CEA-GO-15-14/2/2020-NPC Division/137 dated 20.03.2024

उपरोक्त संदर्भित पत्र के अंतर्गत राविसमिति द्वारा गठित उप-समिति की अंतिम रिपोर्ट निम्नलिखित टीओआर (मद के संदर्भ में) के अधीन इस पत्र के साथ संलग्न हैः-

Please find enclosed herewith the final report of the sub-committee constituted by NPC vide letter under reference on following TOR (Term of Reference):

1. स्काडा प्रणाली और एसईएम आँकड़ों के मध्य मिसमैच (बेमेल) की समस्या का अध्ययन करें।
   Study the issue of mismatch between data of SCADA system and SEM.
2. स्काडा प्रणाली और एसईएम आँकड़ों के मध्य मिसमैच (बेमेल) की समस्या के सभी कारणों की पहचान करें ।
   Identity all the reasons for mismatch between data of SCADA system and SEM.

----/2

3. इस समस्या पर म.प्र., राभाप्रेकेन्द्र द्वारा पायलट प्रोजेक्ट पर अध्ययन ।
   Study the pilot project being done by MP SLDC on the issue.

4. स्काडा प्रणाली और एसईएम आँकड़ों के मध्य मिसमैच (बेमेल) की समस्या के हल हेतु समाधान की सिफारिश ।
   Recommend the solutions to resolve the issue of mismatch between data of SCADA system and SEM.

5. संबंधित मामलों पर कोई अन्य सुझाव / सिफारिशें ।
   Any other suggestions/ recommendations on related matters.

भवदीय/ Yours faithfully,

संलग्नः उपरोक्तानुसार A/a

(बी. वी. संदीप/ B. V. Sandeep)
(कार्य. अभि. / Exe. Eng. (प्रचा.) / Opn)

प्रतिलिपि/Copy to:

सभी सदस्य संलग्न सूची के अनुसार/All Members as per list

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Report of the Sub-Committee Constituted on the issue of Mismatch between data of SCADA system & SEM

October 2024

Index

Abbreviations

AMR	-	Automatic Meter Reading
BCU	-	Bay Control Units
CCM	-	Commercial Committee Meeting
CEA	-	Central Electricity Authority
CERT-In	-	Indian Computer Emergency Response Team
CESC	-	Calcutta Electric Supply Corporation
CMRI	-	Common Meter Reading Instrument
CT	-	Current Transformer
CTU	-	Central Transmission Utility
DCU	-	Data Concentrator Units
DMTCL	-	Darbhanga Motihari Transmission Company Limited
DSM	-	Deviation Settlement Mechanism
DVC	-	Damodar Valley Corporation
EMS	-	Energy Management System
ERPC	-	Eastern Regional Power Committee
F&I	-	Finance and insurance
FAT	-	Factory Acceptance Test
FOR	-	Freight Over Load
GETCO	-	Gujarat Energy Transmission Corporation Limited
GPRS	-	General Packet Radio Service
GRIDCO	-	Grid Corporation of Odisha
IEC	-	International Electrotechnical Commission
IEM	-	Interface Energy Meter
IPP	-	Independent Power Producers
ISTS	-	Inter State Transmission System
KTPL	-	Kirti Telnet Private Limited
LOA	-	Letter of Award
MDP	-	Meter Data Processing
MFM	-	Multi Function Meter

MPPTCL	-	Madhya Pradesh Power Transmission Company Limited
NHPC	-	National Hydroelectric Power Corporation Limited
NPC	-	National Power Committee
NTPC	-	National Thermal Power Corporation Limited
OPGW	-	Optical Ground Wire
PGCIL	-	Power Grid Corporation of India Limited
PLCC	-	Power Line Carrier Communication
PMU	-	Phasor Measurement Unit
PT	-	Power Transformer
RLDC	-	Regional Load Despatch Center
RS Port	-	Recommended Standard Port
RTU	-	Remote Terminal Unit
S/s	-	Sub Station
SAS	-	Substation Automation System
SCADA	-	Supervisory Control & Data Acquisition
SDH	-	Synchronous Digital Hierarchy
SEM	-	Special Energy Meter
SLA	-	Service Level Agreement
SLDC	-	State Load Despatch Center
SRPC	-	Southern Regional Power Committee
ToR	-	Term of Reference
TG SLDC	-	Telangana SLDC
UAT	-	User Acceptance Test
ULDC	-	Unified Load Despatch and Communication
UPS	-	Uninterrupted Power Supply
VLAN	-	Virtual Local Area Network
WBES	-	Web Based Energy Scheduling
WRLDC	-	Western Regional Load Despatch Center
WRPC	-	Western Regional Power Committee

Executive Summary

It has been observed that there is a difference between the DSM charges computed from the real time SCADA values and DSM account prepared by RPCs from the data of interface meters. The difference is observed because of involvement of different meters and different communication architectures in both processes. In order to minimize the difference, it is necessary to provide the data of interface points from the same source i.e. from Interface Energy Meters (IEMs).

Earlier, the states of Madhya Pradesh and Gujarat carried out the pilot project of SEM integration in their SCADA system. Both the pilot projects were discussed earlier in various meetings of WRPC and NPC during 2020-22 in which the stakeholders raised several concerns such as cyber security and applicability of extension of the pilot projects for the entire state because of the involvement of various types & makes of meters, RTUs, communication channels etc. Therefore, the process of SEM integration does not gain momentum thereafter.

To look into the issue afresh, NPC constituted a sub-committee under the chairmanship of Member Secretary, WRPC with representations from PGCIL, RPCs Secretariat, RLDCs, CTU, NPC Secretariat as per the decision taken in the 14th NPC meeting held on 03.02.2024. The Terms of Reference (ToR) of the Sub-Committee are as follows: -

i. Study the issue of mismatch between data of SCADA system and SEM.
ii. Identify all the reasons for the mismatch between data of SCADA system and SEM.
iii. Study the pilot project being done by MP SLDC on the issue.
iv. Recommend the solutions to resolve the issue of mismatch between data of SCADA system and SEM.
v. Any other suggestions/recommendations on related matters.

The committee studies the issue in detail and their findings are given in brief in the succeeding paras:

Reasons for Differences Observed in SCADA and SEM Data:

i. Different sources of data (MFM & Energy meter) in two systems.

ii. Long data Channel having multiple nodes/multiple systems (i.e. the SCADA data of Central Sector Interface points at SLDCs is received through RLDCs).

iii. The long data channel and multiple system involvement (SLDC & RLDC SCADA) result in outage of communication channel in SCADA system while in case of SEMs, data is downloaded manually and therefore, effect of communication system outage is not there.

iv. Time drift observed in some of the SEMs.

v. Difference in accuracy class of the meters (Accuracy class of SEM and MFM are 0.2 & 0.5 respectively).

In order to minimize the difference, it is necessary to provide the data of interface points from the same source i.e. from interface energy meters.

Comparative Analysis of Pilot Projects of Gujarat & Madhya Pradesh:

In their pilot project, Gujarat has done the integration of an additional meter placed in the series with the existing SEMs with an additional communication link whereas Madhya Pradesh has done the integration of SEM placed at their end with the same communication channel of their SCADA system.

The Sub-Committee observed that the pilot project carried out by Madhya Pradesh appears to be a better solution compared to the pilot project of Gujarat as it is not fiddling with existing SEM meter configuration and its implementation would be cheaper considering that it does not involve requirement of any additional equipment (additional energy meter, ring type CT and IOT). Also, it is also found safe from cyber security point of view.

PGCIL Study of the SEM Integration in SCADA System:

A feasibility study of energy meter integration in the Madhya Pradesh SCADA system has also been done by PGCIL for integration of all ISTS meters based on the pilot project done by Madhya Pradesh at four of its S/s. As per the findings of their studies, it is technically feasible to provide real time data (MW/instantaneous) data to SLDC from the RTU/SAS-based substations. However, the meters not supporting MODBUS feature need to be replaced. In SAS-based system, installation of a new RTU appears to be the best solution.

The total estimated cost is coming around 4.2 crores for providing real time data (MW/instantaneous) to SCADA of Madhya Pradesh if conventional RTUs are installed in SAS S/s. However, the cost may come down to Rs. 1.71 crores only if in place of conventional RTUs, mini RTUs are procured and integrated.

Real Time Data Integration in AMR System:

In Eastern Region, Automatic Meter Reading (AMRs) system are operational which provides SEM data to RLDC for the accounting purpose. The system was designed to incorporate an automated solution in the weekly DSM in which the 15-minute block-wise data of SEM is retrieved in a predefined interval. Therefore, the real time data could be routed to respective SLDCs through RLDC and in that case, MDP (Meter Data Processing) unit of ERLDC is required to be reconfigured to capture real time data which is, presently, recording only 15-minute block data for DSM calculation purpose. To enable such type of integration:

i. The SEMs may be re-configured to send 1 MW instantaneous data to MDP server located in ERLDC.

ii. The MPD server, in turn, may transfer data to an augmented data server so that the data used for the accounting system should not be exposed to any cyber threat.

iii. A customized software application on the backup server data may be developed through which real time SEM data be accessed by the states through LAN.

The implementation cost of the proposed integration scheme or the entire Eastern Region is estimated as Rs 7.54 crores and the time schedule for work completion is expected as six months.

Recommendations:

The main recommendations of the Sub-Committee are:

i. The difference between the SCADA and SEM data is causing appreciable financial implications for the beneficiaries in form of DSM charges. Therefore, integration of SEMs with SCADA must be done.

ii. The only way to minimize the mismatch is to fetch the data from the same source (i.e. from SEM).

iii. The pilot project carried out by MPPTCL is comparatively better than GETCO as it involves lesser cost and lesser fiddling with existing SEM configuration and therefore, it should be followed in other parts of the country.

iv. The expenditure of the projects should be borne by the beneficiaries as its associated benefit is comparatively more.

v. The data fetched from SEM to SCADA may be used only for making operational decisions and may not to utilize for raising commercial disputes.

****

Chapter 1

Introduction

Differences have been observed between the DSM charges computed from the real time SCADA values and DSM account prepared by RPCs from the data of interface meters which is causing huge financial implications for the beneficiaries. The difference is observed because of involvement of different meters and different communication architecture in both processes. In SCADA/EMS system, the real time data of active power is acquired from Multi-Function Meter whereas for accounting purposes, 15-minute time block SEM data are used.

In order to minimize the difference, it is necessary to provide the data of interface points from the same source i.e. from interface energy meters. Therefore, some of the states carried out the pilot project of SEM integration in their system. For the state of Gujarat, PGCIL agreed to allow them to put additional meters in series with the existing SEMs in their premises at the state cost in the 40th WRPC held on 07.06.2021. Subsequently, the CEA joint Committee gave a go ahead for the pilot project of Gujarat and recommended that once the outcome of the pilot project results in saving to the State, then other states may also go ahead with this arrangement.

In another parallel development, in the 85th CCM of WRPC held on 28.01.2022, MP SLDC informed that they have successfully integrated the SEM data (at 220 kV Jabalpur S/s) in their SCADA system and requested for allowing the SEM data of all interface points to their SCADA system. Their scheme is based on the fact that the existing SEMs are having two communication ports, which can function independently for fetching the SEM data. The optical port is being used for fetching the weekly DSM data through Common Meter Reading Instrument (CMRI) for accounting purposes. The other RS 232 port available remains unused, the online real time data can be fetched from the existing SEM through the unused RS 232 port. This arrangement does not require additional meters or new communication facilities and therefore no additional cost is involved.

Thereafter, the scheme of Integration of Energy meter was discussed in a special meeting of National Power Committee (NPC) held on 24.06.2022, wherein the implementation of pilot project of MPPTCL in the standby meters at ISTS interface points was approved by NPC. The minutes of the meeting are available at **Annexure-1.1**. In the meeting, it was also directed that before implementation of the scheme, the cyber security issues may be assessed by a Sub-Committee having members from CEA, CERT-In, CTU, WRPC, GETCO, WRLDC & MPPTCL. Accordingly, a Sub-Committee was formed by WRPC vide order dated 24.08.2022. The Sub-Committee discussed the matter in three meetings and recommended that MPPTCL can go ahead with the pilot project of integration of state end IEMs/ SEMs with SCADA.

Accordingly, the states of Madhya Pradesh and Gujarat have carried out pilot projects in their respective for integrating SEM data into their state SCADA in real time.

In the various deliberations held in WRPC & NPC meetings on the pilot project, several concerns were raised by the stakeholders which are enumerated below:

i. Cyber security concern due to transmission of data between different utilities.
ii. As there are MODBUS RS232/485 extension units etc., there are chances of data hanging due to the intermediate electronic equipment.
iii. The availability of spare RS232/RS485 ports in all the RTUs and the feasibility of modifying the RTU database.
iv. Some substations are having old RTUs and it may not be feasible to integrate IEMs through them.
v. Continuity/availability of SCADA data to RLDC may be adversely affected by increased data traffic. Further, the configuration may get affected during any upgradation/modification carried out on RTU during routine O&M resulting in loss of energy data transmission.
vi. Existing ABT meters are very old and may not have RS 232 port & RS 485 port available.
vii. The data fetched from RS-232 port may be used only for making

operational decisions and may not to utilize for raising commercial disputes.

The SEM-SCADA integration proposal could not make much progress because of the above concerns thereafter. The issue was deliberate recently in the 14th NPC meeting held on 03.02.2024 at Bangalore. As decided in the meeting, NPC constituted a sub-committee under the chairmanship of Member Secretary, WRPC with representations from PGCIL, RPCs Secretariat, RLDCs, CTU, NPC Secretariat and States to look into the issue of SCADA vs SEM mismatch, reasons thereof and also to study the pilot project of Madhya Pradesh afresh. The Terms of Reference (ToR) of the Sub-Committee are as follows: -

1. Study the issue of mismatch between data of SCADA system and SEM.
2. Identify all the reasons for the mismatch between data of SCADA system and SEM.
3. Study the pilot project being done by MP SLDC on the issue.
4. Recommend the solutions to resolve the issue of mismatch between data of SCADA system and SEM.
5. Any other suggestions/recommendations on related matters.

The constitution order of the committee is at **Annexure-1.2**. The committee met four times on 28.05.2024, 03.07.2024, 08.08.2024 & 20.09.2024. The minutes of its 1st, 2nd, 3rd and 4th meetings are placed at **Annexure-1.3**, **Annexure-1.4**, **Annexure-1.5** & **Annexure-1.6** respectively.

In addition to the study of the pilot project being done by MP SLDC & GETCO on the issue, the sub-committee also deliberated on the integration issue in the existing AMR system functional in the Eastern Region.

1.1 Report Layout:

The Report contains eight Chapters as detailed below:

Chapter 1 - Covers the issues in the hand and the background of the constitution of the Sub-Committee.

Chapter 2 - Covers the details of the two pilot projects carried out for integrating SEM data into SCADA in real time in the state of Madhya Pradesh & Gujarat constraints faced and a comparative analysis of both projects.

Chapter 3 – Covers a feasibility study of integration of energy meters in SCADA system of Madhya Pradesh done by PGCIL in detail.

Chapter 4 – Covers the details of the SEM-SCADA integration done by TG Transco in their system with SAS based S/s.

Chapter 5 - Covers the possible solutions for real time data integration in AMR Architecture.

Chapter 6 – Covers the finding and the recommendations of the Sub-Committee for using SEM integration with SCADA for operation or commercial purpose.

Chapter 7 – Covers the finding and the recommendations of the Sub-Committee.

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Chapter – 2

Pilot Projects of MP SLDC and Gujarat SLDC

Two pilot projects were carried out for integrating SEM data into SCADA in real time in the states of Madhya Pradesh & Gujarat so that the SCADA errors and therefore huge DSM penalties are minimized. This chapter outlines the details of the pilot projects, constraints faced and a comparative analysis of both projects.

2.1 Pilot Project of Madhya Pradesh SLDC:

In a study carried out by MP SLDC, difference has been observed between real time SCADA data and SEM data in the range of 0.32% to 0.72% during different weeks which is causing financial implications in the range of 1 to 2 crore in terms of DSM charges. The difference is observed because of involvement of different meters and different communication architecture in both processes.

2.1.1 Existing Arrangement of Energy Meter and RTU Communication:

In SCADA/EMS system, the real time data of active power is acquired from Multi-Function Meter and the same is utilized for working out average values for the 15-minute time block. The state schedule is received in SCADA through WRLDC and deviation for the 15-minute time block is calculated accordingly. However, in the Energy Accounting System, for working out deviation, the block-wise implemented schedule is received through WRLDC Portal and drawl data of the interface points is downloaded at AMR system of WRLDC.

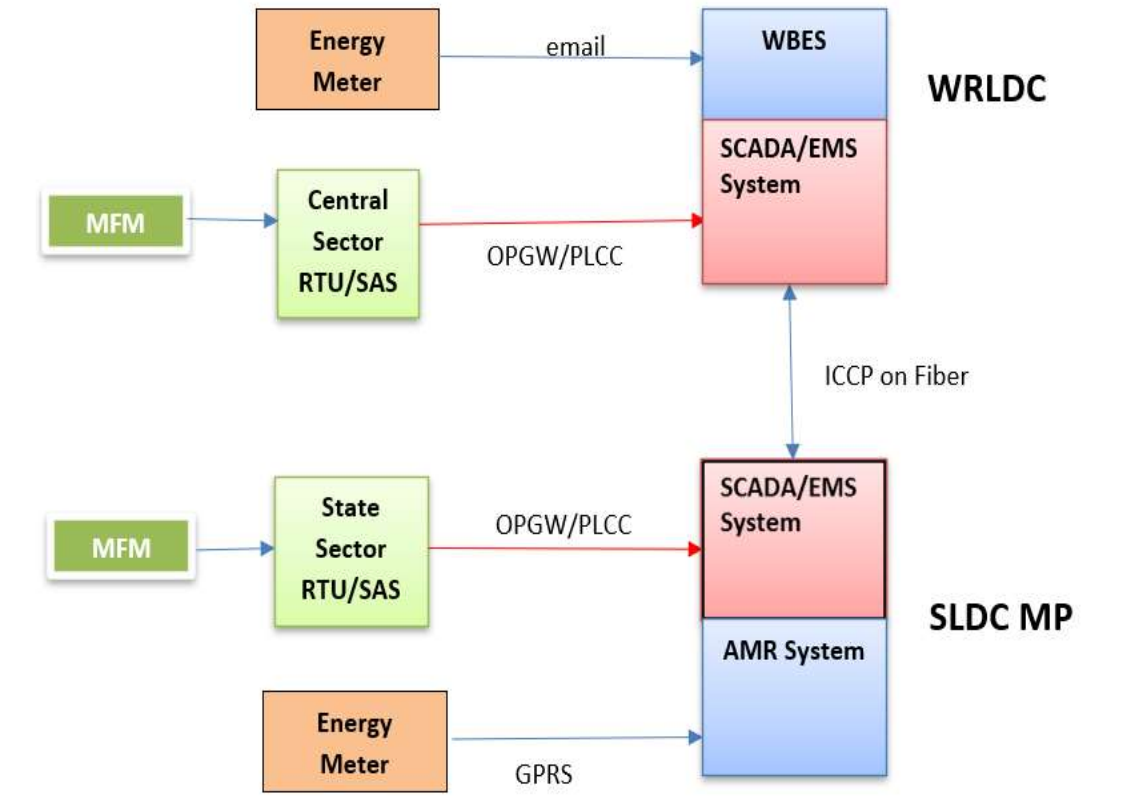

Fig 2.1: Existing Arrangement of Energy Meter and RTU Communication

MP SLDC cited the following reasons for the differences observed between the values calculated through SCADA/EMS system and the energy accounting system:

i. Different sources of data (MFM & Energy meter) in two systems.

ii. Long data Channel having multiple nodes/multiple systems (The data at SLDC is received through WRLDC, e.g. PGCIL Jabalpur 400 KV S/s data which is adjoining to SLDC is first goes to WRLDC and then received to SLDC through WRLDC).

iii. The long data channel and multiple system involvement (SLDC & WRLDC SCADA) results in outage of communication channel in SCADA system while in AMR, effect of communication system outage is not there as AMR data is downloaded periodically whenever communication channel is available.

2.1.2 Scheme of SEM integration into SCADA:

Most of the existing SEMs are having two communication ports, which can function independently for fetching the SEM data. One optical port is being used for fetching the weekly DSM data through Common Meter Reading Instrument (CMRI) for accounting purposes. The other available port remains unused which can be used for fetching online real time data from the SEM. This arrangement does not require additional meters or new communication facilities.

In order to eliminate the difference between deviation worked out by SCADA/EMS and Energy Accounting System, MP SLDC has developed an in-house scheme for integration of interface energy meters into RTU/SAS system using spare RS432/485 port of energy meters. In this pilot project, MPPTCL has integrated standby SEMs (using its RS 485 port) with RTUs through MODBUS Protocol and successfully tested it at four locations viz. 220 kV Jabalpur S/s, 132 kV Indore Chambal S/s, 132 kV Ayodhya Nagar S/s & Sanjay Gandhi Thermal Power Station.

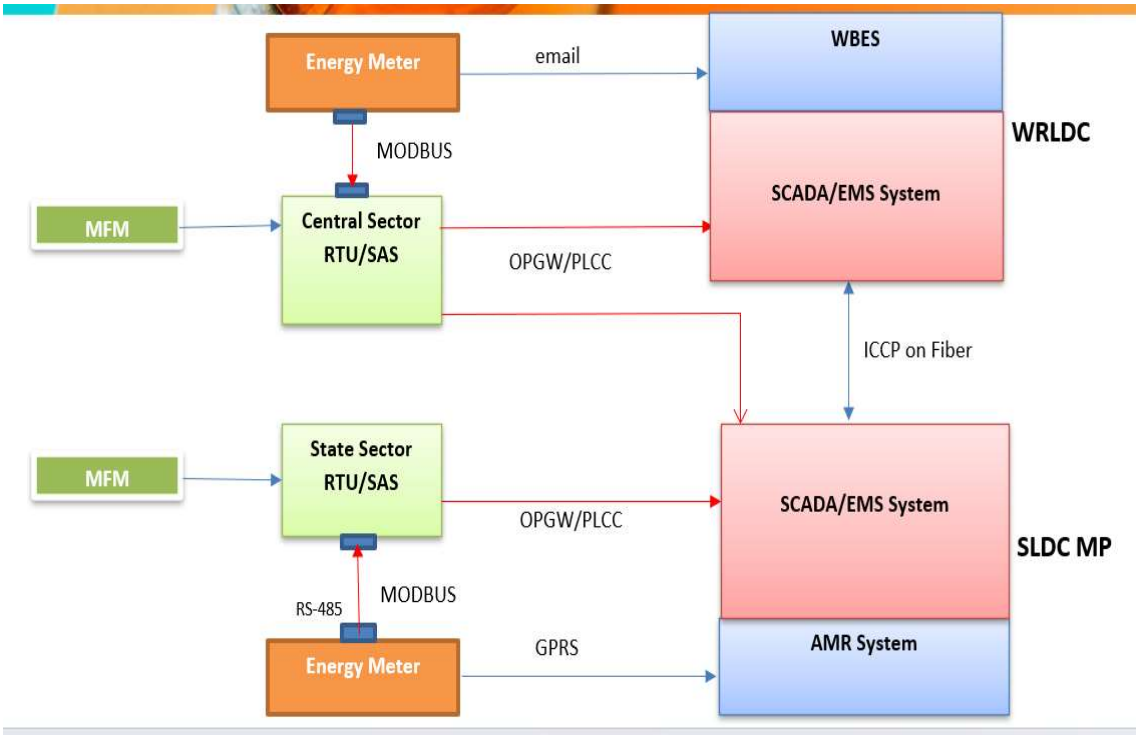

Fig 2.2: SEM Integration Scheme Implemented in Madhya Pradesh

2.1.3 Advantages of the MP Pilot Project:

The advantages of this pilot project are as follows:

a) There is no requirement for any additional equipment as data are acquired using spare RS232/485 ports which are already available in energy meters and not being utilized presently.

b) The data acquired in RTU/SAS S/s through RS 232/485 port, which is read-only and will not affect the functioning of data on other ports i.e. SEM data. Therefore, the project is safe from the cyber security point of view.

c) The data update rate of SEM data through RTU is not affected even during manual downloading of energy meter data.

d) It has not violated any regulatory provisions.

e) The scheme will provide data into SCADA system in real time i.e. data update rate from energy meter to RTU is within one second. The data update rate through RTU depends on the communication channel and is in the range of 5-10 seconds (similar to rate of present system of acquiring data through MFM).

2.1.4 Financial Implications:

MPPTCL informed that the only cost involved in implementation of the project is the payment to be made to the technical consultant to carry out the integration work. In their case, the cost of integrating one SEM with SCADA was Rs. 1 lakh approximately. Considering that Madhya Pradesh has 91 no. of interface points with ISTS network, the total cost of integration is expected to be less than 1 crore.

Box 2.1 – Cyber Security Issue:

In the earlier discussions held on the pilot project during 2020-2022, some of the stakeholders raised the issue of cybersecurity. MP SLDC submitted that since the SEM port used in the integration process and a read only port and there is also no web connectivity involved, their proposal is safe from cybersecurity point of view. To examine the issue holistically, WRPC constituted a Sub-Group to assess the cyber security issues of integration of SEM with SCADA which comprises members from CTU, CEA, SLDC Gujarat, SLDC Madhya Pradesh, Powergrid, WRLDC & WRPC. The recommendations of the Sub Committee Report are as follows:

i. Secure MODBUS protocol to be used for IEMs integration with RTUs/SAS.

ii. The GPRS connectivity from the state end IEMs shall be replaced with dedicated fiber optic connectivity.

iii. Logs of IEMs, RTUs/SAS shall be maintained in order to check any vulnerability in the system.

iv. In the first phase of Pilot project IEMs those are located at state end may be integrated as per the above recommendations.

v. MPPTCL can go ahead with the PILOT project of integration of state end IEMs/ SEMs with SCADA in line with the above recommendations.

The full report is available at **Annexure-2.1**.

2.1.5 Constraints:

The constraints observed in implementing the scheme are as follows:

a) The pilot project is implemented on the standby meter (its reading also accounts for the losses incurring on the line) installed at MPPTCL end. However, to fetch data from a single source, the main meters are to be integrated for which requisite permission from PGCIL is required.

b) No technical constraint was observed during the implementation of the pilot project. However, technical challenges may depend on the make and technical specifications of SEM and RTUs.

Box 2.2 – Some Other Observations of MP SLDC:

a) The integration of SEM with RTU only has been tested as Substation Automation System (SAS) system is not available in their state network. However, such integration is also easily possible either through MODBUS available in BCU or through gateway of SAS system.

b) The integration of SEM with Phasor Measurement Unit (PMU) has also been successfully tested at 220 kV S/s Jabalpur using RS 485 port through MODBUS Protocol.

2.2 Pilot Project of GETCO, Gujarat

GETCO has done a comparative study of the SCADA and SEM data for a few weeks in their system and found differences in their respective readings. Their observations are as follows:

a) In MW, differences have been observed in the range of 24-62 MW.

b) The % errors are in the range of 1.67% to 4.18% during different weeks.

c) The financial implication of this mismatch is estimated as Rs. 30-40 lakhs per day in the form of DSM charges.

In order to eliminate the difference between deviation worked out by SCADA/EMS and Energy Accounting System, GETCO has also done two pilot projects for integration of interface energy meters into their SCADA system and has successfully implemented it at three lines at 400 kV Kasor S/S (Pilot Scheme1on 400 kV Kasor - Chorania line & 220 kV Kasor - Botad lines, Pilot 2 on 220 kV Kasor-Dhuvaran line) through third party vendors. The project

involved installation of separate meters for this purpose and their integration with SCADA network.

2.2.1 Pilot Scheme 1 of GETCO:

The pilot project of integration of SEM meter with SCADA at 400 kV Kasor - Chorania & 220 kV Kasor - Botad lines at 400 kV Kasor S/S was implemented by GETCO through a third-party vendor viz. M/s SCOPE. In this project, the additional meters were installed through clip-on type solution without breaking CT secondary circuit of feeder. The data of Intelligent Electronic Device were integrated through Modem to cloud based analytics software and then made available to SCADA through a web-based link.

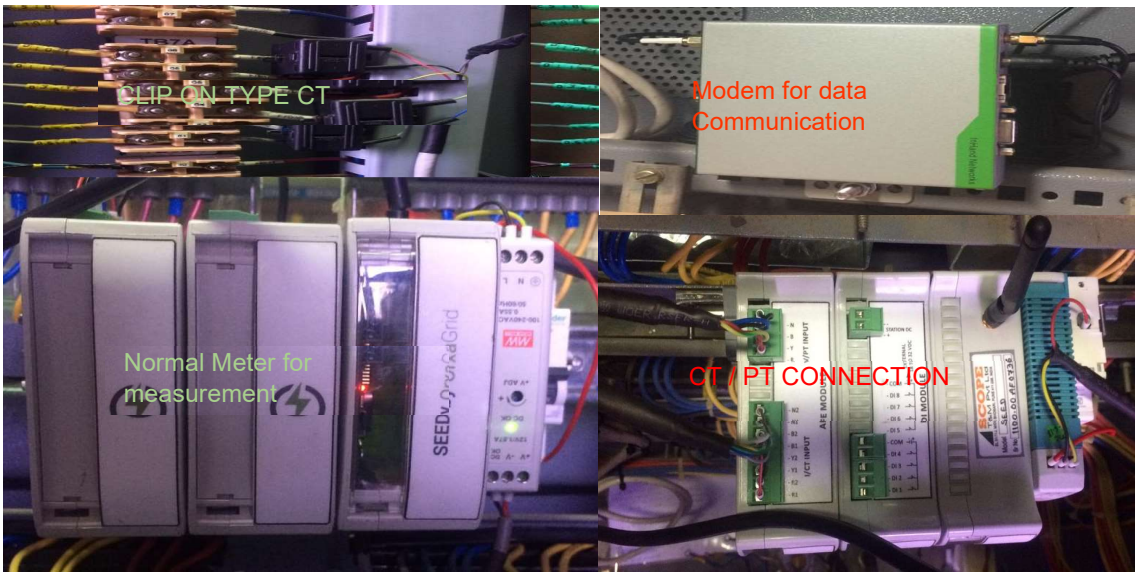

Fig 2.3: Site Installation Photos of Pilot Scheme 1 of GETCO

2.2.2 Pilot Scheme 2 of GETCO:

The pilot project of integration of SEM meter with SCADA at 220 kV Kasor - Dhuvaran line at 400 kV Kasor S/S was implemented by GETCO through a third-party vendor viz. M/s KTPL. In this project, an additional meter was installed through CT/PT extension in series of the existing SEM meter and the meter data was sent through Modem on IEC-104 protocol and integrated with SCADA system at Sub-SLDC Jambuva.

Fig 2.4: Site Installation Photos of Pilot Scheme 2 of GETCO

The outcome of the exercise carried out during the period of 01-Sep-2020 to 30-Sep-2020 is detailed below:

Sl. No.	Particulars	Demo Energy Meter Data and Interface Meter data difference in MW	Demo Energy Meter Data and Interface Meter data difference in %
1.	Min (Light Load Condition +/- 0 to 10 MW)	-1.29	-6445.45
2.	Max (Light Load Condition +/- 0 to 10 MW)	1.38	1970.13
3.	Min	-11.60	-87.44
4.	Max	19.64	-6.54
5.	Average	1.08	-0.96

Table 2.1: Differences Observed in Pilot Scheme 1

Sl. No.	Particulars	Demo Energy Meter Data and Interface Meter data difference in MW	Demo Energy Meter Data and Interface Meter data difference in %	Demo Energy Meter Data and SCADA data difference in MW	Demo Energy Meter Data and SCADA data difference in %
1.	Min (Light Load Condition +/- 0 to 10 MW)	-7.43	-384.97	-0.71	-1014.29
2.	Max (Light Load Condition +/- 0 to 10 MW)	8.76	278.85	-1.15	884.62
3.	Min	-17.67	-200.07	-18.65	211.21
4.	Max	39.85	87.83	38.98	-85.92
5.	Average	0.36	0.49	-0.23	-4.56

Table 2.2: Differences Observed in Pilot Scheme 2

As observed from the above tables, less average difference was observed in Pilot 2 Scheme, it was concluded that this scheme is better between the two. Accordingly, GETCO has worked out the financial implications of their project based on Pilot 2 Scheme.

2.2.3 Financial Implications:

SLDC, Gujarat received budgetary offers from three vendors for providing Real-time data of Interstate Interface point of Gujarat in series of existing Energy Meters. The budgetary offer includes provision of additional ring type CT and IOT, with the existing meter. Details for the same are as under:

Sl. No	Description	M/S SECURE	M/S Kirti Telnet	M/S SCOPE T&M Pvt. Ltd
1	Total Budgetary Offer for providing Real-time data of Interstate Interface point of Gujarat in series of existing Energy Meter	57443745.2	20697200	15535184.04
	Average Budgetary offer			31225376.41

Table 2.3: Budgetary Offer for the SEM Integration in Gujarat

GETCO has estimated the financial implications arising due to discrepancies between SCADA vs SEM data are in the range of 1-2 crore per week. The comparison between WRPC DSM Charges v/s Calculated DSM Charges from 06-May-24 to 12-May-24 is given below:

Sl. No.	Timestamp	WR DSM Charge (Rs.)	Calc DSM Charge with SCADA data (Rs.)
1	06-May-24	-4707810	-5631107
2	07-May-24	2190823	5298692
3	08-May-24	-1457970	1491168
4	09-May-24	-3263670	-2410188
5	10-May-24	-1464683	-5682167
6	11-May-24	9461023	-2588824
7	12-May-24	16664299	20311

Table 2.4: financial implication of discrepancies observed between SCADA vs SEM data

2.2.4 Constraints:

The constraints observed in implementing the scheme are as follows:

i. Installing additional meters will lead to issues of accuracy between the two and the problem will be solved only if the data is taken from the same meter instead of an additional meter.

ii. There will also be issues of update time of data in the meters.

iii. If accuracy class of the additional meter is not same as interface SEM, then the issue of errors and huge DSM penalties to the DISCOMs will remain unresolved.

2.3 Comparative Analysis of Pilot Projects of GETCO & MPPTCL

The pilot project carried out by MPPTCL appears to be a better solution compared to the pilot project of GETCO as it is not fiddling with existing SEM meter configuration and its implementation would be cheaper considering that it does not involve requirement of any additional equipment (additional energy meter, ring type CT and IOT). Also, it is found safe from the cyber security point of view.

Box 2.2 – Differences Observed in WRLDC SCADA and State SCADA:

WRLDC informed that RLDC calculates drawl using ISTS endpoints whereas SLDC calculates drawl using State substation endpoints. SLDC SCADA systems are also mapped to their SCADA system and sometimes, differences are observed between the two data sets. The major reasons for the mismatch identified are:

- Telemetry of both ends goes out (usually happens when one side is already down).
- Telemetry of station, whose ICTs are used in drawl, goes out.
- Sudden sign change of value due to restart of RTU or loading of wrong configuration (very rare although it has occurred sometimes).
- Delayed updation of data.

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Chapter – 3

PGCIL Study of the SEM Integration in SCADA System

A feasibility study of energy meter integration in the Madhya Pradesh SCADA system has also been done by PGCIL. This chapter outlines this PGCIL study in detail.

3.1 Background:

In pursuance of the recommendations of a sub-group constituted by RPC to assess the cyber security issues of integration of SEM with SCADA regarding initiation of the first phase of pilot project with the SEMs located at state end (Pls see **Box 2.1** in the previous chapter), Powergrid extended consent to MPPTCL vide letter dated 26.05.2023 for integration of SEM with their RTU at MPPTCL substations. Thereafter, Powergrid communicated to MPPTCL vide its letter dated 23.10.2023 that its Jabalpur substation (non-SAS station) has been considered for integration of SEM data on a pilot basis. Subsequently, an award was placed on M/s Synergy on 16.05.2024 for integration of 10 nos. of meters of ISTS feeders at Jabalpur substation. The energy meter data has been successfully integrated with SLDC MP SCADA/EMS system on dated 30.07.2024.

3.2 Types of Substations & Meters:

In Madhya Pradesh, PGCIL has 13 Substations out of which 5 are RTU based whereas the other 8 are SAS based. The details are as follows:

Sl. No.	RTU based S/s	Sl. No.	SAS based S/s
1.	Dehgam	6.	Betul
2.	Itarsi	7.	Bina
3.	Khandwa	8.	Damoh
4.	Satna	9.	Gwalior
5.	Jabalpur	10.	Indore
		11.	Rajgarh
		12.	Rewa
		13.	Shujalpur

Table 3.1: Types of Substations in Madhya Pradesh

Also, 7 types of SEM of different models & makes are operational.

Sl. No.	Model & Make of SEM
1.	L&T/Schneider NP
2.	L&T/Schneider IEM
3.	Elster
4.	Secure Premier
5.	Secure make APEX150
6.	Genus SAMAGRA
7.	Genus Type 03D-193

Table 3.2: Types of SEMs

3.3 Challenges Faced:

The challenges faced by PGCIL in SEM integration with SCADA are detailed below:

RTU based S/s:

On a pilot basis, PGCIL has placed an order on M/s. Synergy on 16.05.2024 for integration of 10 nos. of meters of ISTS feeders at Jabalpur substation. Out of the several types of SEM meters installed, integration of only one type of meter (i.e. Secure make APEX150) was done. The capabilities of other meters in supporting 1 min instantaneous data are given below:

Sl. No.	Model & Make of SEM	Capability to support 1 min instantaneous data
1.	L&T/Schneider NP	Does not support 1 min instantaneous MW data
2.	L&T/Schneider IEM	Support instantaneous 1 min MW data
3.	Elster	Meter is obsolete and does not support 1 min instantaneous MW data
4.	Secure Premier 300	Does not support 1 min instantaneous MW data
5.	Secure make APEX150	Support instantaneous 1 min MW data
6.	Genus SAMAGRA	Support instantaneous 1 min MW data
7.	Genus Type 03D-193	Support instantaneous 1 min MW data

Table 3.3: Capability to support 1 min instantaneous data in different types of meters.

SAS based S/s:

i. SAS substations do not have RTUs for data transmission to RLDCs. The data to RLDCs are transmitted through substation gateways (PC based).

These gateways are also used for remote operation of substations. The integration of IEMs with existing infrastructure may involve substation BCUs which is a critical part of the substation control and protection system and therefore, incorrect configuration or communication errors may cause failure/loss of functionality of BCU.

ii. The feature of RS 485 port is not available in Siemens and ABB (Hitachi) make of Bay control units (BCUs) of these SAS based S/s.

BCU OEM	Hitachi	Siemens	GE
Availability of RS-485	No	No	Yes*

Table 3.4: Availability of RS 485 in BCU.

*Although RS-485 port is available in GE make BCU, however, integration of SEM through such BCUs is also challenging as discussed in the next chapter.

iii. These substations have a large population of IEDs and huge SAS signal data traffic. Thus, adding real-time SEM data to existing SAS will add more burden to the network which may affect its performance.

3.4 Possible Solutions:

PGCIL has proposed the following solutions for overcoming the challenges faced in the integration process:

i. Meters not capable to record 1-minute instantaneous MW data are required to be replaced. The details are as follows:

Sl. No.	RTU based S/s	No. of SEMs require replacement	Sl. No.	SAS based S/s	No. of SEMs require replacement
1.	Dehgam	2	6.	Betul	2
2.	Itarsi	8	7.	Bina	7
3.	Khandwa	4	8.	Damoh	5
4.	Satna	4	9.	Gwalior	3
5.	Jabalpur	0	10.	Indore	8
			11.	Rajgarh	5
			12.	Rewa	2
			13.	Shujalpur	4
	Total	**18**		**Total**	**36**

Table 3.5: Quantity of SEMs required to be replaced.

ii. In SAS based S/s, two solutions are possible –

a) Considering the compatibility issue with the existing BCUs, new BCUs are required to be procured. be procured and integrated. In that case SEM data flow will be - from BCU to Gateway to RLDC to SLDC.

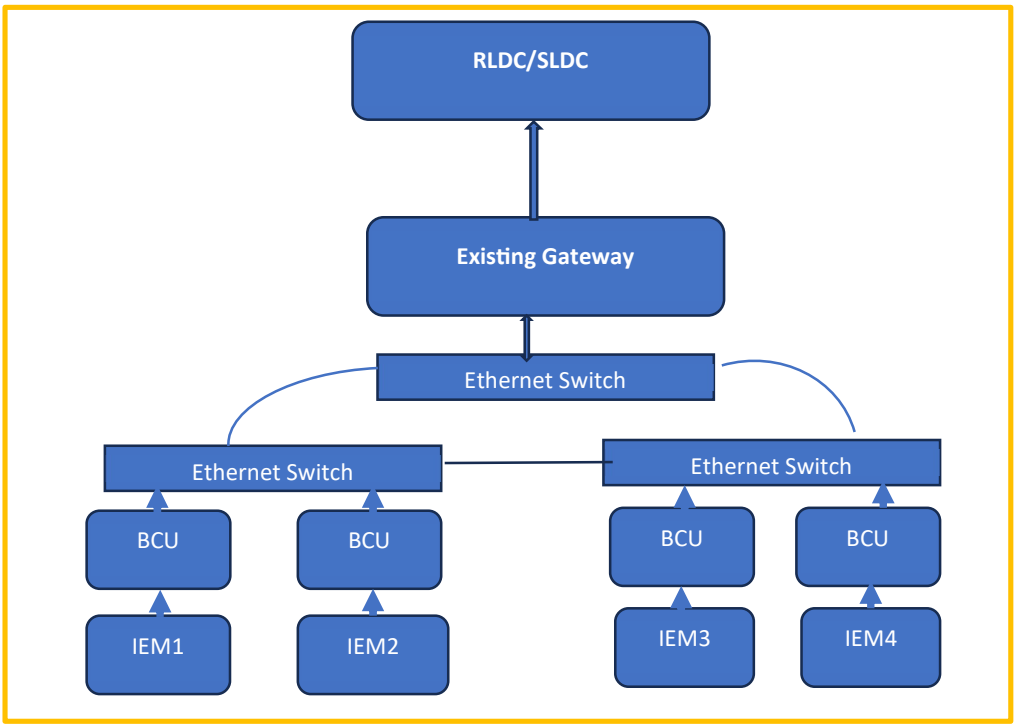

Fig. 3.1: Proposed Architecture through new BCU in existing Gateway

b) The SEM data may also be sent through a separate RTU which needs to be procured and installed. In this case, data flow will be from SEM to RTU (separate) and then to RLDC to SLDC.

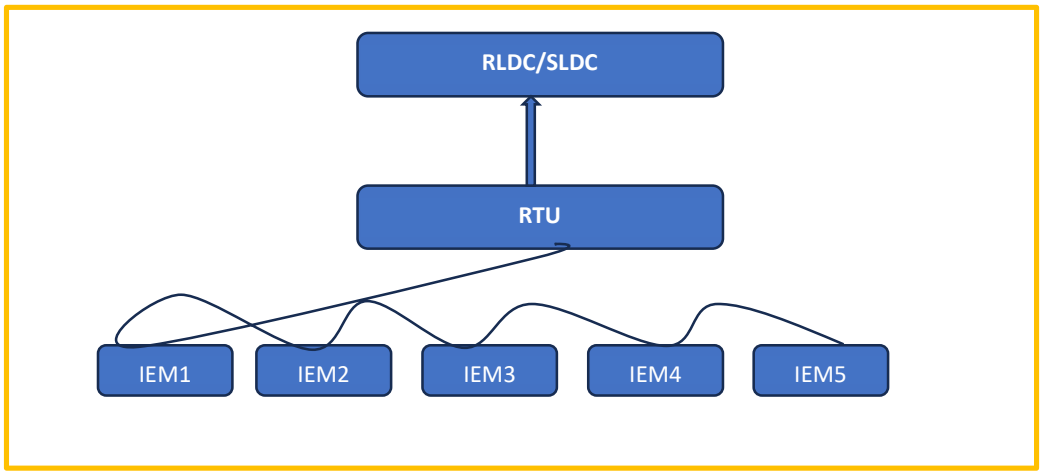

Fig. 3.2: Proposed Architecture through Standalone RTU

iii. As only 5 numbers of analogue points (MW, MVAR, Voltage, Frequency, Cumulative Energy) for each feeder/bay need to be acquired from each energy meter for real-time monitoring of the Interstate lines, the same may be done through installing mini RTUs also.

3.5 Financial Implications:

The cost of SEM integration is estimated separately for RTU based S/s and SAS based S/s for the state of Madhya Pradesh. The cost for three possible options available for SAS based S/s is also estimated separately. The details are as follows:

Options	RTU Based S/s	SAS Based S/s		Total Estimated Cost (In Rs.)
	Estimated Cost (In Rs.)	Particulars	Estimated Cost (In Rs.)	
	A		B	C=A+B
Option 1	13,88,977	Through installing new BCU in existing Gateway	4,26,35,559	4,40,24,536
Option 2	13,88,977	Through installing standalone RTU	4,05,95,111	4,19,84,088
Option 3	13,88,977	Through installing standalone mini RTU	1,51,96,638	1,71,04,285

Table 3.6: Cost of SEM integration for various options available

The further details of the estimate cost are discussed in the succeeding paragraphs.

3.5.1 Details of the Cost Estimate (RTU Based S/s):

The estimate cost of SEM integration for RTU based s/s is Rs. 13, 88, 977/- which is prepared by PGCIL based on the LOA rate awarded in 2023. The details are as follows:

Sl. No.	Particulars	Cost estimate in Rs. (including taxes)
A	Supply of 18 no. of SEM	8,97,655
B	Supervision service charges for commissioning of SEMs	63,189
C	Integration of SEM with Existing RTU	4,28,133
	Total Cost	13,88, 977

Table 3.7: Details of cost estimate for RTU based S/s

3.5.2 Details of the Cost Estimate (SAS Based S/s):

The cost of integration of SEMs for SAS based S/s are estimated for the following three possible options:

Sl. No.	**Proposed Architecture**	**Estimated Cost in Rs.**
1.	Integration through installing new BCU in existing Gateway	4,26,35,559
2.	Integration through installing standalone RTU	4,05,95,111
3.	Integration through installing standalone mini RTU	1,71,04,285

Table 3.8: Details of cost estimate for SAS based S/s

The estimated cost of the integration of SEMs for SAS based s/s through installing new BCU is Rs. 4, 26, 35,559/-. A summary of the cost break up is given below:

Sl. No.	Particulars	Cost estimate in Rs. (including taxes)
A	Supply of 18 no. of SEM	17,95,311
B	Supervision service charges for commissioning of SEMs	1,12,336
C	Integration of SEM along with supply of new BCU & accessories	4,07,27,912
	Total Cost	4,26,35,559

Table 3.9: Cost estimate of integration through new BCU for SAS based S/s

The estimated cost of the integration of SEMs for SAS based s/s through installing standalone conventional RTU is Rs. 4, 05, 95,111/-. The detail break up is given in **Annexure - 3.1**. A summary of the cost break up is given below:

Sl. No.	Particulars	Cost estimate in Rs. (including taxes)
A	Supply of 18 no. of SEM	17,95,311
B	Supervision service charges for commissioning of SEMs	1,12,336
C	Integration of SEM along with supply of new RTU & accessories	3,86,87,464
	Total Cost	4,05,95,111

Table 3.10: Cost estimate of integration through RTU for SAS based S/s

The estimated cost of the integration of SEMs for SAS based s/s through installing standalone mini RTU is around Rs. 1.83 crores. The detail break up is given in **Annexure - 3.1**. A summary of the cost break up is given below:

Sl. No.	Particulars	Cost estimate in Rs. (including taxes)
A	Supply of 18 no. of SEM	17,95,311
B	Supervision service charges for commissioning of SEMs	1,12,336
C	Integration of SEM along with supply of standalone mini RTU & accessories	1,63,97,886
	Total Cost	1,83,05,533

Table 3.11: Cost estimate of integration through standalone mini RTU for SAS based S/s

The most economical option involves integration of SAS based S/s through installing a standalone mini RTU system and the estimated cost in that case is coming around 1.83 crores for the whole state of Madhya Pradesh.

3.6 Implementation Schedule:

The total time required for implementing the proposed scheme is estimated as 6 months after award of contract.

Box 3.1 – Observations of Telangana, SLDC on Powergrid Proposal:

In the sub-committee meetings, Telangana, SLDC stated that installing separate RTUs in a SAS based S/s is neither economical nor required. Their observations were as follows:

i. Only 5 numbers of analogue points (MW, MVAR, Voltage, Frequency, Cumulative Energy) for each feeder/bay need to be acquired from each energy meter for real-time monitoring of the Interstate lines.

ii. The above points can be integrated into the feeder Bay Control Unit (BCU) over MODBUS protocol and in turn to the Gateway system over IEC 61850 protocol and further transmitted to LDC over IEC-60870-5-104 protocol.

iii. The number of total additional points to be communicated to SCADA system is {(no. of inter-state feeders) x (no. of analogue points mapped from corresponding energy meters)} only.

iv. In a substation, additional bandwidth consumption for transmission of additional analogue points is negligible as the ethernet interfaces of IEDs/Switches typically support 100 Mbps & above bandwidth and towards SLDC, communication equipment (SDH) has a minimum 2 Mbps bandwidth. Therefore, the integration may not adversely impact the performance.

Powergrid submitted that their substations have large population of IEDs and huge SAS signal data traffic unlike the S/s of states. Therefore, adding real time SEM data in existing SAS will add more burden in the network which will affect its performance and hence, installing separate RTUs is a better solution.

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Chapter – 4

SEM Integration with SCADA in Telangana

TG SLDC has implemented integration of SEM installed at their end with SCADA system successfully and the system has been working satisfactorily for last few years. This chapters give details of the integration done by them through SAS based S/s.

4.1 BCU and Gateway Compatibility with MODBUS Protocol

A typical architecture of SEM integration with SCADA is given in the previous chapter which is reproduced below:

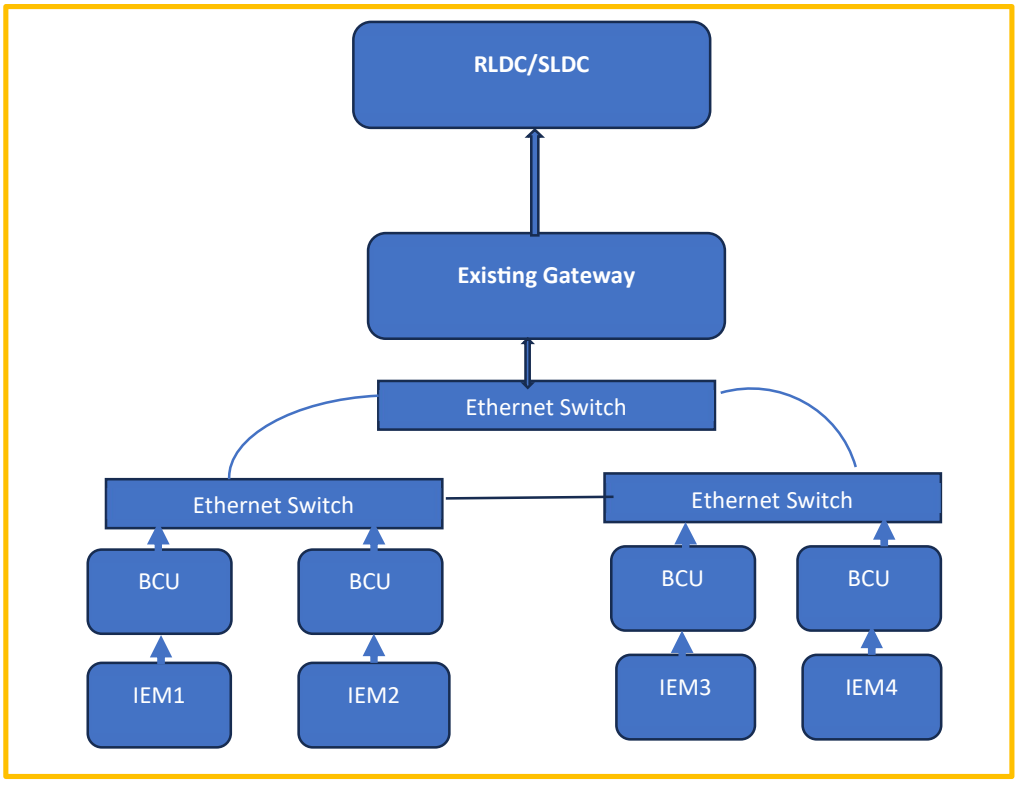

Fig. 4.1: Architecture for SEM SCADA integration in SAS Based S/s

The data from SEM is retrieved in real time through MODBUS protocol. In their integration architecture, data flows from SEM to BCU to Gateway and then, to SLDC. In cases where gateway servers are supporting MODBUS protocol, data flows from SEMs to the gateway directly.

In the integration, compatibility issues with MODBUS protocol are observed in BCU and Gateway. The details of BCU & Gateways existing in TG SLDC system and their compatibilities with MODBUS protocol are tabulated below:

Sl. No	CRP Supplier	BCU type	Provision for Modbus Master Integration
1	ABB/ Hitachi	REC 670	Not Available
2	ABB/ Hitachi	REC 650	Not Available
3	Alstom	C264	Yes Available
4	Schneider	C264	Yes Available
4	GE	C30	Not Available
5	GE	C60	Not Available
6	GE	C90	Not Available
7	Siemens	6MD63/ 66	Not Available
8	Siemens	6MD85/86	Not Available
9	NR Elec	PCS-9705	Not Available
10	NR Elec	PCS-9705S	Not Available
11	Sifang	CSI-200E	Not Available
12	ZIV	IRF	Not Available

Table 4.1: Compatibility of BCU with MODBUS Protocol

Sl. No	CRP Supplier	Gateway server type	Provision for Modbus Master Integration
1	ABB/ Hitachi	RTU560 & COM600 (with License)	Available
2	Alstom	Windows OS based	Available with License
3	Schneider	Windows OS based	Available with License
4	GE	D400 & G500	Available
5	Siemens	AK1703	Available
6	Siemens	Windows OS based	Not Available
7	NR Elec	RCS-9698	Not Available
8	Sifang	CSC1321	Not Available

Table 4.2: Compatibility of Gateway with MODBUS Protocol

The incompatibilities of BCUs & Gateways with MODBUS protocol threw challenges and to address those, different architectures were adopted in different cases.

4.2 Integration Architecture:

TG SLDC acquires data from various EHT stations (Generating station/ Substation) through TS Transco communication network by erecting Gateway/RTU. In addition to EHT stations, data of 33 kV Generating stations is also acquired by erecting Mini RTU through MPLS leased line from various network providers like BSNL, AIRTEL, IDEA.

TG SLDC acquires the data from energy meters trough non-SAS based S/s by erecting RTU. The data in SAS based S/s is acquired in following ways:

i. Integrating energy meter to BCU, if it is supporting MODBUS protocol.

ii. Integrating energy meter by installing an auxiliary BCU which support MODBUS protocol if the existing BCU is not supporting it.

iii. Integrating energy meter directly to Gateway, if it is supporting MODBUS protocol.

The architecture used in each of the above cases are detailed in the subsequent paragraphs.

4.2.1 Integration of SEM with BCU supporting MODBUS protocol

In GE & Schneider make SAS systems, energy meters are directly integrated to respective feeder BCU (MODBUS Master) in Modbus over serial protocol. The BCU sends acquired data from feeder energy meter along with other feeder related parameters to Operator workstation/Gateway Server over IEC 61850 protocol and the Gateway server sends data to SLDC over IEC 60870-5-104 protocol as per requirement of SLDC.

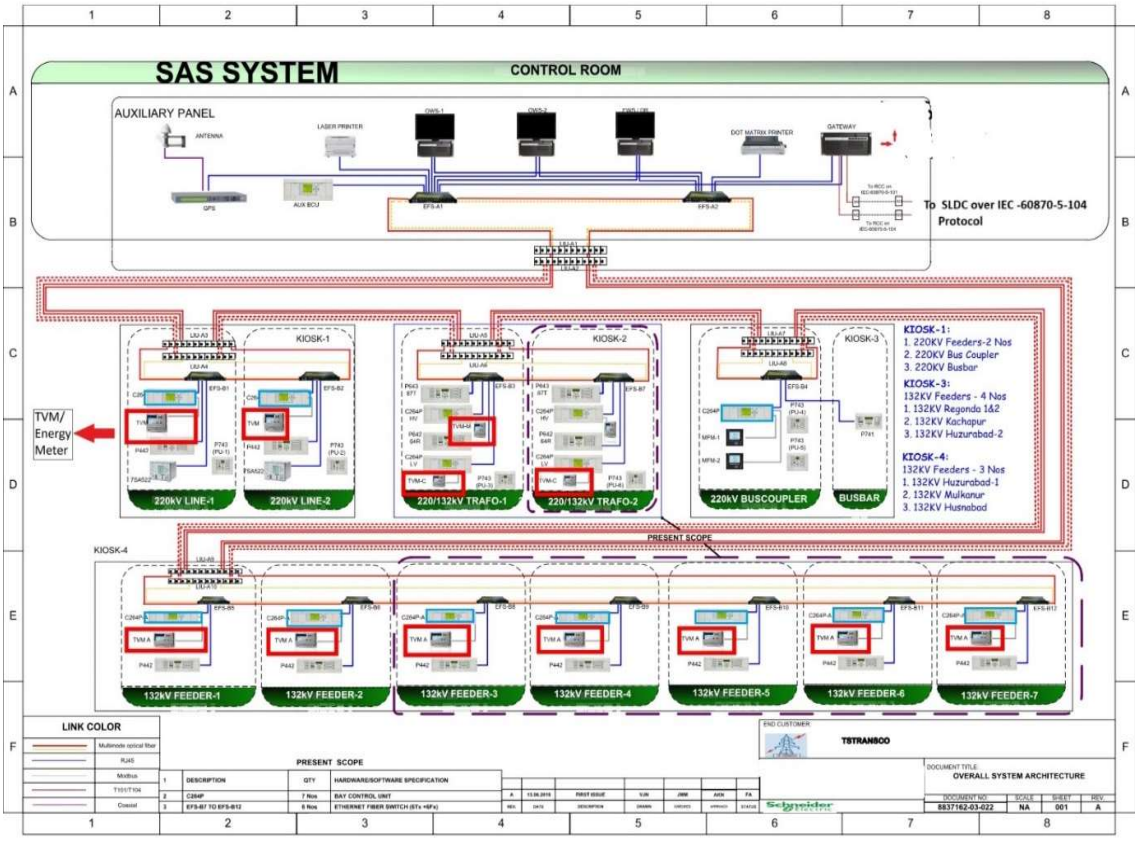

Fig. 4.2: Integration of SEM with BCU supporting MODBUS protocol

4.2.2 Integration of SEM with BCU not supporting MODBUS protocol

12 different makes of BCUs exist in TG SLDC SAS system out of which only C264 Model of GE (Alstom) and Schneider support integration with MODBUS protocol. In case of BCU not supporting MODBUS protocol, an auxiliary BCU has been installed for integration. In that case, energy meters are directly integrated to auxiliary BCU (MODBUS Master) in MODBUS over serial protocol.

In this architecture, the Auxiliary BCU sends acquired data from feeder Energy Meters along with other auxiliary parameters (UPS, AC Supply, etc.,) to Operator workstation and then, configured to send data over IEC 61850 protocol to Gateway server and in turn to SLDC Over IEC60870-5-104 Protocol as per requirement of SLDC.

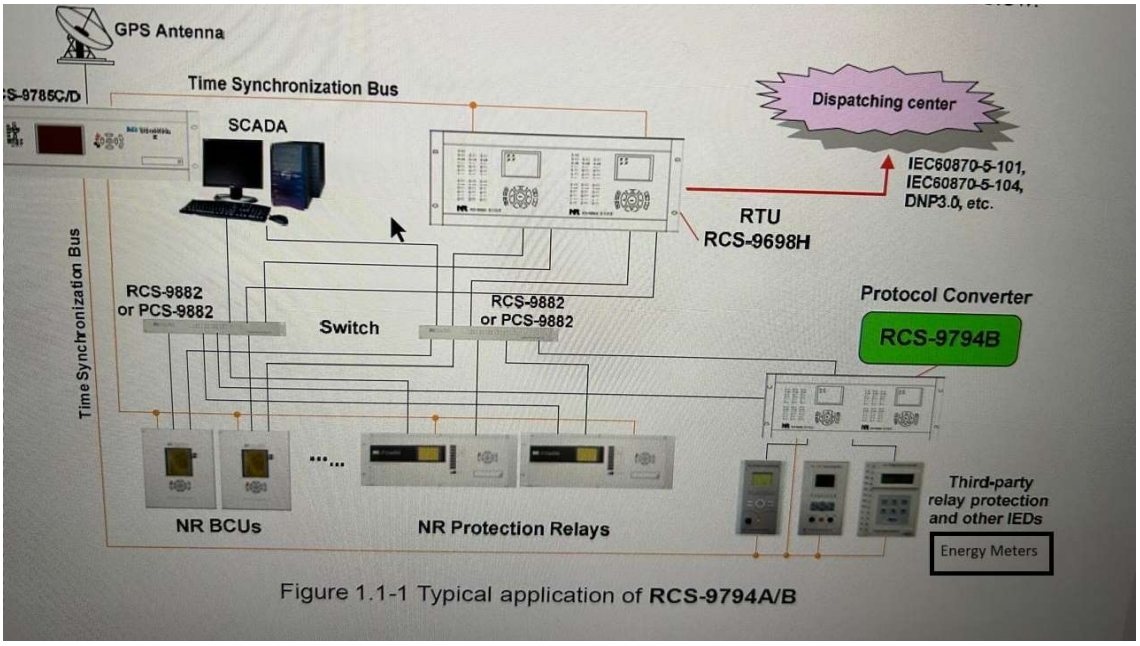

Fig. 4.3: Integration of SEM with BCU not supporting MODBUS protocol

4.2.3 Integration of SEM with Gateway supporting MODBUS protocol

In TG SLDC system, 10 different makes of gateway servers exist out of which RTU 560 & COM 600 models of ABB/Hitachi, D400 & G500 models of GE and AK 1703 model of Siemens have the provisions of MODBUS integration readily available. In Alstom and Schneider make servers also, the integration provisions are available, however, the necessary license needs to be procured.

In the gateway servers supporting MODBUS protocol, energy meters are connected to it in daisy chain topology over RS 485 interface. The acquired data from energy meters are then sent to SLDC over IEC60870-5-104 as per requirements of SLDC.

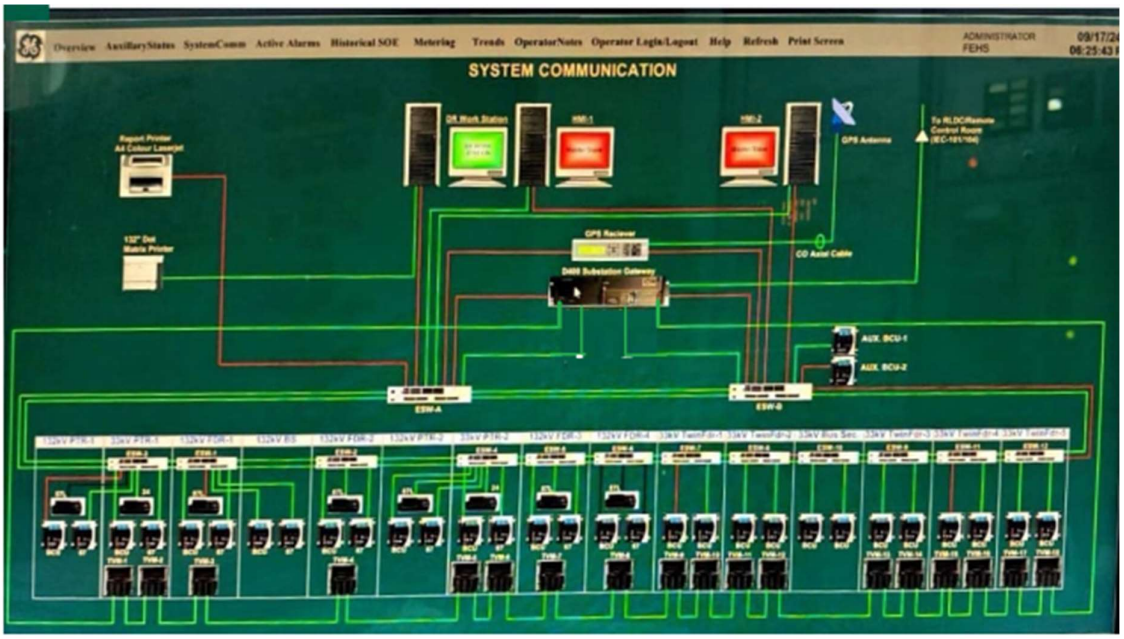

Fig. 4.4: Integration of SEM with Gateways supporting MODBUS protocol

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Chapter – 5

Real Time Data Integration in ER-AMR System

In Eastern Region, Automatic Meter Reading (AMRs) systems are operational for the last 10 years which provides SEM data to RLDC for accounting purpose. The system was designed to incorporate an automated solution in the weekly DSM in which the 15-minute block-wise data of SEM is retrieved in a predefined interval.

Therefore, in another possible solution, in addition to the solutions discussed in the previous chapter, the real time data could also be shared with respective SLDCs through RLDC. In that case, MDP (Master Data Processing) unit of ERLDC is required to be reconfigured to capture real time data which is, at present, recording only 15-minute block data for DSM calculation purposes. This chapter discusses the possible solution of real time data integration of SEM with State SCADA through the AMR system.

5.1 AMR Architecture of Eastern Region:

In the existing AMR architecture of Eastern region, RS-485 port available with SEM is used for retrieving data from it in a daisy chain network topology (i.e. the devices are connected to the next in a line or chain). The brief details of the architecture of the existing AMR system, which is implemented by TCS, is as follows:

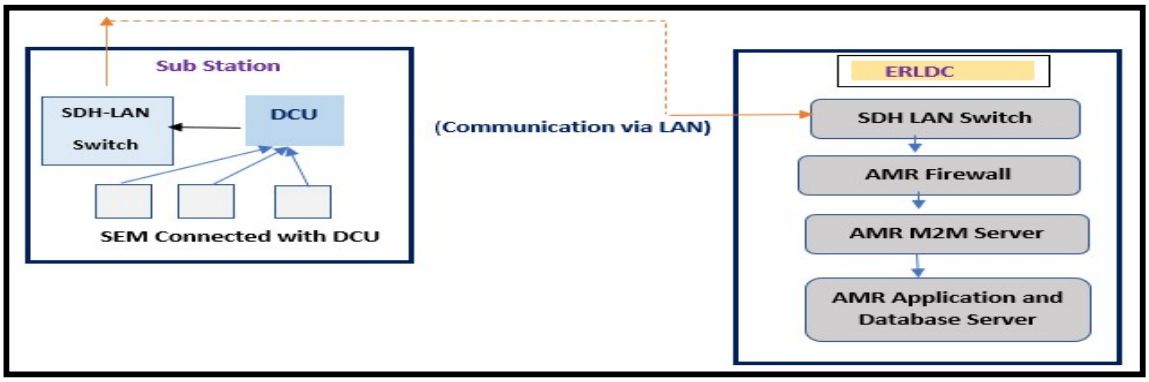

Fig. 5.1: AMR Architecture of Eastern Region

i. The DCU (Data Concentrator Unit) installed at Substations, is connected with the SEM.

ii. DCU connects with ULDC/OPGW LAN System at Substation's SDH Panel.

iii. VLAN connection between DCU & AMR Network (at ERLDC) gets established.

iv. Using the Secure Point to Point VLAN connection, DCU transmits SEM data to AMR Servers at ERLDC.

5.2 Constraints in Real Time Data Integration:

PGCIL submitted the following constraints in the existing AMR system which could not make possible real time SEM data integration through it to the state SCADA system:

i. In the existing architecture of AMR, no other reporting except for sending 15-minute time block SEM data to ERLDC is envisaged as the existing Rs-485 Port of SEM is used for data transmission to ERLDC only. The existing AMR was designed to have a Secure Private LAN based system, where the SEM data will only be available to ERLDC users. In the system, about1200+ SEM are communicating through LAN.

ii. The SEM or the AMR system device cannot be directly connected with SCADA as these two follow completely different topologies.

iii. In AMR, the retrieval of Load Survey data (15 mins block-wise) from SEM happens in a predefined interval and that depends on some operational factors (Like type of SEM, type of Substation, number of SEM in a station etc.). Therefore, real time data could not be displayed.

5.3 Possible Solution:

As incorporation of external users apart from ERLDC was not considered in the existing architecture of AMR, PGCIL submitted that a new solution is required for providing the SEM data to other SLDCs in which a separate AMR Infrastructure, database and application are to be designed. As per their proposal:

- The SEMs needs to re-configured to send 1 MW instantaneous data to MDP server located in ERLDC.
- The MPD server, in turn, may transfer data to an augmented data server so that the data used for the accounting system should not be exposed to any cyber threat as it will physically isolate ERLDC existing system & the new system.
- A customized software application on the backup server data may be developed through which real time SEM data be accessed by the states through LAN

Box 5.1: Sharing Real Time Data through Web based Application:

PGCIL has submitted that developing a customized web-based application for accessing the real time data online by states through internet would be prone to cyber security risk. They have highlighted the following points:

i. AMR system operates completely in OT environment, physically isolated from IT network of ERLDC.
ii. Internet based data communication had been permanently disabled in AMR, as per Cyber Security Guideline from CEA/CERC.
iii. When GPRS/Internet based communication was active in ERLDC, network Audit was carried out and CSK team instructed to disable public IP based communication on immediate effect.
iv. Present AMR in ER is fully operating on Intranet on compliance of CSK advise. So, the 01 min instant data cannot be shared via web browser using public IP.

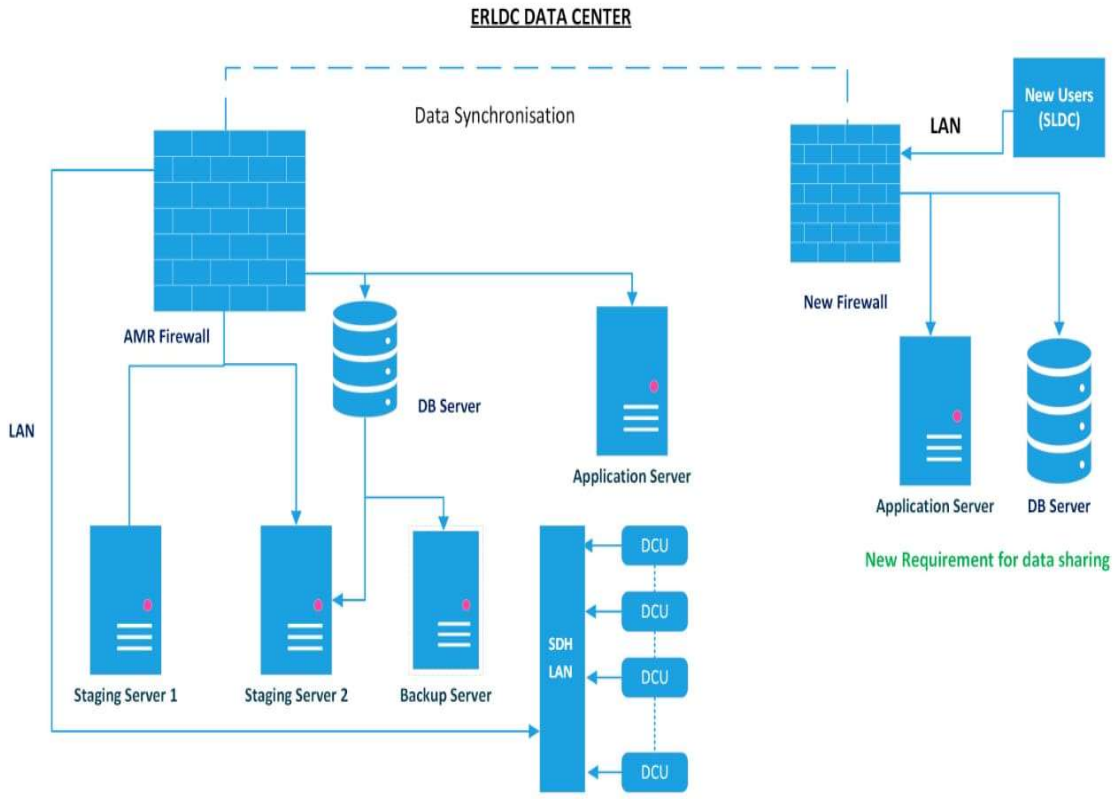

Fig. 5.2: Proposed Architecture of SEM-SCADA Integration in Eastern Region

The proposal requires the following augmentation in the existing infrastructure:

i. New DCUs with high processing power & storage memory. DCU will have proper scheduler configuration to ensure collection of three types of data: instant (in 01 min interval), Load Survey (05/15 min) & Midnight.

ii. Proper fail-safe configuration in DCU to handle unprecedent scenarios like LAN outage.

iii. Augmented data centre to physically isolate ERLDC existing system & new system for external users (SLDC/Utilities). Additional Server/Storage needed for instant data handling.

iv. Application will be hosted over intranet, for SLDC/Utilities through LAN.

v. Special system design has to be made to get instant data from Kiosk type Sub Stations. Fiber Optical based Ethernet loop has to be created with local network Switch to get data from all Meters which are located in a far distance. (800-1200 mtr. approx.). [Typical ISTS station design, generally not available in STU stations].

vi. Replacement of existing SEMs with TCP/IP protocol enabled meter as due to daisy chain mechanism of existing SEM, the data can be viewed after a standard delay time (based upon number of meters connected) and not in real time.

Box 5.1: Real time data compatibility of existing SEM in ER

Meter OEM	Meter Type	Meter Count	Remarks
L&T- 300-P	Non DLMS	448	Preoperatory protocol Meter, No provision for instantaneous data.
Genus- 03D-193	DLMS	1100	Instantaneous MW data is available in Meter. However, total 03 type of Series available in ER, having different registry entity not matching with each other as not included in tender TS at that period. Therefore, Registry mismatch/ Re-arrangement need to be done
Secure- Apex 150 (upcoming)	DLMS	300	Instantaneous MW data is available in Meter in similar registry as included in Tender TS an integration possible.

The easiest way of sharing real time MW data in Current AMR- ER is by installing Energy Meters with Ethernet communication port (Included in new TS of CTU). This will enable TCP/IP protocol and hence the data can be collected simultaneously from multiple Meters in a single instant through higher bandwidth. Meter Loop can be created (at sub-station) using Network Switch. Limitations of various SEMs will be avoided in such cases.

Box 5.2: LAN Upgradation of AMR System in Eastern Region

There are the possibilities of facing data broadcast issue resulting in choking of the entire network hence loss of data in implementing the above proposed architecture as all meters will start sending data in every one minute, along with 15 Min scheduler. Therefore, the above solution requires upgradation of WAN/LAN Network with adequate bandwidth.

The current network of Eastern Region is completely on Layer-2 with no logical segregation and same subnet of IP. Its upgradation to Layer3/Layer4 with logical isolation and different subnet of IP is approved in 52nd ERPC recently held on 06.09.2024. The expected implementation time is six months.

5.3.1 Financial Implications:

The cost of sharing real time MW data in Current AMR system of ER is estimated as Rs. 7.54 crores (excluding taxes) by PGCIL. The details are as follows:

Sl. No.	Particulars	Estimated Cost (in Rs)
1.	Hardware/Software Supply:	2,12,45,251
2.	Installation Services, Application development	3,31,39,472
3.	TCP/IP Enabled Meter Procurement*	2,10,00,000
	Total Cost	**7,53,84,723**

Table 5.1: Estimated cost of sharing real time MW data in Current AMR system of ER

*As TCP/IP enabling is included in new Technical Specification, the meter procured will be used in new AMR system also.

The further break up of cost estimation is given below:

A. Cost Component for Hardware/Software Supply:

Sl. No	Item	Estimated Cost (in Rs.)	Remarks
1.	Data Concentrator Unit (DCU)	1,45,32,953	New DCU will be needed with high processing power, memory.
2.	Augmented Data Centre Setup	52,66,799	Network devices, Servers & Software licenses are considered.
3.	16 port switches at all Substation	15,60,000	Required to establish connection between DCU & TCP IP Meters at Sub Stations.
4.	Other Ancillary hardware	14,45,500	Spare items required at Sub Stations, to establish Switch based connection between Meter, DCU.
5.	Total Cost (excluding Taxes)	2,12,45,251	

Table 5.2: Estimated Cost for Hardware/Software Supply

B. Cost Component for Installation Services, Application development:

Sl. No.	Item	Estimated Cost (in Rs.)	Remarks
1.	Development of new AMR Application, testing, Go-Live.	29787472	• New Application development for external users. • 7 users (for 05 states, & PGCIL, ERLDC-admin access) are considered. • Access control based on roles & hierarchy. Logical isolation between users. • Design of Database schema. • Development of Data dumping scripts, for 01 min instant data processing & display. • Unit testing, Security Testing, User Acceptance testing, Bug fixing. • Go-Live & training for end users. • Periodic SSA Audit. • Design of Network, isolation between different utilities.
2	Other Services at sub stations	3352000	To establish Switch based connection between new IP based Meter and DCU.
	Total Cost (excluding Taxes)	3,31,39,472	

Table 5.3: Estimated Cost for Installation Services, Application development.

C. Cost component for Procurement of TCP/IP Enabled Meters:

Sl. No.	Item	Estimated Cost (in Rs.)	Remarks
1.	Procurement of TCP/IP Enabled Meters	2,10,00,000	Approx unit price of TCP/IP enabled Meter is: 70k. Considering ~300 number of Meter procurement for ER on immediate basis (05 states), the estimated cost will be 2.10 Cr (without Taxes).

Table 5.4: Estimated Cost for Procurement of TCP/IP Enabled Meters

5.3.2 Implementation Schedule:

The total time required for implementing the proposed scheme is estimated as 6-9 months.

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Chapter – 6

Integration for Operation or Commercial Purpose?

In the Sub-Committee meetings, various stakeholders raised concerns about the reliability of the SEMs data displayed in the State SCADA system after the implementation of the proposed integration. Their concerns are tabulated below:

Sl. No.	Stakeholders	Observations
1.	WRLDC	The meters are very old, and it would be very difficult to identify any errors if it occurs in the metering data and hence RLDC should not be held responsible for this. Further, WRLDC was also of the opinion that if the main meter has error in the data and if such error has to be checked then how the veracity of data from the check and standby meter will be verified. Also, during the full-fledged project, there might be no standby or check meters on the line and the meters on the other end of the line may not be of the state system, then how will the modalities of the project be finalised. If there is any issue in data accounting, it shall be the responsibility of state.
2.	SRPC	In many instances Main SEM is under recording/over recording or having errors, Check or Standby meter data may be used by RLDCs on post facto basis for energy accounting and the same would be given to RPCs for accounting. In that case, data used for accounting and real-time operation would be different. Even if Check & Standby meters are integrated for this purpose, system operator follows the Main Meter data only in the absence of

		correctness of data. Further, there is MODBUS, RS232/485 Extension units etc. and there are chances of data hanging due to this intermediate electronic equipment. The same may be the case in proposed AMR scheme (1 min instantaneous data for SLDC). Therefore, no entity should raise any Techno Commercial issues with respect to the account prepared based on SEM data and what was visible during real time operation at SLDC.
3.	ERPC	The data fetched from RS-232 port may be used only for making operational decisions and may not to utilised for raising commercial disputes.

The sub-committee deliberated on the issue and opined that the data fetched from SEM to SCADA may be used only for making operational decisions and may not to utilised for raising commercial disputes.

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Chapter 7

Observations/Recommendations

The observations/recommendations of the Sub-Committee are given below:

vi. The difference between the SCADA and SEM data is causing appreciable financial implications for the beneficiaries in form of DSM charges. Therefore, integration of SEMs with SCADA must be done to ensure better management of drawl from the regional grid by a beneficiary. However, states may take a call on this as per their own assessment.

vii. The only way to minimize the mismatch is to fetch the data from the same source (i.e. from SEM).

viii. The pilot project carried out by MPPTCL is comparatively better than GETCO as it involves lesser cost and lesser fiddling with existing SEM configuration and therefore, it should be followed in other parts of the country.

ix. The proposed implementation is not in violation of any regulatory provisions.

x. The expenditure of the projects (estimated as about 2 crores for a state) should be borne by the beneficiaries as its associated benefit is comparatively more.

xi. The data fetched from SEM to SCADA may be used only for making operational decisions and may not to utilized for raising commercial disputes.

xii. It is technically feasible to provide real time data (MW/instantaneous) data to SLDC from the RTU/SAS-based substations. However, the meters not supporting MODBUS feature need to be replaced.

xiii. In SAS-based system, installing a new mini RTU is the most appropriate solution.

xiv. In the existing AMR system, the best way to share real time SEM data is by augmenting the system and running a software application on a backup data server for sharing data through Intranet.

xv. The new AMR system, once it comes, will have the provisions of displaying data to RLDCs as well as SLDCs.

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Gist of discussion on review of Islanding Schemes in Upper Assam Power System dated 17-02-25

Date: 17-02-2025 (Monday)

Time: 15:30 hrs

Mode: Video conference (VC)

Participants: Representatives from NERPC, NERLDC, AEGCL, APGCL, SLDC Assam, NEEPCO, and PGCIL

The meeting focused on reviewing and discussing the existing Islanding Scheme for the Upper Assam Power System. This was conducted in light of recent modifications in the region's power network.

NERLDC presented the existing Islanding scheme for the Upper Assam Power System with few modifications on placement of UFR (under frequency relay) due to the changes in Upper Assam power network. The details of UFR location in Upper Assam power network and updated status provided by utilities is as below:

Table-1: Proposed UFR location for Islanding schemes along with the status:

Sl. No	Existing Location	UFR requirements	Status to be updated by Utilities		NERLDC Comments
			Weather UFR setting are implemented (if yes, provide the setting)	Weather Numerical relays are available or not	
1	220 kV AGBPP - Mariani (PG) line at Mariani (PG)	Required		Yes	Reply from PGCIL
2	220 kV Mariani (AEGCL) - Misa line at Mariani (AEGCL)	**Not Required**			**Not Required**
3	220 kV Mariani (AEGCL) - Samaguri line at Samaguri (AEGCL)	Required	Yes, 48.7 Hz	Yes	Reply from AEGCL

4	132 kV Mariani (AEGCL) - Mokokchung line at Mariani (AEGCL)	Required	Yes, 48.7 Hz	Yes	Reply from AEGCL
5	132 kV Dimapur (PG) - Bokajan line at Dimapur (PG)	Required	Yes, F<48.70 Time delay 500ms.	Yes	Reply from PGCIL
6	220 kV Mariani (AEGCL) – Mariani (PG) line at Mariani (PG)	Additional UFR Required	NO	Yes	Reply from PGCIL
7	132 kV Rupai-Chapakhuwa line at Rupai	Additional UFR Required	No	Yes	Reply from AEGCL
8	Anguri Solar Plant	Additional UFR Required	No	Yes	Reply from AEGCL
9	220 kV Mariani (AEGCL) - Samaguri line-I at Samaguri (AEGCL)	Required	Line is under long outage condition, so at present UFR not required		

The Islanding schematic of Upper Assam power network is given below.

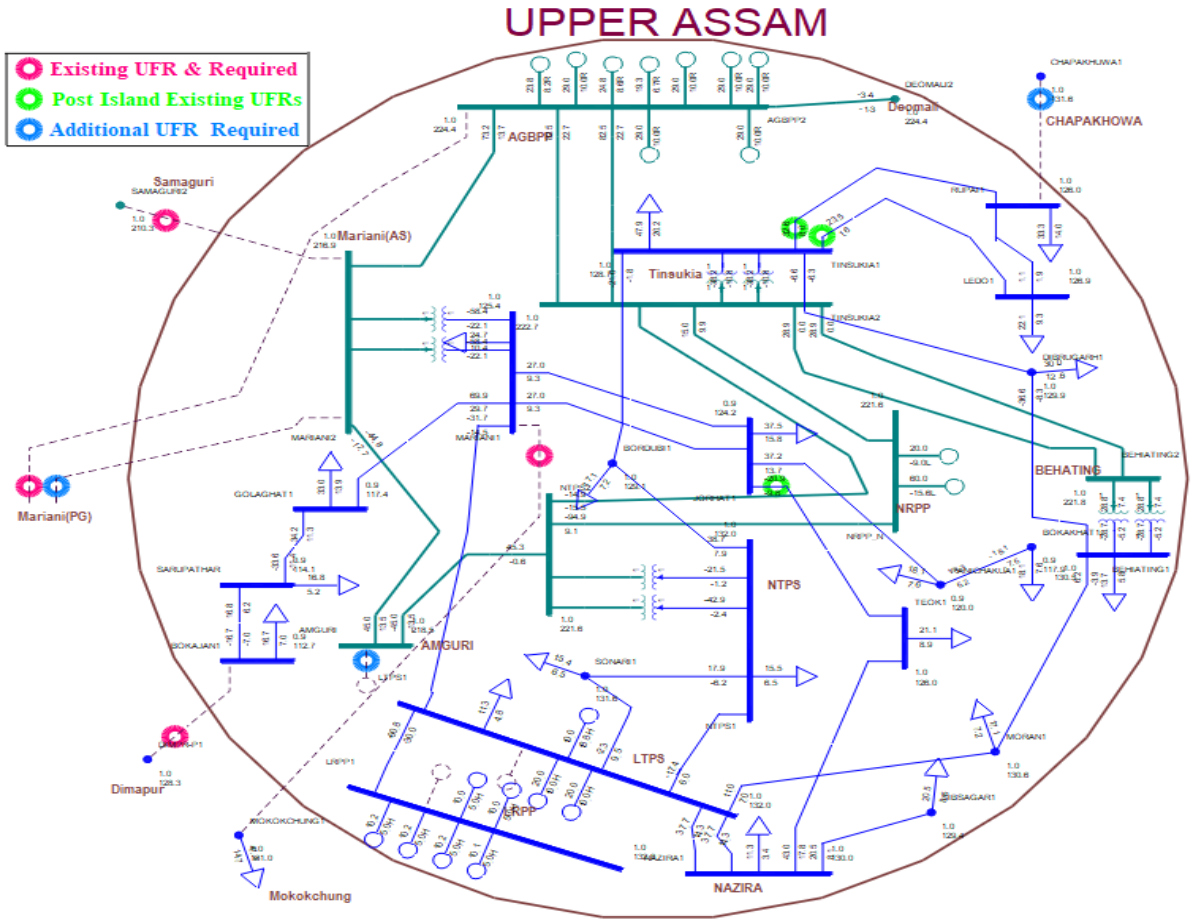

Figure-1: Schematic layout of Upper Assam system

Revised UFR Settings:

The forum decided that the island would form at 48.2 Hz with a time delay of 300 ms. The identified elements would be disconnected at this frequency to ensure island formation and system stability

Table-2: Updated UFR setting for Islanding schemes

Sl. No	Location of UFR	Comments on UFR	Revised UFR setting with Time delay	
			Frequency	Time delay in Millisecond (ms)
1	220 kV AGBPP - Mariani (PG) line at Mariani (PG)	Required	48.2	300
3	220 kV Mariani (AEGCL) - Samaguri line at Samaguri (AEGCL)	Required	48.2	300
4	132 kV Mariani (AEGCL) - Mokokchung line at Mariani (AEGCL)	Required	48.2	300
5	132 kV Dimapur (PG) - Bokajan line at Dimapur (PG)	Required	48.2	300
6	220 kV Mariani (AEGCL) – Mariani (PG) line at Mariani (PG)	Additional UFR Required	48.2	300
7	132 kV Rupai-Chapakhuwa line at Rupai	Additional UFR Required	48.2	300
8	Anguri Solar Plant	Additional UFR Required	48.2	300
9	220 kV Mariani (AEGCL) - Samaguri line-I at Samaguri (AEGCL)	Required	Line is under long outage condition, so at	

All concerned Utilities were instructed to implement the revised settings promptly and provide update to NERPC and NERLDC.

Load and generation nodes considered in islanding schemes are:

Table-3: Load and generation data provided by SLDC Assam

Sl. No.	Node/Bus	Average Load		MVAR		Generation	
		Off-Peak	peak	Off-Peak	peak	Off-peak	Peak
1	MARIANI	14	35				
2	GOLAGHAT	27	45				
3	BOKAJAN	14	32				
4	JORHAT	29	49				
5	BOKAKHAT	14	22				
6	LAKWA TNT	5	5				
7	NTPS TNT	NO LOAD AT 33KV LEVEL					
8	SONARI	10	21				
9	TINSUKIA	37	65				
10	LEDO	17	32				
11	DIBRUGARH	21	46				
12	BEHIATING	12	29				
13	MORAN	16	28				
14	NAZIRA	20	30				
15	SIBSAGAR	13	28				
16	PANICHAKUA	15	22				
17	RUPAI	20	36				
18	BORDUBI	15	28				
19	SILAPTHAR						
20	CHAPAKHUWA	3	7				
21	SARUPATHAR	12	20				
22	BPCL_BEHA	0.5	1				
23	TEOK	15	28				
24	NTPS	GENERATION OF GAS STATION DOES NOT VARY WITH TIME PERIOD. THEY ARE RUN AS PER RQUIREMENT				15	15
25	LTPS					30	30
26	LRPP					60	60
27	NRPP					70	70
28	AMGURI Solar					0	0

Automatic Demand Management System (ADMS) location in Upper Assam system

SLDC Assam confirmed the availability of ADMS within the Islanding Scheme, which is designed to manage an average load of around 15 MW at following locations.

Table-4: ADMS location in Upper Assam system

	UPPER ASSAM ZONE	
S.N.	33/11 KV FEEDER UNDER ADMS	FEEDING GSS

1	CHINNAMORA	MARIANI
2	RADHABARI	BOKAKHAT
3	RAJGARH	MORAN

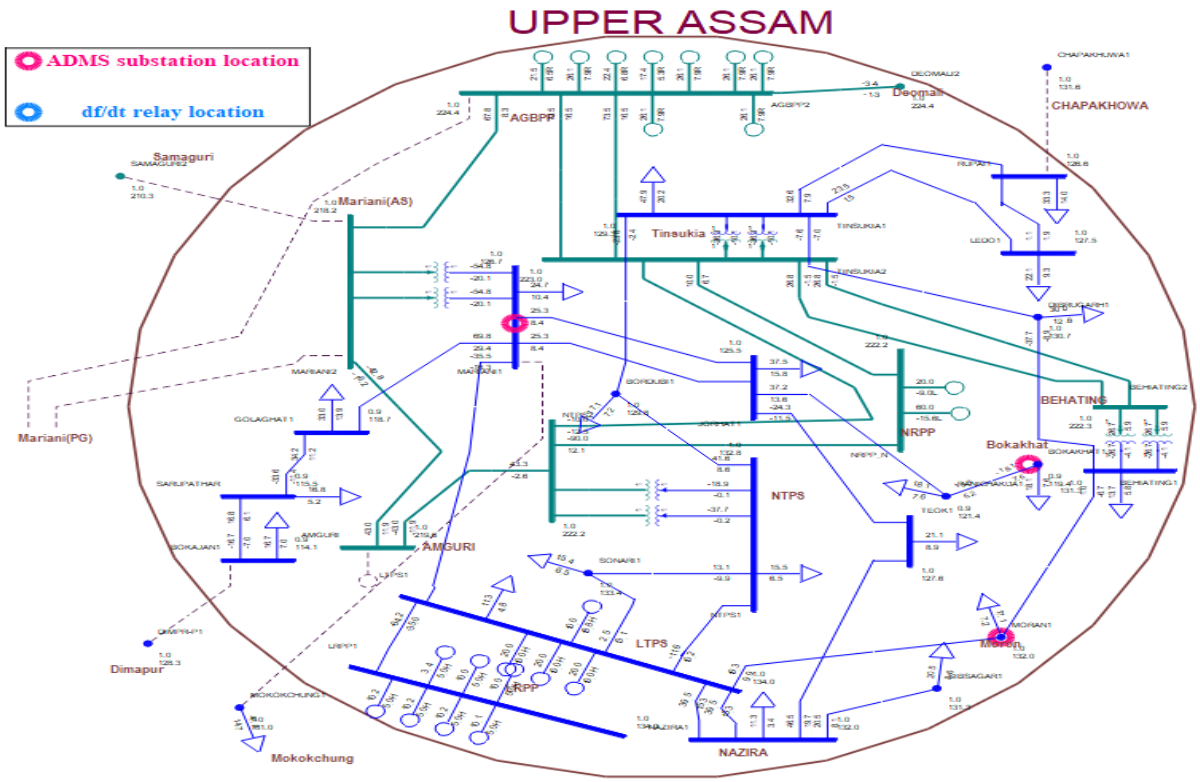

Figure-2: Location of ADMS in Upper Assam system

Automatic Under Frequency Load Shedding (AUFLS)scheme location in Upper Assam system

SLDC Assam confirmed that defence mechanisms constitute Automatic Under Frequency Load Shedding at frequency 49.2 Hz and 49 Hz is available in the Islanding scheme having average load of around 45 MW. The details are given below:

Table-5: AUFLS Location in Islanding schemes

Sl.No.	UFR location in Upper Assam Zone	Operating frequency
1	132 kV Jorhat- Panichokuwa	49 Hz
2	132 kV Panichokuwa-Bokakha	49.2 Hz

The load and generation curve suggested that, due to the high availability of generation within the island, the AUFLS scheme should be shifted to a location outside the islanding scheme, to which SLDC Assam agreed.

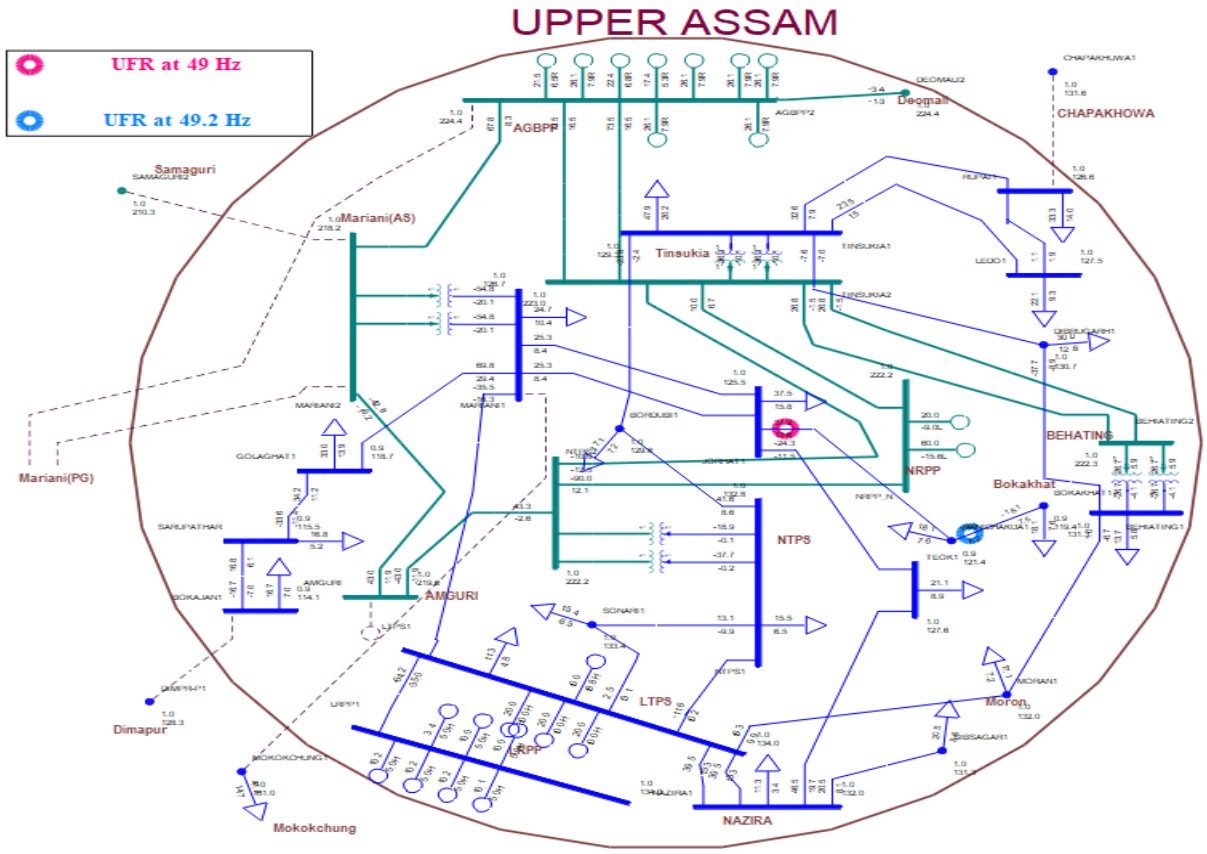

Figure-3: AUFLS scheme location in Upper Assam system

Load and Generation details

A detailed analysis was conducted based on the SCADA data over the past three years, focusing on load and generation duration curves. This analysis helped in identifying the worst-case scenarios and planning for adequate load-generation balance during islanding formation.

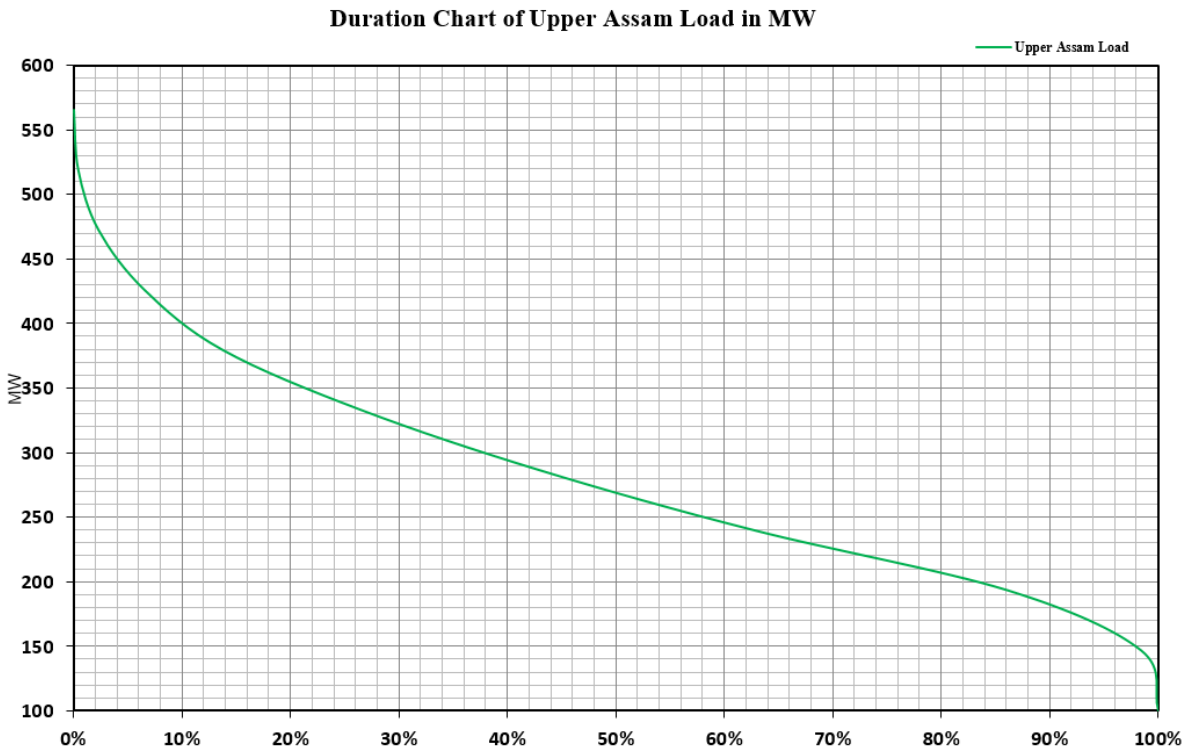

Figure-4: Load Duration Chart

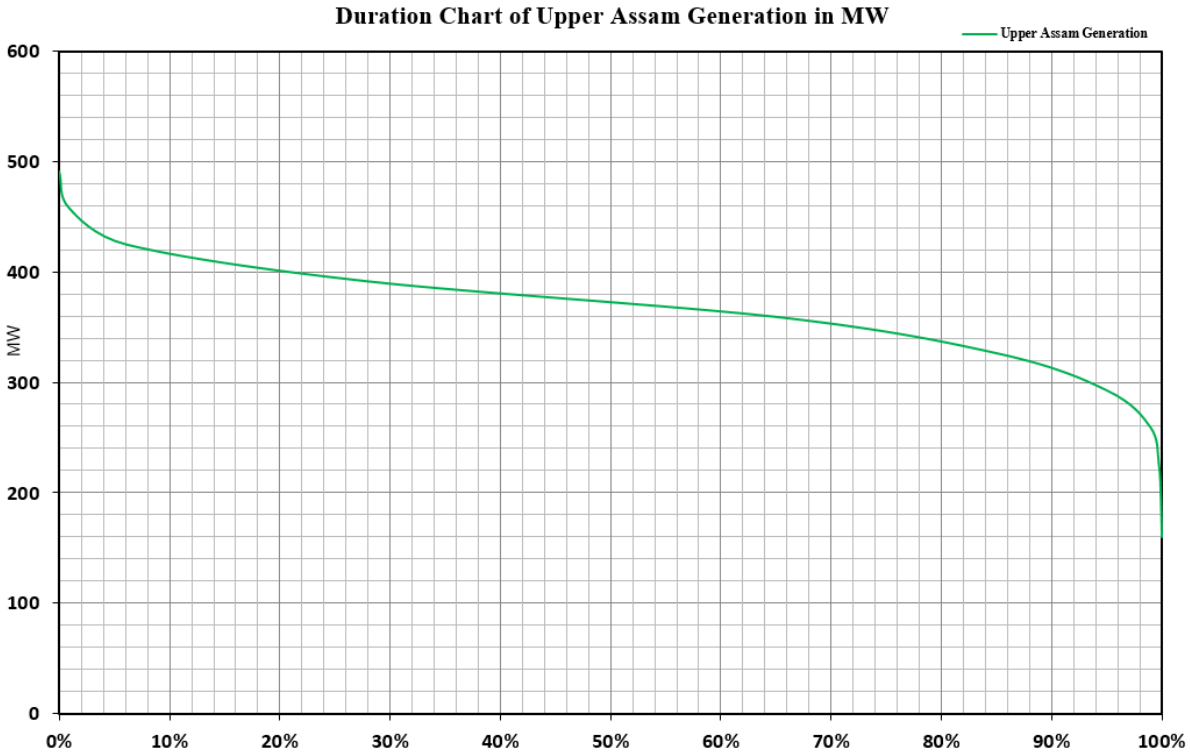

Figure-5: Load Duration Chart

Based on the above duration curve, maximum and minimum load and generation has been derived. The load and generation considered for study purpose are as tabulated below:

Islanding Scenarios				
Scenarios for studies		**Load in MW**	**Gen in MW**	**Shortfall(-) & Surplus(+)in MW**
Minimum load	Minimum Generation	200	300	100
Maximum load	Minimum Generation	425	300	-125
Maximum load	Maximum Generation	425	428	-3
Minimum load	Maximum Generation	200	428	228

Note: Maximum value of load and generation considered as 95% of the time these values are below the adopted value.

These scenarios helped in understanding the potential shortfall or surplus during island formation, and appropriate measures shall be recommended to manage the conditions based on worst case scenarios.

Operating frequency range of machines in Islanding scheme:

The forum discussed the operating frequency range for generators within the islanding scheme. The details provided by the utilities (based on the previous meeting held on 14-08-2024) and comments provided by the forum is tabulated below:

Sl. No	**Generating Units**	**Status to be updated by Utilities**					**Forum Remarks**
		Existing Frequency Setting (Over frequency) in Hz			**Existing Frequency Setting (Under frequency) in Hz**		
		Stage	**OFR Setting**	**Time delay**	**UFR Setting**	**Time delay**	
1	NRPP GTG	I	51	1 sec	48.5	2 Sec	The OFR stage-II setting may be changed to 52.5 Hz with inclusion of 1.5 second time delay
		II	52.5	2 Sec	47.5	1.5 Sec	
2	NRPP STG	I	51	1 sec	48.5	2 Sec	OK
		II	52.5	1 Sec	47.5	1.5 Sec	The OFR stage-II setting may be changed to 52.5 Hz

Sl. No	Generating Units	Status to be updated by Utilities					Forum Remarks
		Existing Frequency Setting (Over frequency) in Hz			Existing Frequency Setting (Under frequency) in Hz		
		Stage	OFR Setting	Time delay	UFR Setting	Time delay	
							with inclusion of 1 second time delay
3	NTPS Unit-2	I	51.5	2 sec	49	2sec	Ok
		II	52	1 sec	47.5	1 sec	
4	NTPS Unit-3	I	51.5	2 sec	49	2sec	Ok
		II	52	1 sec	47.5	1 sec	
5	NTPS Unit-6	I	51.5	2 sec	49	2sec	Ok
		II	52	1 sec	47.5	1 sec	
6	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-1	II	55	4 sec	47.5	4 sec	OK
7	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-2	II	55	4 sec	47.5	4 sec	OK
8	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-3	II	55	4 sec	47.5	4 sec	OK
9	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-4	II	55	4 sec	47.5	4 sec	OK
10	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-5	II	55	4 sec	47.5	4 sec	OK
11	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-6	II	55	4 sec	47.5	4 sec	OK
12	LRPP	I	51	30 sec	49	30 sec	OK
	UNIT-7	II	55	4 sec	47.5	4 sec	OK
13	LTPS	I	Overspeed trip setting is at 110% of Turbine speed which comes out to be 3300 rpm of Generator thereby the over frequency trip setting is calculated at 55 Hz.		49	1 sec	OK
	UNIT-5	II			47.5	1sec	
14	LTPS	I			49	1 sec	OK
	UNIT-6	II			47.5	1sec	
15	LTPS	I			49	1 sec	OK
	UNIT-7	II			47.5	1sec	
16	LTPS	I	51.5	2 sec	48.5	1 sec	OK
	UNIT-8	II			47.5	2 sec	OK
Data submitted by NEEPCO							
Sl. No	**Existing**	**Status to be updated by Utilities**					**Forum Remarks**
		Existing Frequency Setting (Over frequency) in Hz			**Existing Frequency Setting (Under frequency) in Hz**		
		Stage	**OFR Setting**	**Time delay**	**UFR Setting**	**Time delay**	
1		I			48.00	1.6 Sec	OK

Sl. No	Generating Units	Status to be updated by Utilities					Forum Remarks
		Existing Frequency Setting (Over frequency) in Hz			Existing Frequency Setting (Under frequency) in Hz		
		Stage	OFR Setting	Time delay	UFR Setting	Time delay	
	AGBPS Unit-1	II	Turbine Over speed Trip at 110% of rated speed		47.50	0.4 Sec	OK
2	AGBPS Unit-2	I			48.00	3.2 Sec	OK
		II			47.50	0.4 Sec	OK
3	AGBPS Unit-3	I			48.00	3.2 Sec	OK
		II			47.50	0.4 Sec	OK
4	AGBPS Unit-4	I			48.00	3.2 Sec	OK
		II			47.50	0.4 Sec	OK
5	AGBPS Unit-5	I			48.50	2 Sec	The UFR stage-II setting may be changed to 47.5 Hz with inclusion of time delay.
		II			47.50	2 Sec	
6	AGBPS Unit-6	I			48.50	2 Sec	The UFR stage-II setting may be changed to 47.5 Hz with inclusion of time delay.
		II			47.50	2 Sec	
7	AGBPS Unit-7	I			48.50	600 ms	OK
		II			47.50	600 ms	OK
8	AGBPS Unit-8	I			48.50	600 ms	OK
		II			47.50	600 ms	OK
9	AGBPS Unit-9	I			48.50	600 ms	OK
		II			47.50	600 ms	OK

Note: *First stage setting with time delay is only alarm purpose (Details submitted by utilities.*

Validation of Islanding scheme through Dynamic study

A dynamic study was performed based on data received from utilities. The following assumptions were noted:

- Most generators submitted partial dynamic models.
- Missing data was taken from All India PSS/E case with similar ratings.

Study results:

Note: As discussed in the previous meeting, the island was expected to form at a frequency of 48.00 Hz, and accordingly, the study was conducted at this frequency. However, in this meeting, it was

decided that the island will ibe formed at 48.20 Hz. Despite this adjustment, the behaviour of the island is expected to remain the same.

Case-1: Max gen(428 MW)- Min load (200 MW)

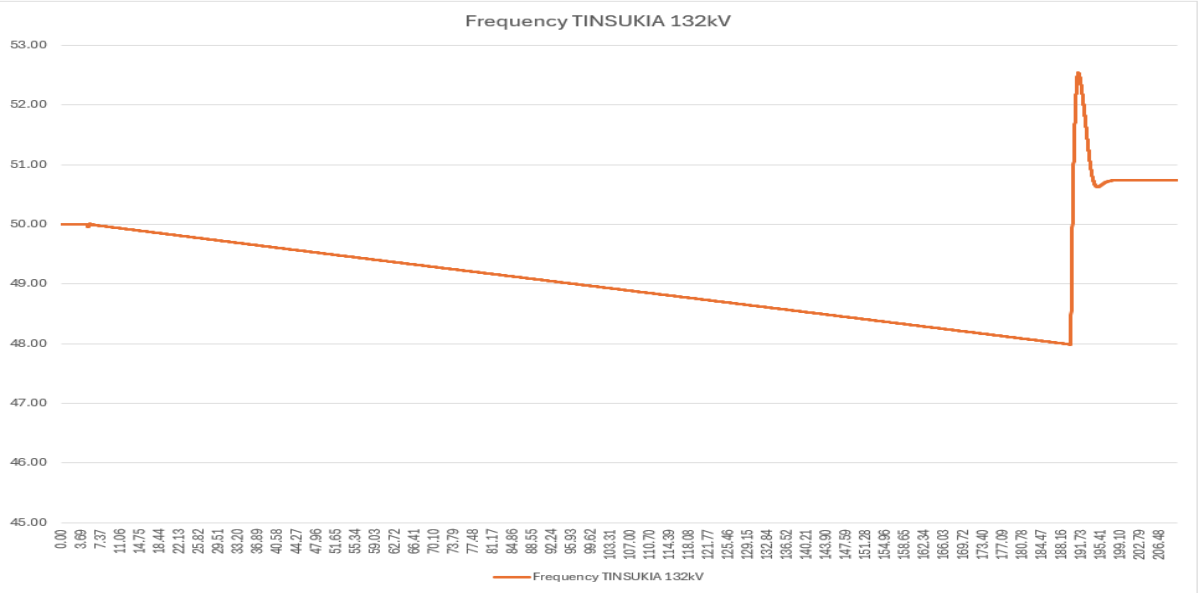

Figure-6: Island frequency

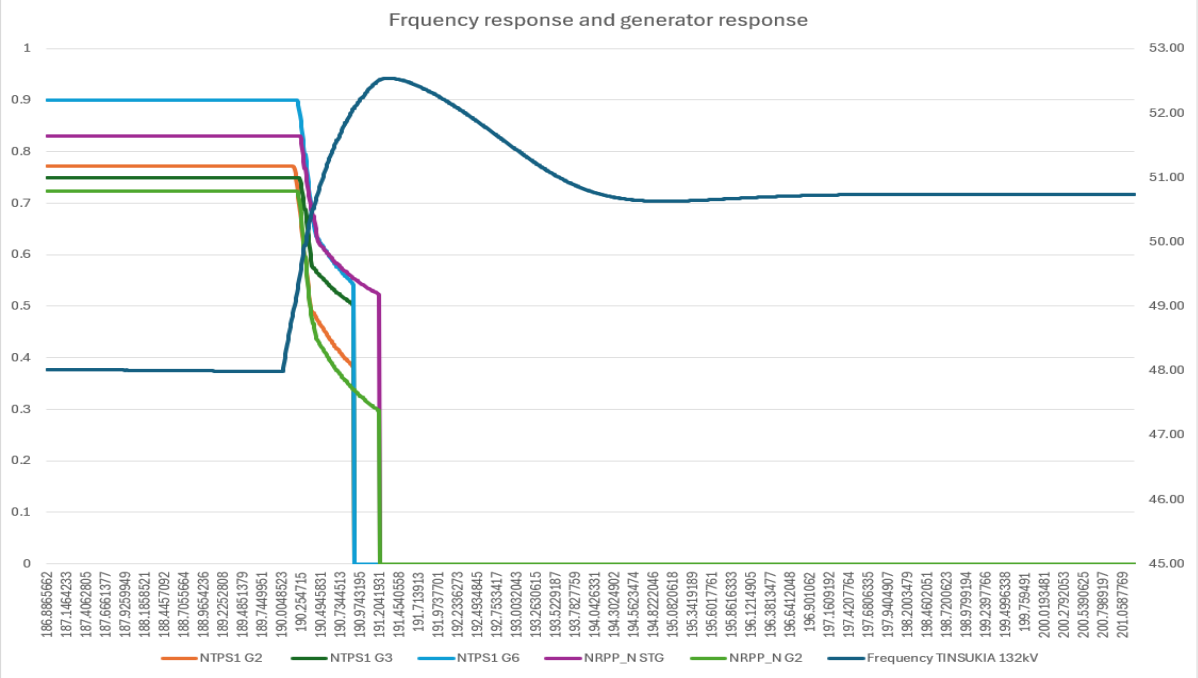

Figure-7: Tripping of units w.r.t Island frequency

The results suggest that after island formation, the island experiences a rise in frequency. However, due to the tripping of the NTPS and NRPP machines at 52 Hz and 52.5 Hz, respectively, the frequency stabilizes at 50.7 Hz. Thus, the island remains stable in this scenario.

Case-2: Min gen(300 MW)- Max load (425 MW)

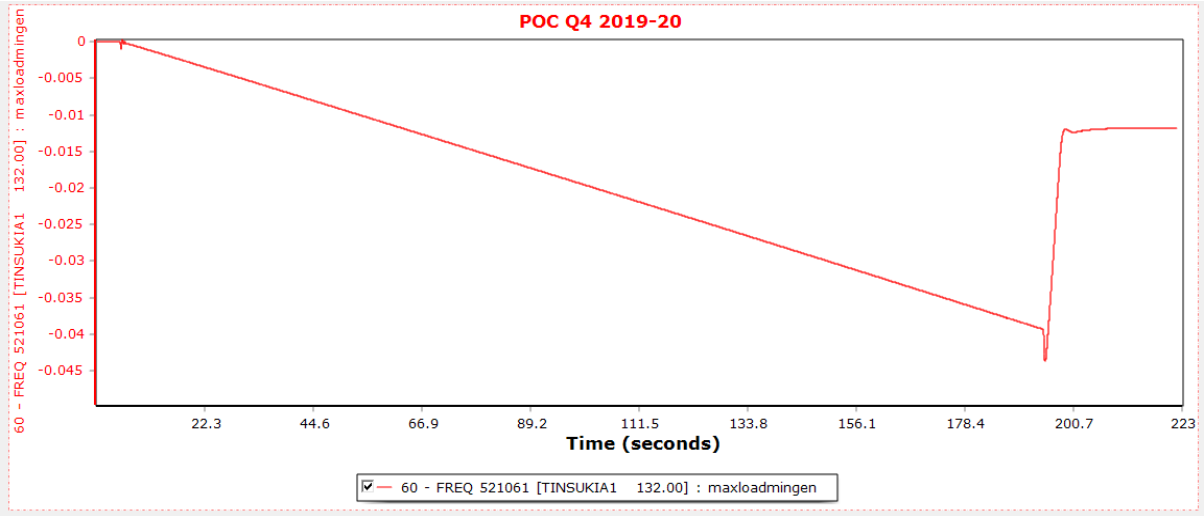

Figure-8: Island frequency

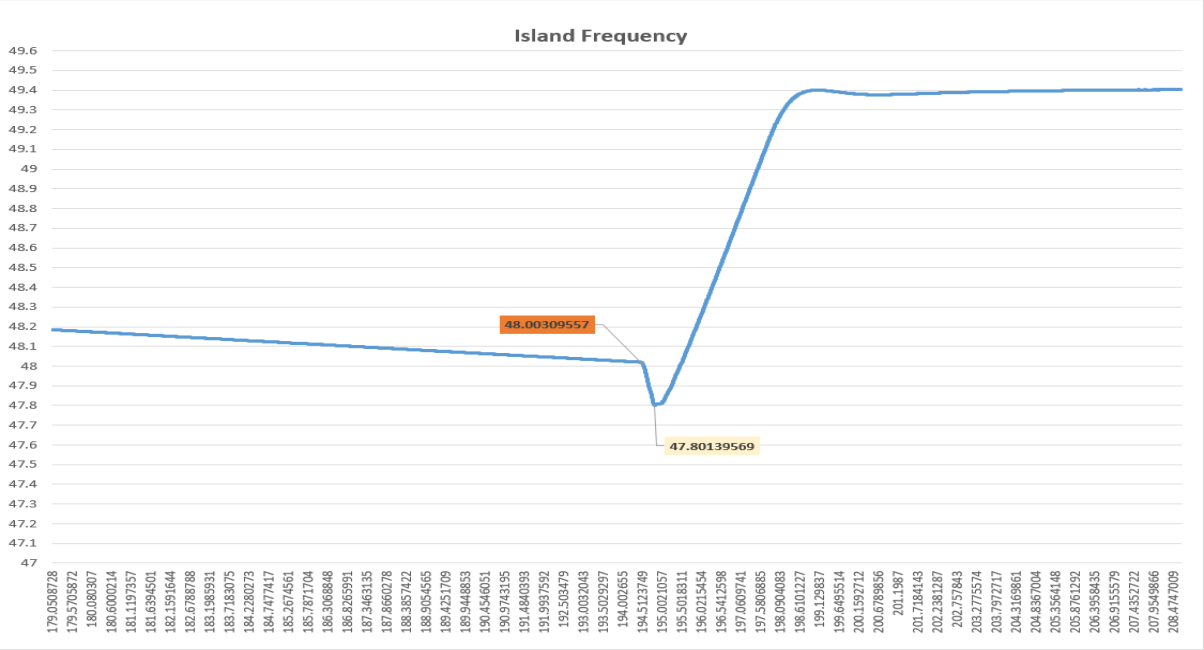

Figure-9: Load disconnection w.r.t Island frequency

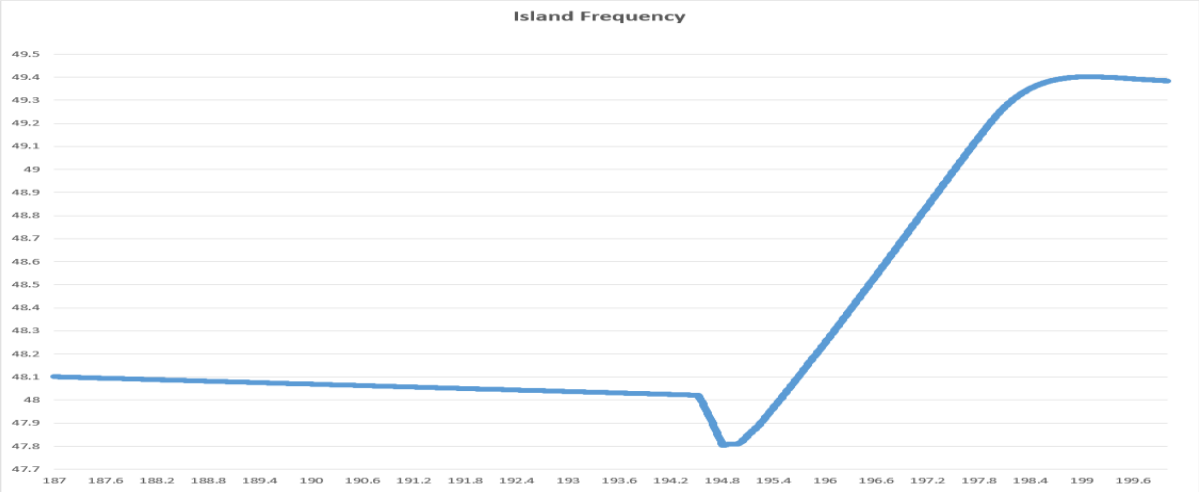

Figure-10: Island frequency

The study results suggest that after island formation, the island experiences a steep dip in frequency. However, due to the disconnection of identified load of around 45MW at 47.8 Hz, the frequency stabilizes at 49.7 Hz. Thus, the island remains stable in this scenario.

Case-3: Min gen(300 MW)- Min load (200 MW)

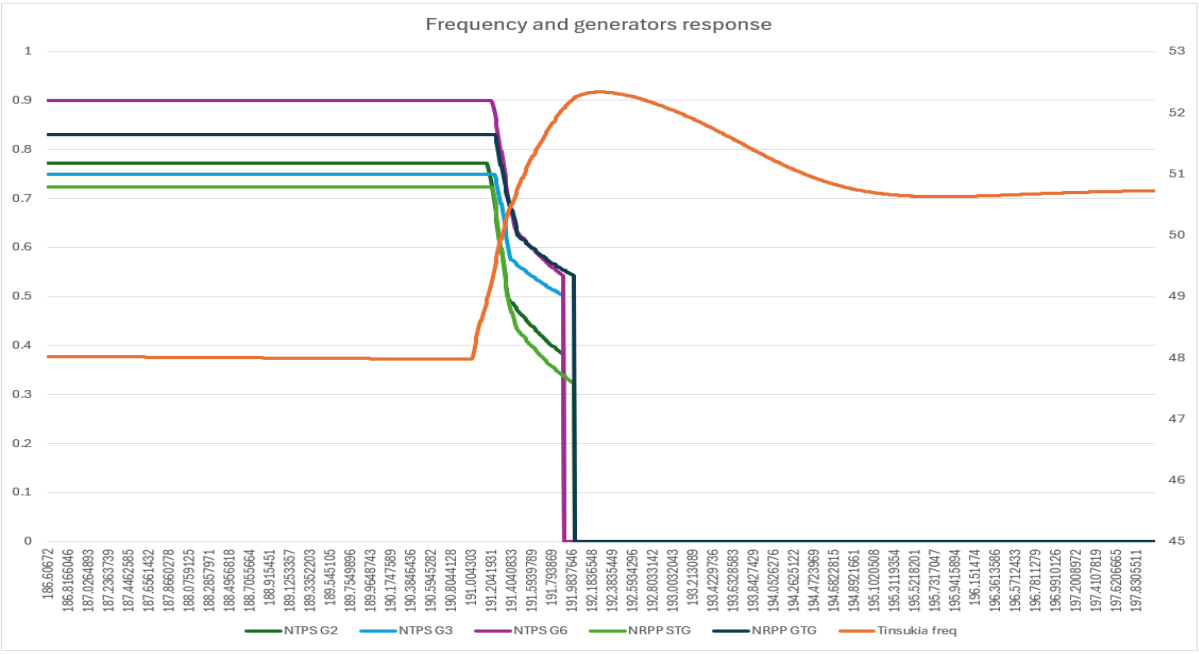

Figure-11: Tripping of units w.r.t Island frequency

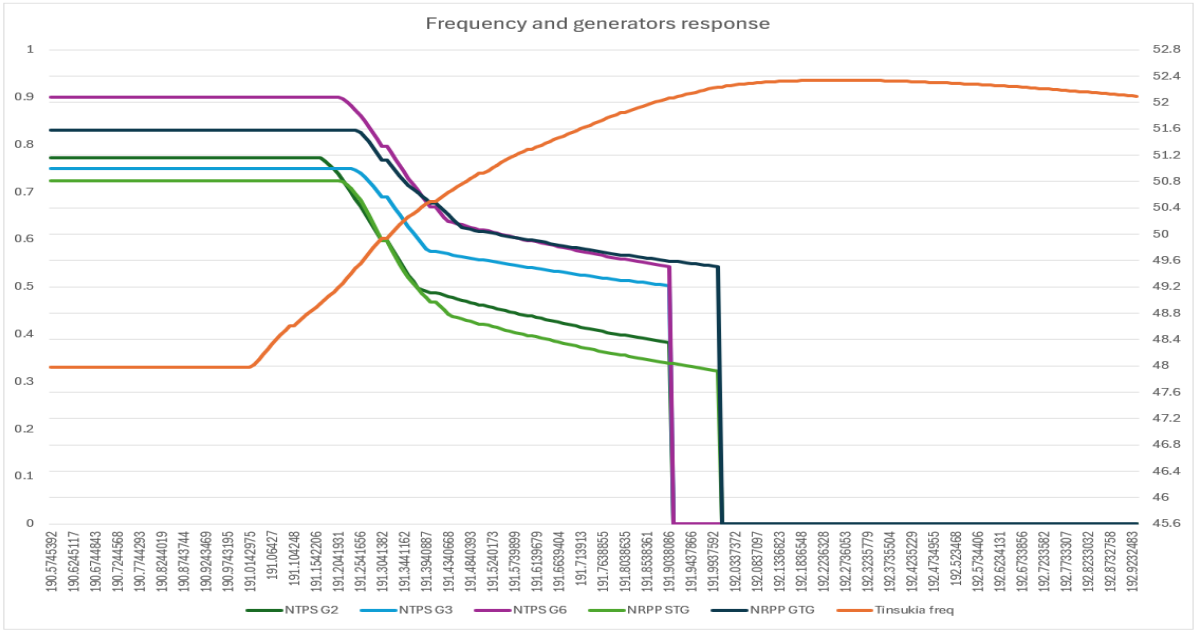

Figure-12: Tripping of units w.r.t Island frequency (Broad view)

The study results suggest that after island formation, the island experiences a rise in frequency. However, due to the tripping of the NTPS and NRPP machines at 52 Hz and 52.5 Hz, respectively, the frequency stabilizes at 50.7 Hz. Thus, the island remains stable in this scenario.

Case-4: Max gen (428 MW)- Max load (425 MW)

The island remains stable in this scenario.

Recommendations for placement of Additional UFR and OFR Placement

Based on the above study for load generation balancing in the Islanding scheme additional UFR and OFR has been recommended.

1. **Additional UFR:**

SLDC Assam was tasked with identifying an additional 100 MW of load at the 132 kV level for UFR placement. The following locations were identified:

- 132 kV Rupai GSS
- 132 kV Ledo GSS
- 132 kV Nazira GSS.

New UFR Settings:

Stages	Frequency in Hz	Time delay in ms	expected load disconnection in MW

Stage-1	48	100	35-40
Stage-2	47.8	100	25-30
Stage-3	47.7	100	25-30

Identification of Generation for OFR Placement:

- First NTPS unit will get disconnected at 52 Hz (with applicable time delay) followed by
- NRPP unit at 52.5 Hz (with applicable time delay)

After over all discussion Final schematic of Islanding scheme is presented below.

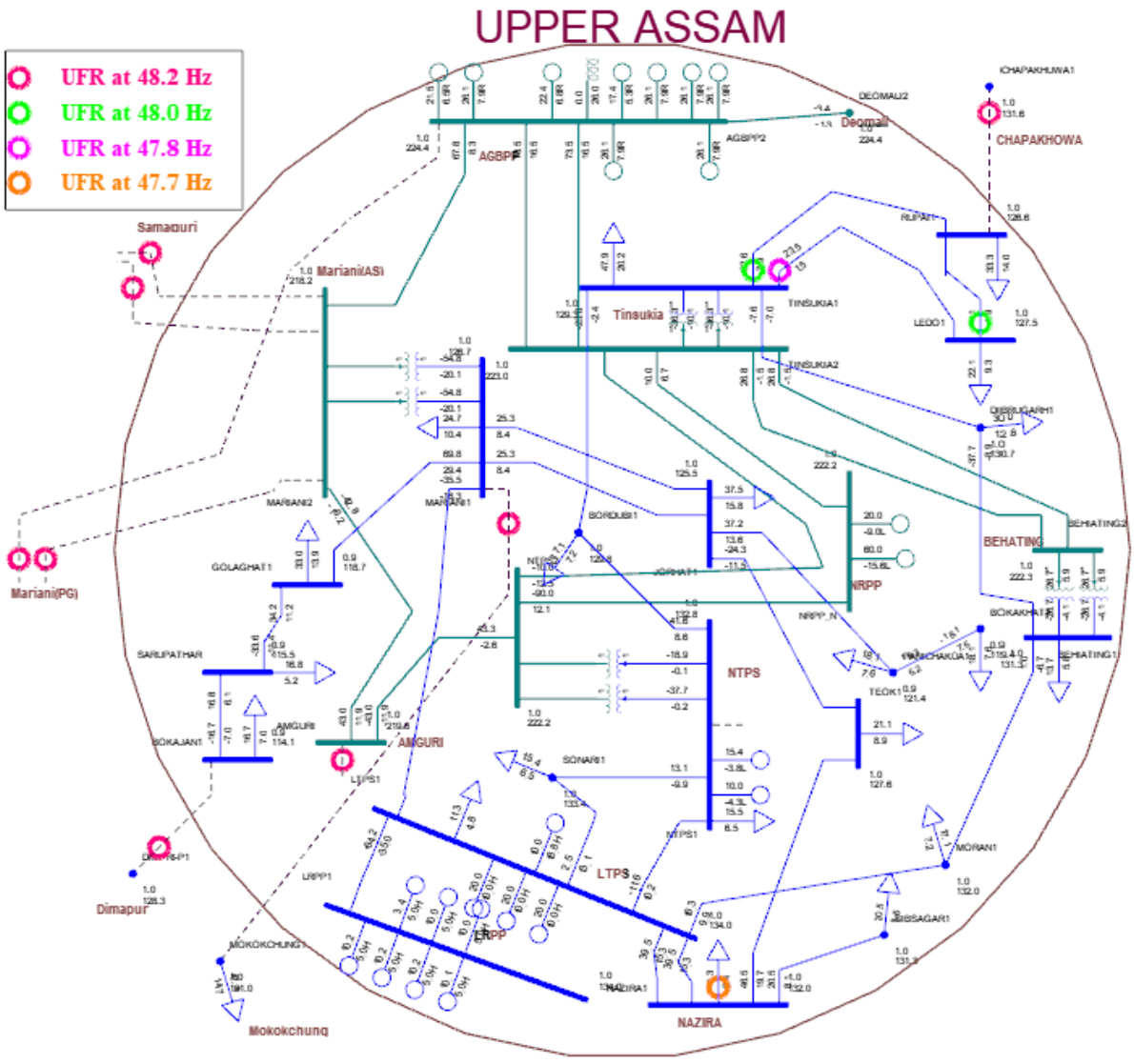

Figure-14: Upper Assam Islanding scheme

Conclusion and Action Items

The meeting concluded with a vote of thanks. All utilities were requested to:

- **Implement the revised UFR settings** at designated locations as discussed.
- **Expedite consultations with OEMs** for necessary modifications to generator settings.

The forum emphasized the urgency of implementing these changes to enhance grid stability in the Upper Assam Power System.