



सत्यमेव जयते

भारत सरकार

Government of India

विद्युत मंत्रालय

Ministry of Power

उत्तर क्षेत्रीय विद्युत समिति

Northern Regional Power Committee

विषय: उ.क्षे.वि.स. की नवीकरणीय ऊर्जा उप-समिति की 1^{वीं} बैठक का कार्यवृत्त ।

Subject: Minutes of the 1st meeting of Renewable Energy Sub Committee of NRPC.

उत्तर क्षेत्रीय विद्युत समिति की नवीकरणीय ऊर्जा उप-समन्वय उप-समिति की पहली बैठक दिनांक 24.10.2024 को आयोजित की गयी थी। उक्त बैठक के कार्यवृत्त उत्तर क्षेत्रीय विद्युत् समिति की वेबसाइट <http://164.100.60.165> पर उपलब्ध है।

इसे सदस्य सचिव, एनआरपीसी के अनुमोदन से जारी किया जाता है।

The 1st Renewable Energy Sub Committee's meeting of NRPC was held on 24.10.2024. The Minutes of this meeting has been uploaded on the NRPC website <http://164.100.60.165>.

This issues with approval of Member Secretary, NRPC.

(डी. के. मीना)

निदेशक (प्रचालन)

सेवा में : उ.क्षे.वि.स. की नवीकरणीय ऊर्जा उप समिति के सभी सदस्य।

**To : All Members of Renewable Energy Sub-committee of NRPC
(As per attached list)**

List of Members of Renewable Energy Sub-committee

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17	Adani Hybrid Energy Jaisalmer Two Ltd.	
18	Adani Hybrid Energy Jaisalmer Three Ltd.	
19	Adani Hybrid Energy Jaisalmer Four Ltd.	
20	Adani Renewable Energy (RJ) limited Rawara	
21	Adani Solar Energy Jaisalmer One Pvt. Ltd. 450MW (Solar)	
22	Adani Solar Energy Four Private Limited	
23	Adani Solar Energy Jaisalmer Two Private Limited	
24	Adani Solar Energy Jaisalmer Two Private Limited Project Two	kailash.nagora@adani.com ; sanjay.bhatt@adani.com ;

25	SB ENERGY FOUR PRIVATE LIMITED, Bhadla	
26	SB Energy Six Private Limited, Bhadla	
27	Adani Solar Enegrj Jodhpur Two Limited, Rawara	
28	Adept Renewable Technologies Pvt. Ltd.	
29	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)	
30	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)	
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59	NTPC Kolayat_400kV	
60	Nedan Solar NTPC	
61	NTPC Nokhra_300MW	

62	One Volt energy Pvt. Ltd.	amarjeet.thakur@amplussolar.com;	
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64	RENEW SOLAR POWER Pvt. Ltd. Bhadla		
65	ReNew Solar Urja Private Limited		
66	Renew Sun Bright Pvt. Ltd. (RSBPL)		
67	Renew Sun Waves Private Limited (RSEJ4L)		
68	Renew Surya Partap Pvt. Ltd.		
69	Renew Surya Ravi Pvt. Ltd.		
70	Renew Surya Roshni Pvt. Ltd.		
71	Renew Surya Vihan Pvt. Ltd.		
72	Renew Surya Ayaan Pvt. Ltd.		
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74	Rising Sun Energy-K Pvt. Ltd.		
75	Serentica Renewables India 4 Private Limited		
76	Tata Power Green Energy Ltd. (TPGEL)		
77	Tata Power Renewable Energy Ltd. (TPREL)		
78	Thar Surya Pvt. Ltd.		
79	TP Surya Pvt. Ltd.		
80	Banderwala Solar Plant TP Surya Ltd.		
81	TRANSITION ENERGY SERVICES PRIVATE LIMITED	kak@evrenewenergy.com;	
82	Transition Green Energy Private Limited		
83	Transition Sustainable Energy Services Private Limited		

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Minutes for 1st RE Sub-Committee Meeting of NRPC

1st Renewable Energy Sub-Committee meeting of NRPC was held on 24.10.2024 (10:30 hrs. onwards) at NRPC Secretariat, Conference Hall, New Delhi.

Member Secretary, NRPC welcomed all the participants from NRLDC/NLDC, CTUIL, PGCIL, SECI, MNRE, IWPA, RVPNL and RE generators in the meeting and appreciated participants for the strong turnout in this 1st RE Sub Committee meeting of NRPC.

List of participants is attached as **Annexure-A**.

MS, NRPC further stated that more and more RE capacity addition is happening at fast pace to achieve the target of 500GW RE capacity by 2030 set by Govt. of India and to meet the rapidly increasing power demand in the country. Therefore, huge Solar, Wind (Off-shore/On-shore), Battery Storage (BESS) and other evolving technologies is going to be integrated with the national grid. With this paradigm shift from conventional to non-conventional resources, electricity grid is going to see significant changes, therefore ensuring grid security & reliability is the paramount. To successfully achieve the target of RE integration up to 500GW on one hand and ensuring grid security & reliability on the other hand, collaborative and sincere efforts of all the stakeholder is required and more importantly efforts by RE developers to operate the plants stably in compliances of IEGC and CEA technical standards for ensuring security & reliability of grid.

Subsequently, he briefed about the composition of RE Sub-Committee in NRPC to discuss & resolve various issues faced by RE Generators as well grid related issues arise due to RE integration as below.

A.1 Composition and Members for Renewable Energy Sub-Committee of NRPC

As per Clause 25 of Chapter 3 of Conduct of Business Rules, 2024 of Northern Regional Power Committee, functions and composition of Renewable Energy Sub-Committee has been laid down. In clause 25.2 of CBR, 2024 of NRPC it has been mentioned that RE Sub-Committee shall be represented by all ISTS connected RE generators, state RE generators having capacity 250 MW & above, MNRE, SECI, Association of RE Generators, NLDC, NRLDC, CTU, Powergrid, STU and SLDC of RE rich states where REMC is operated.

NRPC Secretariat vide email dated 30.09.2024 had requested for nomination from concerned entities for representation in Renewable Energy Sub Committee of NRPC for the year 2024-25.

MS, NRPC urged all RE Sub Committee members who have not yet submitted their nominations to send them to seo-nrpc@nic.in at the earliest.

A.2 RE generation loss events in case of fault in the vicinity of RE complex and Low Voltage Ride Through (LVRT) & High Voltage Ride Through (HVRT) non-compliance by RE Generators at interconnection point:

Representative from NRLDC/Grid-India presented a detailed analysis of RE generation loss and LVRT/HVRT non-compliance for past 6 months (Jan'24-June'24). Analysis was carried out to identify the repetitive non-compliant RE plants which were having major share in total generation loss. These plants are impacting the grid severely during any fault event and need to take the remedial measures on urgent basis to ensure security of the grid.

Since 1st Jan'24 to 30th June'24 total 17 numbers of RE generation loss events (>1000MW) occurred in RE complex of Northern Region, these 17 events were considered for analysis and to identify the repetitive Non-compliant RE plants. As on 30th June'24, there were total 64 ISTS connected RE plants in Northern Region. Out of 64, 58 ISTS connected RE plants were found LVRT/HVRT Non-compliant in at least one of these 17 events and 6 RE plants were found to be LVRT/HVRT compliant in all the 17 events.

Total nos. of ISTS connected RE plants in NR	Nos. of ISTS connected RE plants found LVRT/HVRT Non-compliant in at least any one of the 17 events	Nos. of ISTS connected RE plants found LVRT/HVRT compliant in all the 17 events
64	58	6

Summary of the 17 numbers of RE generation loss events (>1000MW) is given below;

Table: 1 Summary of Grid Events

Sl. No.	Date	Approx. RE Generation Dip (MW)	Frequency Dip (Hz)	Event No.
1	19-06-2024	4930	0.41	Event-1
2	17-06-2024	2870	0.65 (increase in frequency due to load loss)	Event-2
3	09.06.2024	2625	0.20	Event-3
4	04.06.2024	1295	0.11	Event-4
5	04.06.2024	1090	0.11	Event-5
6	01.06.2024	3180	0.17	Event-6
7	01.06.2024	1835	0.12	Event-7
8	30.05.2024	1435	0.11	Event-8
9	02.05.2024	1840	0.15	Event-9
10	07.04.2024	1680	0.13	Event-10
11	06.04.2024	4870	0.49	Event-11
12	03.03.2024	2510	0.25	Event-12
13	25.02.2024	1890	0.18	Event-13
14	24.01.2024	1225	0.12	Event-14
15	15.01.2024	2020	0.15	Event-15
16	15.01.2024	1760	0.21	Event-16

17	10.01.2024	1360	0.21	Event-17
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Representative from NRLDC further stated that as per analysis of all the 64 ISTS connected RE plants in the 17 events, **following 15 RE plants** have been identified as **repetitive non-compliant RE plants** which were having major share in total generation loss and found non-compliant in more than 40% of total 17 nos. of events occurred between 1st Jan'24 to 30th June'24.

Table: 2 List of Repetitive LVRT/HVRT Non-complaints RE plants (Jan'24-June'24)

Sr. No.	Name of REGS	Capacity of REGS (MW)	Name of ISTS Pooling Station where REGS is connected	Total Numbers of Events	No. of times REGS found non-compliant	% of Noncompliance of REGS (Nos. of times non-compliant w.r.t total nos. of event occurred)	Inverters/ WTG Make	Inverter/ WTG Model No	Inverter/ WTG Rating in MVA @50 deg.	Number of Inverters	Inverters total Capacity (MW) in Plant
1	Renew Sun Waves Pvt. Ltd.	300	Fatehgarh-II (PG)	17	16	94%	SUNGROW	SG250HX-IN	0.2	1500	300
2	Adani Hybrid Energy Jaisalmer Two Ltd.	300	Fatehgarh-II (PG)	17	15	88%	SUNGROW	SG250HX-IN	0.2	1500	300
3	ReNew Solar Urja Pvt. Ltd.	300	Fatehgarh-II (PG)	17	14	82%	SUNGROW	SG250HX-IN	0.2	751	150
							TBEA	TS208KT L-HV	0.208	680	141
4	Clean Solar Power (Jodhpur) Pvt. Ltd.	250	Bhadla (PG)	17	12	71%	SUNGROW	SG250HX-IN	0.2	1250	250
5	Azure Power Forty-Three Pvt. Ltd.	600	Bikaner (PG)	17	11	65%	SUNGROW	SG3125HV	3.125	96	300
							SUNGROW	SG250HX-IN	0.2	1500	300
6	Renew Surya Ravi	300	Bikaner (PG)	17	11	65%	SUNGROW	SG250HX-IN	0.2	1500	300

	Pvt. Ltd.										
7	ACME Chittorgarh Solar Energy Pvt. Ltd.	250	Bhadla (PG)	17	11	65%	TBEA	TC3750K F	3.75	56	210
							TBEA	TC5000K F	5	2	10
							TBEA	TS208KT L	0.208	144	30
8	Adani Solar Energy Jaisalmer One Pvt. Ltd.	450	Fatehgarh-II (PG)	17	10	59%	SUNGROW	SG3125HV	3.125	67	209
							KEHUA	SPI3125K-B-HUD	3.125	64	200
							KEHUA	SPI3125K-B-H2	3.125	4	13
9	AMP Energy Green Five Pvt. Ltd.	100	Bhadla-II (PG)	8	5	63%	FIMER	PVS98O	4.421	26	115
10	AMP Energy Green Six Pvt. Ltd.	100		17	9	53%	SUNGROW	SG320HX	0.295	340	100
							FIMER	PVS98O	4.421	2	9
11	Adani Hybrid Energy Jaisalmer Three Ltd.	300	Fatehgarh-II (PG)	17	9	53%	HUAWEI	SUN2000-185KTL-INH0	0.16	1563	250
							TBEA	TS208KT L-HV	0.208	240	50
12	ABC Renewable Pvt. Ltd.	300	Bhadla-II (PG)	17	9	53%	TBEA	TC3125K F	3.125	96	300
13	Altra Xergi Power Pvt. Ltd.	380	Fatehgarh-III	17	8	47%	SUNGROW	SG4400U D-20	4.4	94	414
14	Avaada Sunrays Pvt. Ltd.	320	Bhadla-II (PG)	17	8	47%	SINENG	SP-250K-INH	0.2	1600	320
15	Devikot Solar plant NTPC Ltd.	240	Fatehgarh-II (PG)	17	7	41%	TBEA	TC2500K F	2.5	96	240

It was further emphasized that several communications have already been sent from NRLDC to these 15 repetitive Non-complaints RE plants, but no major improvement observed yet.

MS, NRPC requested CGM (SO), NRLDC for presentation and discussion on non-compliances status of RE plants developers wise as given below:

A.2.1 ReNew Power:

Representative from NRLDC presented the summary of Renew Sun Waves Pvt. Ltd. (300MW), ReNew Solar Urja Pvt. Ltd. (300MW) and Renew Surya Ravi Pvt. Ltd. (300MW) in 17 events ((Jan'24-June'24) as follows;

Renew Sun Waves Pvt. Ltd (RSWPL) is a 300 MW Solar plant and connected at 220 kV Fatehgarh-II (PG) through 220 kV RSWPL-Fatehgarh-II(PG) S/C line.

Out of total 17 events, plant is found LVRT/HVRT Non-compliant **16 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	282	98	Non-Compliant
Event-3	263	93	Non-Compliant
Event-4	59	21	Non-Compliant
Event-5	107	39	Non-Compliant
Event-6	258	93	Non-Compliant
Event-7	275	96	Non-Compliant
Event-8	265	100	Non-Compliant
Event-9	183	67	Non-Compliant
Event-10	185	77	Non-Compliant
Event-11	304	100	Non-Compliant
Event-12	303	100	Non-Compliant
Event-13	273	99	Non-Compliant
Event-14	299	100	Non-Compliant
Event-15	290	100	Non-Compliant
Event-16	295	100	Non-Compliant
Event-17	298	99	Non-Compliant

Renew Solar Urja Pvt. Ltd. (RSUPL) (Indigrd) is a 300 MW Solar plant and connected at 220 kV Fatehgarh-II(PG) through 220 kV RSUPL-Fatehgarh-II(PG) S/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **14 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	280	97	Non-Compliant
Event-3	196	68	Non-Compliant
Event-5	75	33	Non-Compliant
Event-6	267	91	Non-Compliant
Event-7	240	81	Non-Compliant
Event-8	157	60	Non-Compliant
Event-9	239	81	Non-Compliant
Event-10	165	65	Non-Compliant
Event-11	208	70	Non-Compliant
Event-12	202	67	Non-Compliant
Event-13	188	62	Non-Compliant
Event-15	214	74	Non-Compliant
Event-16	175	60	Non-Compliant
Event-17	142	47	Non-Compliant

Renew Surya Ravi Pvt. Ltd. is a 300 MW Solar plant, power of 250 MW Renew Solar Power Pvt. Ltd Bikaner and 300 MW Renew Surya Ravi Pvt. Ltd. are pooling at common 400 kV PSS of Renew Bikaner and entire 550 MW is being evacuated through 400 kV Renew Bikaner-Bikaner (PG) S/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **11 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	136	46	Non-Compliant
Event-4	62	21	Non-Compliant
Event-6	116	41	Non-Compliant
Event-7	38	13	Non-Compliant
Event-8	33	13	Non-Compliant
Event-10	64	24	Non-Compliant
Event-11	185	61	Non-Compliant
Event-12	73	24	Non-Compliant
Event-13	92	47	Non-Compliant
Event-15	87	38	Non-Compliant
Event-16	66	25	Non-Compliant

1. Representative from NRLDC stated that Renew Sun Waves Pvt Ltd and Renew Surya Ravi Pvt Ltd are having only **Sungrow SG250HX-IN** Inverters for complete 300MW and ReNew Solar Urja Pvt. Ltd. is having 50% capacity of Sungrow SG250HX-IN and 50% capacity of TBEA TS208KTL-HV inverters. He further highlighted that issue pertaining to Sungrow SG250HX-IN inverters is long pending issue and several communications has already been sent earlier for resolution of this issue. Same issue w.r.t Sungrow SG250HX-IN inverters was also highlighted by several developers (Renew, AGEL, CSP(J)PL etc.) in last special meeting conducted by NRPC on "*RE related issued of Northern Region*" held on 25th April'24. It was noted that in case of any fault event it wrongly crosses zero and gets tripped. Also due to the issue of df/dt (ROCOF) protection operation based on single cycle measurement, inverter gets tripped in case of distortion in voltage waveform by sensing abrupt change in frequency in next cycle.
2. Representative from NRLDC further highlighted that M/s Renew vide its mail communication dated **17th May'2023** stated that issue of **Sungrow SG250HX-IN** inverters would be resolved by **30th June'2023**, but **it's been more than 16 months and issue is yet to be resolved.**
3. Representative from ReNew Power stated that they were planning for optimization of df/dt (ROCOF) settings of the Sungrow SG250HX-IN inverters, but no major improvement observed hence OEM (Sungrow) has disabled the df/dt (ROCOF) protection setting of Sungrow SG25-HX-IN inverters and same is under observation.
4. Representative from NRLDC shown the ± 60 ms Inverter terminal voltage waveform and explained how inverters were tripped on df/dt frequency protection due to distortion in voltage waveform even for a single cycle and highlighted the issue of operation of df/dt (ROCOF) protection based on single cycle measurement.
5. RSWPL, RSRPL and RSUPL were also found non-compliant in recent event of 11th Oct'24 in which RE generation loss of ~ 750 MW occurred. Renew was requested to analyse the performance of plant and Sungrow SG25-HX-IN inverters on 11th Oct'24 event whether improvement observed or not after

disabling df/dt (ROCOF) protection setting of Sungrow SG25-HX-IN inverters by OEM.

6. Representative from ReNew Power stated that non-compliance issues has been appraised to top management. Also, issue will be further taken-up with OEM (Sungrow) and **action taken report** along with plant performance in recent events will be submitted to NRLDC/NRPC **within 30 days**.
7. ReNew Solar Urja Pvt. Ltd. is being owned by Indigrid, representative from Indigrid stated that issue pertaining to RSUPL non-compliance has been taken up with OEM (Sungrow & TBEA) and Sungrow disabled the df/dt setting in July'24, after that plant is under observation.

A.2.2 Adani Green Energy Ltd. (AGEL):

Representative from NRLDC presented the summary of Adani Hybrid Energy Jaisalmer Two Ltd, Adani Solar Energy Jaisalmer One Pvt. Ltd. and Adani Hybrid Energy Jaisalmer Three Ltd.

Adani Hybrid Energy Jaisalmer Three Ltd. (AHEJ2L) is a 300 MW Hybrid plant (300MW solar + 75MW wind), connected at 220kV Fatehgarh-II(PG) through 220kV AHEJ2L-Fatehgarh-II(PG) S/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **15 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	229	76	Non-Compliant
Event-2	72	24	Non-Compliant
Event-3	121	43	Non-Compliant
Event-4	145	48	Non-Compliant
Event-5	161	53	Non-Compliant
Event-6	215	71	Non-Compliant
Event-7	226	75	Non-Compliant
Event-8	258	87	Non-Compliant
Event-10	96	42	Non-Compliant
Event-11	196	64	Non-Compliant
Event-12	229	73	Non-Compliant
Event-13	245	78	Non-Compliant
Event-15	253	96	Non-Compliant
Event-16	266	100	Non-Compliant
Event-17	147	52	Non-Compliant

Adani Solar Energy Jaisalmer One Pvt. Ltd. (ASEJ1L) is a 450 MW Hybrid plant (420 MW Solar + 105 MW Wind) and connected at 220kV Fatehgarh-II(PG) through 220kV ASEJ1L-Fatehgarh-II(PG) D/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **10 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	163	35	Non-Compliant
Event-3	275	68	Non-Compliant
Event-6	272	60	Non-Compliant

Event-7	266	58	Non-Compliant
Event-8	227	53	Non-Compliant
Event-10	117	31	Non-Compliant
Event-11	315	75	Non-Compliant
Event-12	266	60	Non-Compliant
Event-15	64	28	Non-Compliant
Event-16	339	79	Non-Compliant

Adani Hybrid Energy Jaisalmer Three Ltd. (AHEJ3L) is a 300 MW Hybrid plant (300 MW Solar + 75 MW Wind) and connected at 220kV Fatehgarh-II(PG) through 220kV AHEJ3L-Fatehgarh-II(PG) S/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **10 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	104	34	Non-Compliant
Event-2	45	15	Non-Compliant
Event-3	61	21	Non-Compliant
Event-7	52	17	Non-Compliant
Event-8	61	20	Non-Compliant
Event-9	96	32	Non-Compliant
Event-10	287	92	Non-Compliant
Event-12	51	16	Non-Compliant
Event-13	57	18	Non-Compliant
Event-16	42	16	Non-Compliant

1. Representative from AGEL stated that AHEJ2L is having Sungrow SG250HX-IN inverters for full 300MW capacity. Sungrow team updated the software on 22nd July'24, even after updating the software some inverters were going in standby mode without giving any alarm and reducing its active and reactive power to zero. Then firmware in Sungrow SG250HX-IN inverters in AHEJ2L was again updated on 15th Sept'24 but issue was not resolved completely, and some inverters were still going in standby mode (making active and reactive power zero). Issue was strongly taken up with OEM and after meeting at head office, as a permanent solution firmware was last updated on 5th Oct 2024 in all 1500 nos. of Inverters, no undesirable tripping observed after that, no tripping observed on 11th Oct'24 event.
2. It was suggested by the forum that performance should be observed in case of any fault event and **action taken report to be submitted by AGEL within 30 days**.
3. Regarding issue of repetitive non-compliance of Adani Solar Energy Jaisalmer One Pvt. Ltd. (ASEJ1L), representative from AGEL stated that ASEJ1L (450MW) is having Sungrow SG3125HV and KEHUA SPI3125K-B-HUD & SPI3125K-B-H2 central inverters, issue have been observed in KEHUA SPI3125K-B-HUD & SPI3125K-B-H2 inverters, same has been followed-up with OEM (KEHUA) **progress status report on ASEJ1L plant** along with OEM actions will be submitted **within 30days**.

A.2.3 Clean Solar Power (Jodhpur) Pvt. Ltd.:

Representative from NRLDC presented the summary of Clean Solar Power (Jodhpur) Pvt. Ltd. (CSP(J)PL).

Clean Solar Power (Jodhpur) Pvt. Ltd. (CSP(J)PL) is a 250MW Solar plant and connected at 220kV Bhadla (PG) through 220kV CSP(J)PL-Bhadla(PG) S/C line. Out of total 14 events, plant is found LVRT/HVRT Non-compliant **12 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	199	83	Non-Compliant
Event-2	49	21	Non-Compliant
Event-3	78	32	Non-Compliant
Event-6	129	54	Non-Compliant
Event-7	57	23	Non-Compliant
Event-9	63	26	Non-Compliant
Event-10	116	50	Non-Compliant
Event-11	172	70	Non-Compliant
Event-12	143	58	Non-Compliant
Event-15	159	64	Non-Compliant
Event-16	94	37	Non-Compliant
Event-17	55	22	Non-Compliant

Representative from Clean Solar Power (Jodhpur) Pvt. Ltd. stated that firmware and software has been updated in Sungrow SG250HX-IN inverters by OEM. Further, CSP(J)PL is carrying regular meetings with Sungrow and taking the resolution of these issues on priority. He further informed the forum that due to medical urgency technical team is not available, **detailed report on actions taken and further action plan** will be submitted **within one (1) week**.

A.2.4 Azure Power Forty-Three Pvt Ltd. (AP43PL):

Representative from NRLDC presented the summary of Azure Power Forty-Three Pvt Ltd. (AP43PL).

Azure Power Forty-Three Pvt. Ltd. (AP43PL) is a 600MW Solar Plant and connected at 400kV Bikaner (PG) through 400kV AP43PL-Bikaner (PG) S/C line. Out of total 17 events, plant is found LVRT/HVRT Non-compliant **11 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	246	42	Non-Compliant
Event-3	137	23	Non-Compliant
Event-4	82	14	Non-Compliant
Event-6	150	27	Non-Compliant
Event-9	66	11	Non-Compliant
Event-11	116	19	Non-Compliant
Event-12	139	23	Non-Compliant
Event-13	77	17	Non-Compliant
Event-15	189	33	Non-Compliant
Event-16	112	20	Non-Compliant

Event-17	112	19	Non-Compliant
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Note: No one was present from Azure Power Pvt Ltd.

MS-NRPC stated that RE Sub Committee has been setup to discuss any RE related issues and its resolution, all RE developers should attend the meeting.

A.2.5 ACME Chittorgarh Solar Energy Pvt. Ltd.

ACME Chittorgarh Solar Energy Pvt. Ltd. (250MW) is being owned by Ayaana Power, representative from NRLDC presented the summary of ACME Chittorgarh Solar Energy Pvt. Ltd.

ACME Chittorgarh Solar Energy Pvt. Ltd. is a 250 MW Solar plant and connected at 220kV Bhadla (PG) through 220kV ACME Chittorgarh Solar Energy Pvt Ltd-Bhadla (PG) S/C line.

Out of total 17 events, plant is found LVVRT/HVRT Non-compliant **11** times. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-1	36	16	Non-Compliant
Event-2	49	22	Non-Compliant
Event-3	28	13	Non-Compliant
Event-4	25	11	Non-Compliant
Event-6	41	18	Non-Compliant
Event-7	51	21	Non-Compliant
Event-10	52	23	Non-Compliant
Event-13	35	14	Non-Compliant
Event-15	37	15	Non-Compliant
Event-16	32	15	Non-Compliant
Event-17	49	20	Non-Compliant

Representative from ACME Chittorgarh stated that SVG has already been planned. Representative from NRLDC clarified that SVG is supposed to provide dynamic reactive power support, it can provide good support during fault event, but inverter's inherent characteristics & behaviour won't change with installation of SVG. Therefore, root cause analysis is required why inverters are not able of recover active power or why it is getting tripped. He further suggested that similar to ACME Chittorgarh, TBEA inverters are installed in other RE plants too, TBEA (OEM) can compare setting/parameters of other compliant plant with ACME Chittorgarh and implement the corrective measures.

A.2.6 ABC Renewable (RJ-01) Pvt. Ltd.

Representative from NRLDC presented the summary of ABC Renewable Pvt. Ltd.

ABC Renewable (RJ-01) Pvt. Ltd. is a 300MW Solar plant and connected at 220kV Bhadla-II(PG) through 220kV ABC Renewable Pvt. Ltd.-Bhadla-II(PG) S/C line. Out of total 17 events, plant is found LVVRT/HVRT Non-compliant **9 times**. Summary is given in below table:

Event	Generation loss (MW)	% Generation loss w.r.t pre-fault generation	Status
Event-3	36	12	Non-Compliant
Event-5	34	11	Non-Compliant
Event-6	78	26	Non-Compliant
Event-7	48	16	Non-Compliant
Event-11	94	29	Non-Compliant
Event-13	40	12	Non-Compliant
Event-15	89	29	Non-Compliant
Event-16	85	27	Non-Compliant
Event-17	44	14	Non-Compliant

It was informed that ABC Renewable (RJ-01) Pvt. Ltd. has recently commissioned 80MVAr SVG for reactive power support during steady state and fault conditions. Further, regarding repetitive non-compliance, issue has been taken up with OEM for required corrective actions in TBEA TC3125KF inverters.

Apart from above mentioned plants, representative from NRLDC presented summary of non-compliances for rest of the plants as mentioned in table-2 (i.e. AMP Energy Green Five Pvt. Ltd. (100MW), AMP Energy Green Six Pvt. Ltd. (100MW), Adani Hybrid Energy Jaisalmer Three Ltd. (300MW), Altra Xergi Power Pvt. Ltd. (380MW), Avaada Sunrays Pvt. Ltd. (320MW) and Devikot Solar plant NTPC Ltd. (240MW) and actions taken apprised to the forum are as follows;

- i. AMP Energy Green Five Pvt. Ltd. (100MW) and AMP Energy Green Six Pvt. Ltd. (100MW) has revised the O/V and U/V setting of the 33kV feeders. However, revised setting won't meet the CEA standard requirements at POI, hence setting need to be further revised with more margin or O/V & U/V setting of 33kV feeders need to be disabled.
- ii. Altra Xergi Power Pvt. Ltd. (380MW) reported the tripping of Inverters on Abnormal Frequency protection and GFRT, **OEM (Sungrow) has disabled the active anti-islanding and df/dt (ROCOF) protection of Sungrow SG4400UD-20 inverters to avoid undesirable tripping of inverters on frequency protection.**

Representative from Thar Surya 1 Pvt. Ltd. stated that based on last meeting outcome, they have rectified the O/V setting of 33kV feeders, MS-NRPC enquired about the modification done on Thar Surya 1 Pvt. Ltd., representative from Thar Surya apprised followings;

- i. Firmware of GAMESA inverter and some parameters was updated after April'24. Earlier parameters were set as per idle grid condition (High SCR), parameters have been tuned by OEM considering the actual SCR at POI.
- ii. As per outcome of last meeting held on 25th April'24, over voltage (O/V) setting of 33kV feeders was disabled.
- iii. Presently no issue faced on ride-through the fault.

Representative from NRLDC stated that based on several meeting and discussion, several developers has already taken some corrective measures and improvement in RE generation loss issues can be seen from past event details. However, at present 15 RE plants as mentioned in Table-2 are yet to implement the adequate corrective measures, 70-75% issue of RE generation loss will be resolved if these 15 RE plants

as mentioned in Table-2 take the required corrective measures and ensure the LVRT/HVRT and Frequency ride-through compliances at POI.

Representative from CTUIL state that there are several old plants (~8GW-10GW capacity) who got connectivity based on undertaking that required corrective actions will be taken to ensure Reactive power capability (CEA clause B2(1)) compliance. These plants are yet to planned and installed the dynamic reactive compensation device like SVGs, and this issue has become a long pending issue. Multiple communication has already been sent from CTUIL & GRID-INDIA but no appreciable corrective measures taken yet from RE developer's side. He further emphasized dynamic reactive device would certainly provide some support during fault event and tripping of Inverter on Voltage protection may be avoided.

Representative from AGEL stated that AGEL have already planned SVGs in old plants, other remaining RE developers were requested to plan and install the dynamic reactive power support device to ensure Reactive power capability (CEA clause B2(1)) compliance.

As multiple RE developers reported several events of tipping of Inverters on frequency protection (Abnormal frequency, GFRT etc.). Representative from NRLDC presented the international practice of Inverter frequency protection as follows;

NERC Inverter-Based Resource Performance Guideline

- **Frequency Measurement Duration: Frequency is calculated over a window of time. Instantaneous calculated frequency should not be used for protection.** While the PRC-024-2 frequency ride-through curve includes the option to trip instantaneously for frequencies outside the specified range, this calculation should occur over a time window. **Typical window/filtering lengths are three to six cycles (50–100 ms).**

IEEE 2800-2200

- **9.1 Frequency protection**

This standard does not require frequency protection for equipment in an IBR plant.

If there is a specific need to protect the IBR plant, the applied IBR frequency protection shall allow the IBR plant to meet its ride-through requirements. The TS owner and the IBR owner shall coordinate the IBR plant frequency protection with the TS frequency protection, if present, and the under frequency load shedding (UFLS) scheme in the area.

IEEE 2800- 2200

- **9.2 Rate of change of frequency (ROCOF) protection**

This standard does not require rate of change of frequency (ROCOF) protection in an IBR plant. In cases where ROCOF protection is used to protect specific equipment within the IBR plant, it shall not impede the IBR plant from meeting the ride-through requirements of this standard inclusive of ROCOF ride-through requirements. ***ROCOF should be based on a change of frequency averaged over sufficient time to reject spurious frequency measurements caused by distortion and transients.***

Representative from NRLDC further emphasized that if under/over frequency protection or df/dt protection operates on frequency measured for one cycle only instead of averaging the frequency of 4-5 cycles window, then undesirable tripping on

under/over frequency protection or df/dt may occur despite frequency at Interconnection point remains within No-tripping zone. Also, phase-jump can result incorrect zero-crossing and thus tripping of Inverter on under frequency or df/dt if Inverters sense frequency in 1-2 cycle window as during phase jump time-period of complete cycle may get changed. Same was shown through Inverter level SOE and waveform from real-time tripping event occurred on 01.06.2024.

Recently this issue was reported by RE developers having Sungrow 1+X series inverters (i.e. SG1100UD-20, SG3300-UD-20 and SG4400UD-20), OEM (Sungrow) disabled the Active anti-islanding and df/dt (ROCOF) protections in inverter to avoid undesirable tripping of Inverters on frequency protection.

Forum suggested that in case of future procurement of inverters, RE developers should include the requirement of IEEE 2800-2200 (i.e. No ROCOF protection in Inverter) or if frequency protection or df/dt protection is there in inverters then operation of protection should be on frequency measured by averaging the frequency of 4-5 cycles window.

Representative from SECI suggested that if undesirable tripping on frequency protection observed in Sungrow 1+X series inverters (i.e. SG1100UD-20, SG3300-UD-20 and SG4400UD-20), also as reported by RE developers, undesirable tripping on frequency protection or wrong zero-crossing is yet to be resolved in Sungrow SG250HX-IN inverters then RE developers can request the OEM (Sungrow) to present their observations, analysis, action take and future action plan to resolve the issue completely, in a common forum like RE sub-committee meeting.

After detailed deliberations forum directed all the concerned RE developers (exclusively the 15 RE plants as mentioned in Table-2) to take remedial measures on priority basis to ensure secure and reliable operation of grid.

MS-NRPC further suggested that same make & model inverters have been installed in many RE plants, out of these plants few are LVRT/HVRT complaint, and few are non-compliant, therefore comparisons of setting & parameters may yield some fruitful results to pinpoint the exact behaviour of these inverters during trippings.

Detailed list of number of times non-compliant observed in all 64 ISTS connected RE plants, make & model of Inverters in those RE plants is enclosed as **Annexure-I**, RE developers & Inverters OEM having same make & model inverters should compare the settings & parameters of Inverters of Non-compliant plants with compliant plants and tune it accordingly, if required OEM should update the firmware, Root cause analysis for tripping of Inverters in case of any fault event need to be made in detailed.

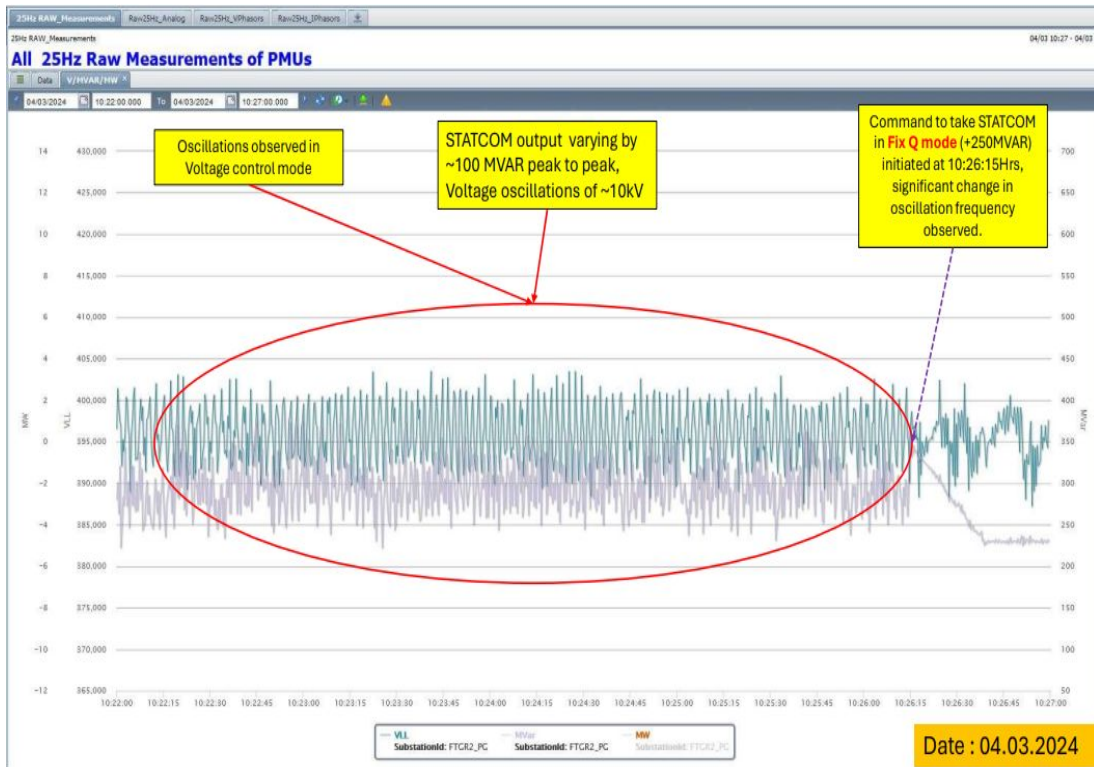
Forum further directed that even after tuning the parameters, changing the settings, updating the firmware and with some retrofitting, if plant remains LVRT/HVRT non-compliant then RE developers need to explore the possibility of changing the Inverters. However, compliance need to be ensured by RE plants for secure and reliable operation of grid

A.3 Voltage Oscillation in RE complex:

Representative from NRLDC stated that events of High frequency high amplitude **voltage oscillations of magnitude 60-80kV** have been observed in RE complex of Northern Regional grid during the month of June'24-Sept'24 and deliberated followings;

1. High-frequency, low-amplitude oscillations originating from RE plants were observed even before the commissioning of STATCOMs. These oscillations escalate into high-frequency, high-amplitude oscillations when the STATCOM at Fatehgarh-II & Bhadla-II remains in Auto mode (VCM or QCM).
2. At the time oscillations significant hunting of around 10 MWe, has been reported at nuclear plants (both units RAPP-C) and at intra-state Generators (Rajwest in Rajasthan). This presents a serious issue that requires urgent resolution. With the upcoming 700 MW unit at RAPP-C, the impact of hunting could be even more severe.
3. PMU voltage plots were shown for 400kV Bhadla-II (PG), showing the 40-45kV oscillation in 400kV bus and 70-80kV oscillation in 765kV bus of Bhadla-II(PG) on 9th Sept'24 and 11th Sept'24.
4. Several instances have been noted where switching the STATCOM to manual mode (fixed -Q) from V-control mode (Auto mode) has led to a reduction or damping of oscillations. These observations were also shared with RTAMC-NR1 vide letters dated 15.04.2024 and 24.07.2024, and it was requested to initiate a comprehensive investigation to identify and address the above issue.
5. Voltage oscillation and MVAR fluctuation of STATCOM plots were shown for several events, it was shown that when STATCOM mode was changed from Auto mode (VCM or QCM) to manual mode (Fixed-Q), oscillation died out. Sample of few events is given below;

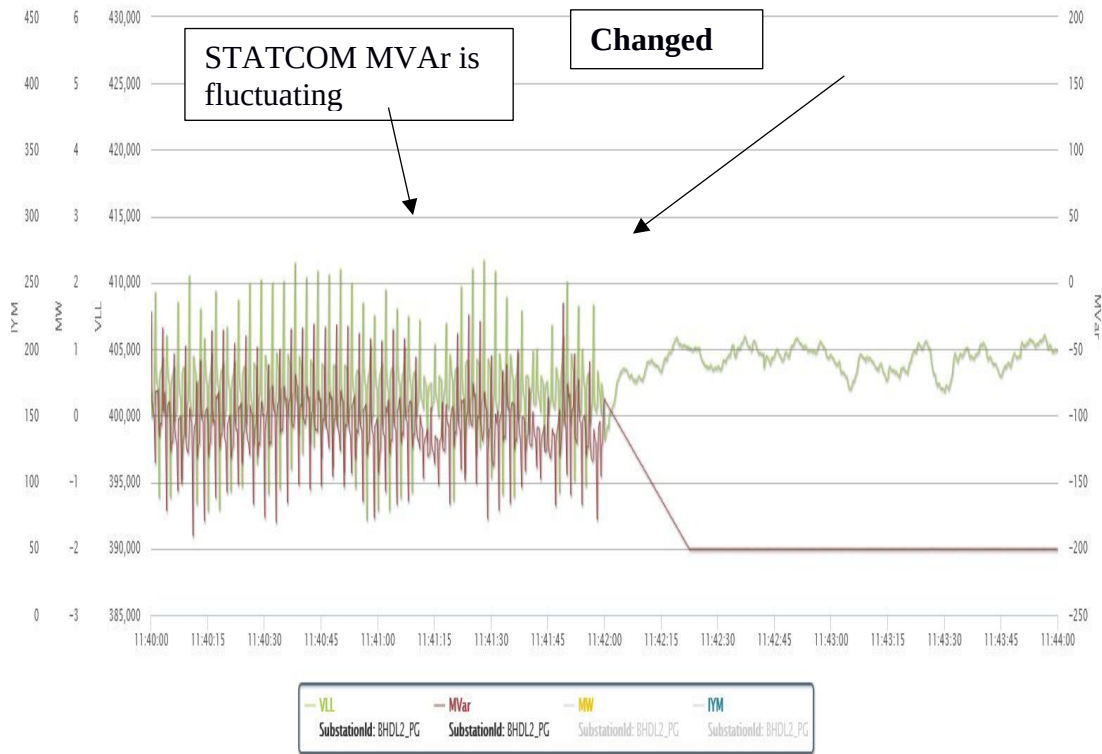
Oscillation event of 4th March'24



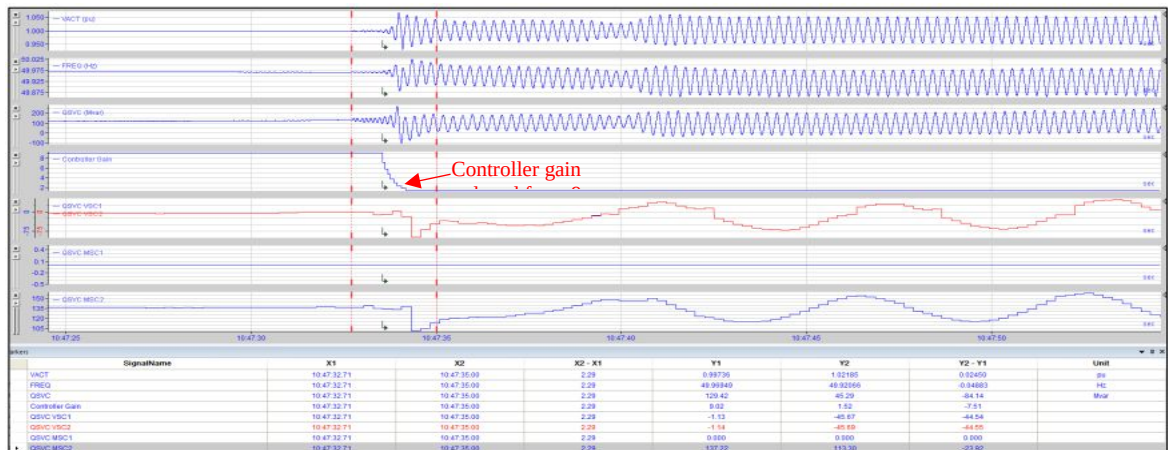
Oscillation event of 5th June'24



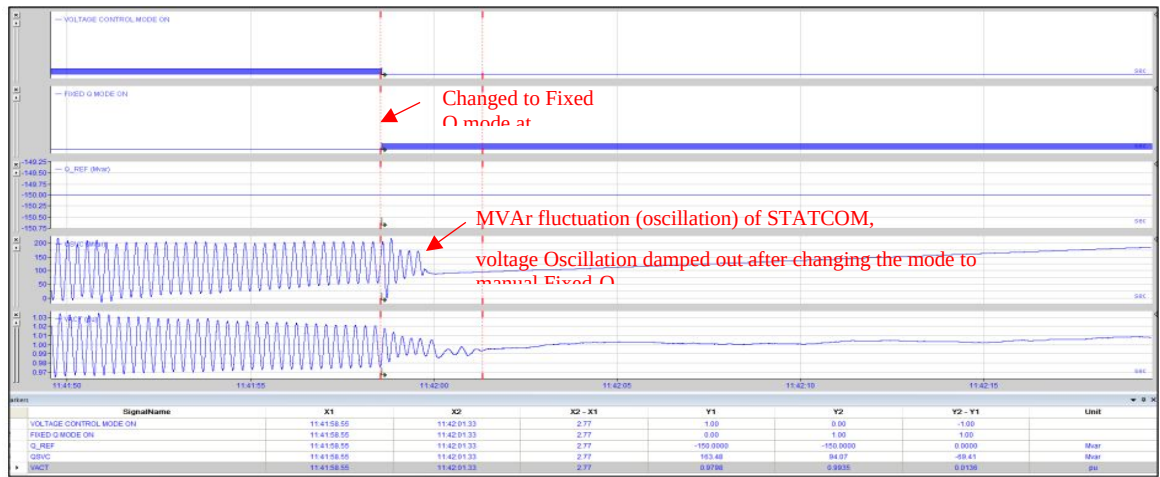
Oscillation event of 30th Sept'24



6. To validate the same reason and to find the root cause, DR based analysis of STATCOM at Bhadla-II (PG) was carried out **30th Sep 2024** Oscillation event, details are as follows:
- Very low amplitude oscillations started in the system just before 10:47:30 hrs.
 - At 10:47:33:53 hrs**, the stability controller of the STATCOM at Bhadla-II reduced the gain considerably (**from 9 to 1.5**) on hunting detection, subsequently increasing the magnitude of oscillations significantly, DR is shown below



- At 11:41:58:55 hrs**, the STATCOM was put in Manual (Fixed-Q) mode from Auto mode (voltage control) which resulted in damping out of the oscillations, DR is shown below



7. It was informed to the forum that issues have already been taken up with PGCIL and SIEMENS, as discussed in separate meeting of PGCIL, NLDC/NRLDC and SIEMENS brief is given below;

Issue pertaining to STATCOM: As per STATCOM Manual “The hunting detection function is activated only for Ireg hunting **above 4 Hz**. Therefore, the voltage controller output Ireg is monitored in order to detect multiple consecutive changes in the direction of the Ireg signal. In this case, it reduces the gain stepwise by a factor of 80 % until stability is reached. This hunting detection level must ensure sufficient margin to avoid unwanted gain reduction in the lower frequency range of the power swings in the specified range”

As discussed with PGCIL and STATCOM OEM (SIEMENS), if any oscillation is there in system having frequency >4Hz with whatsoever magnitude of voltage it would cause the hunting detection in STATCOM and STATCOM would reduce its gain. NRLDC/NLDC team requested SIEMENS team if some dead-band of (~4-5kV) can be put in STATCOM such that in case of voltage oscillation of small magnitude (4kV, 0.01pu) with high frequency (>4Hz), STATCOM won't detect any hunting and any sudden gain reduction can be avoided. With this arrangement STATCOM can be put in Auto mode without suffering the grid in high amplitude high frequency oscillation. However, SIEMENS team clarified that it's not possible. It was further requested that SIEMENS should carry out the detailed analysis of the events, with change in network topology if any further tuning is required then same can be done by SIEMENS. Also, SIEMENS was requested to submit the **analysis report along with suggestive remedial measures within 30days**.

8. SIEMENS's Representative further highlighted one issue of Oscillations in the RE pocket linked with grid frequency, Oscillations occurred when the frequency hovers around 49.9 Hz or 50.1 Hz. The magnitude of oscillations increases during solar peak hours at these frequency boundaries. Oscillations stop when frequency moves beyond 49.9 Hz or 50.1 Hz, but sustained oscillations occurs when frequency stays near these points (49.9 Hz or 50.1 Hz). This has been observed only on few days it's not a regular observation. All the observations were shown to the forum through PMU plots.

A.3.1 Actions required to address the issue of oscillation:

1. Submission of high-resolution data (1ms) during oscillation event (data for P, Q, V and I from inverters and PPC during oscillation). Representative from NRLDC highlighted that for any oscillation event **DR of STATCOM is being received** from PGCIL which certainly help in analysis as its high-resolution waveform (1ms). But **high-resolution data is not being received from RE plants**, hence performance of Inverters during oscillation, exact reason of low amplitude high frequency oscillation from RE plant side and exact source of oscillation is still unidentified.
2. Regarding high resolution data, representative from Thar Surya 1 Pvt. Ltd. stated that they have installed four (4) numbers of Power Quality Analyzer meter in the plant in strategic location, PQ Analyzer meter can record continuous waveform of millisecond resolution data throughout the day, this waveform can also be used for power quality measurement. He further stated that OEM has find tuned the parameters of GAMESA make inverter w.r.t SCR=5. As PQ Analyzer meter is not a costly device hence other RE developers should also install the PQ Analyzer meter in some inverter to analyse the performance at their end to improve the performance of plant.
3. As re-iterated earlier also on 25th April'24 NRPC special meeting, reason of High frequency low amplitude oscillations from RE plant(s) side needs to be analysed collectively in detail by RE developers and Inverter OEMs.
4. Harmonics measurements and Power Quality testing of RE plants may help to identify if any DC injection or harmonic violation or flicker from RE plant side causing of High frequency low amplitude oscillations.
5. Testing of inverter performance in case of low SCR to identify if any oscillatory response coming from inverter side in case of low SCR interconnection.
6. PGCIL team suggested that PQ Analyzer meter at polling station (POI) may help to identify the source of oscillation.
7. MS, NRPC stated that as an interim measure we can operate the STATCOM in manual mode (Fixed-Q) whenever required to avoid any major oscillation (60-70kV). Further, with improvement in connectivity and strength of pooling S/s we can change the strategy. He further enquired from CTUIL & PGCIL about timeline of commissioning of 765kV Sikar-II-Aligarh D/C line and 765kV Khetri-Narela D/C line. PGCIL informed the expected timeline of lines as follows;
 - a. 765kV Bhadla-II-Sikar D/C line: Expected by Nov'24 end.
 - b. 765kV Khetri-Narela D/C line: Expected by Jan'25 end.
8. Forum further clarified that operating STATCOM in manual mode is not advisable and in long run we have to operate the STATCOM in Auto mode only. Forum requested PGCIL to take up the matter with SIEMENS if any parameter tuning can be done in STATCOM such that escalation of High frequency low amplitude oscillations to High frequency high amplitude oscillations can be avoided.
9. Translation of High frequency low amplitude oscillations to High frequency high amplitude oscillations when STATCOM operates in auto mode control mode

(predominantly in case of low SCR due to high RE power injection or outage of line in the complex) needs to be analysed in detailed. **Representative from PGCIL stated that SIMENES will submit the analysis report along with suggestive remedial measures by 15.12.2024.**

10. Regarding oscillation linked with 50.1 Hz and 49.9 Hz frequency, RE developers were requested to analyse the performance of inverter and PPC actions in frequency boundary of 50.1 Hz and 49.9 Hz.
11. *All RE developers were advised to investigate the issue of any oscillatory response from Inverters in case of low SCR, it was suggested to all RE developers to fine tune their plants Inverter & PPC controller as per present grid condition so that oscillations could reduce in the system.*

A.4 Power Quality measurement and Harmonic distortion analysis for all RE generating stations in line with Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2013, Part-II, clause B1, Sub-clause (1), (2), (3) & (4):

1. Representative from NRLDC started the discussion with harmonic related clauses of Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007 and amendments thereof.
2. It was emphasised that measurement of harmonic content, DC injection and flicker shall be done at least **once in a year** in presence of the parties concerned and the indicative date for the same shall be mentioned in the connection agreement.
3. Several RE plants commissioned in 2019, 2020, 2021 and onwards. Those **RE plants commissioned full capacity before 31.08.23 has already violated the 1-year timeline as mandated in CEA (Technical Standards for Connectivity to the Grid)**. List of these RE plants along with status (as on 24th Oct'24) is enclosed as **Annexure-II**
4. It was informed to the forum, as on 20.10.2024 only five plants have done the power quality testing in filed and submitted the reports to NRLDC & CTUIL, Observations on one has been shared and remaining 4 test reports are under scrutiny. Representative from AGEL informed that they have performed the power quality field testing for almost all the plants of AGEL and Power Quality test report shall be submitted by 15.11.2024.
5. Data need to be submitted as per IEEE 519 compliance table and report need to be submitted in same format.
6. It was mentioned that Power Quality analyzer meter (device) is not that costly, it would be better if plant will install this device to keep all the track of harmonics and DC content being injected from plant side to grid.
7. Representative from PGCIL requested the forum for expediting the Power Quality testing of RE plants & corrective actions accordingly to keep harmonics, DC

injection & Flicker within prescribed limit to ensure the safety of important assets of Power Grid in Pooling S/s. It was agreed that PGCIL shall report if any harmonic violation being observed in Sub-station, if using any PQ analyzer meter or with support of DR if PGCIL can mention the source/cause of the violation then corrective measures need to be taken on priority basis by concerned RE developers.

8. NRLDC informed that already three numbers of communications on power quality testing (dated 13th April'22, 8th Aug'22 and 4th March'24) has been given to all the RE developers regarding power quality field testing in adherence of CEA (Technical Standards for Connectivity to the Grid). However, majority of the plants are yet to perform the Power Quality testing, same was also discussed in last RE special meeting held on 25.04.2024.
9. In reference to the clause B1(4)-*"Measurement of harmonic content, DC injection and flicker shall be done at least once in a year in presence of the parties concerned and the indicative date for the same shall be mentioned in the connection agreement"*. **Forum decided** that here parties concerned shall be PGCIL. **Power Quality testing shall be done by independent and accredited 3rd party agency, RE developers shall do all the arrangements and facilitate all the requirements for Power Quality testing at POI, PGCIL shall allow & facilitate the testing at POI (PGCIL S/s) and concerned PGCIL S/s executive shall witness the testing. Report shall be signed by RE developers, 3rd party agency and PGCIL (as a witness).**
10. **MS NRPC requested all RE developers to perform Power Quality (Harmonic, DC injection & flicker) testing at field and to submit the Power Quality test report by Dec'24. Status of progress regarding Power Quality testing of RE plant shall be taken as agenda in next RE sub-committee meeting.**

A.5 Huge MVar drawl by RVPN network:

Representative from NRLDC highlighted the persistent issue of Huge Reactive Power (MVar) drawl by Rajasthan Intra-state system, and discussed how problem gets aggravated during winter when RE plants (Solar & Wind) draws reactive power from grid as usual, at the same time drawl of reactive power by agriculture load of Rajasthan further aggravate the situation and causes issue of low voltage, voltage oscillation/fluctuation in the grid, points deliberated are as follows;

1. During the winter months, the RVPN network draws huge MVar, which causes voltage drops in the RE pocket which leads to increased dependency on STATCOM and other ISGS RE plants for MVAR support.
2. As a result, STATCOM may not provide adequate support in the event of a sudden voltage drop caused by faults. Additionally, low voltages aggravate voltage oscillations in the RE pocket.
3. Solar generation connected at Jodhpur and nearby area draws MVAR from Kankani and Jodhpur results significant low voltage issue in 400kV Kankani S/s which causes low voltage issue in nearby connected RE pooling S/s.

4. On enquiring about Rajasthan action plan and action taken to mitigate this low voltage issues, Representative from Rajasthan SLDC apprised followings to the forum;
 - i. Issues of huge MVAR drawl by Solar/Wind plants has been taken up on urgent basis, meeting has been done with RE developers, RE developers have been strictly directed to inject the Reactive power in system as per requirement. Rajasthan SLDC is issuing communication to those RE plants which are not complying with the direction of Rajasthan SLDC regarding injection of reactive power as per CEA standards during sever low voltage condition, recently communication has been issued to Saurya Urja Pvt. Ltd.
 - ii. Last year management of Rajasthan SLDC has constituted a team of 5 members who have visited several RE plants, it has been observed that during visit RE plants comply with the direction and inject reactive power but after that they hardly inject any reactive power support to the grid.
 - iii. It has been observed that Thermal plant of Rajasthan Intra-state does not inject the reactive power as per its capability. Thermal plants have also been directed to inject the Reactive power in system as per requirement as per its machine Capability curve.
 - iv. Earlier monitoring was up to GSS level only from the normal Control centre, presently REMC control centre is fully functional which gives the visibility up to individual plant level. In REMC control centre all the RE plants are being monitored individually and required direction is being issued to individual plant.
 - v. Apart from reactive power (MVAR) drawl from Solar/Wind plants, Pumping load (Inductive load) plays a vital role in huge MVAR drawl and thereby causing severe low voltage issues in western Rajasthan during winter. Pumping load is of capacity of 30HP to 100HP is there in western Rajasthan, during Ravi season agriculture demand rises significantly. DISCOM is supposed to install the capacitor bank at 33kV level however not much action taken in this front by DISCOM. RVPNL is taking its part and installation of capacitor bank is being executed at STU level, also issue is being continuously pursued with DISCOM.
 - vi. Further, shifting of some agriculture load from Peak-solar hour to off peak-peak solar hour at some strategic location (where severe low voltage issues observed, RE plants and Agriculture load at common S/s) is being planned and same shall be executed on priority.
5. Representative from NRLDC requested that Rajasthan should intimate the commissioning of any Solar/Wind generation at Intra-state level in advance to NRLDC such that same can be incorporated at NRLDC. REMC report and RE evacuation study can be carried out for western Rajasthan complex. Further, before commissioning of any new Solar/Wind generation at Intra-state level compliance of all CEA technical standards must be ensured like installation of dynamic reactive compensation device, Inverter's compliance w.r.t LVVRT/HVRT, commissioning of PPC etc.

MS-NRPC acknowledged the Rajasthan efforts and suggested to take the actions on priority basis at multiple fronts such as reactive power injection by RE plants and Thermal plants, commissioning of additional capacitor bank at STU level and pursuing with DISCOM for timely commissioning of required capacitor bank along with ensuring healthiness of existing capacitor bank and shifting of some agricultural load from solar peak to solar Off-peak period to

ensure healthy voltage profile and voltage stability of the western Rajasthan RE complex.

A.6 Development of 24×7 Centralized Control room:

Representative from NRLDC informed that at present NRLDC control room has to coordinate with each plant individually for any action, like during low voltage & voltage oscillation, code has to be issued to individual plants and despite issuing the code, NRLDC control room has to call to individual plants for reactive power injection in Fixed-Q. Similarly, in case of huge deviation from schedule, NRLDC control room need to call to individual plants for adherence to the schedule or revision of schedule. This results in delay in implementing the required corrective measure for smooth operation of grid, also it consumes significant manpower time of dedicated shift personnel. This can be avoided if single point of contact can be made for one developer. Presently 17 RE developers own 64 RE plants in NR, **single point of contact for one developer can reduce the coordination with 64 individuals to just 17.** Following points were further deliberated in the meeting;

1. With rapid integration of large numbers of RE plants, it becomes important that a 24×7 Centralized Control room should be there for multiple plants being owned and managed by same RE developer to reduce the coordination time and quick implementation of desired action for smooth grid operation.
2. Presently 64 nos. of ISTS connected RE plants are there in Northern region, NRLDC C/R need to coordinate with individual RE plant for any real-time operation related issues which causes delay in implementation of any instruction from NRLDC C/R in case of contingencies.
3. Adani Green Energy Ltd. (AGEL) has developed one Centralized Control center, deployment of trained manpower with 24×7 operation, executing instruction of NRLDC C/R through Centralized Control center may be ensured by AGEL.
4. Other RE developers having capacity >500MW-1000MW should explore the possibility of development of 24×7 Centralized Control centres with deployment of trained manpower for executing instruction of NRLDC through Centralized Control centre.
5. In PGCIL entire Northern Region is divided in 3 sub control area as CPCC-1, CPCC-2 & CPCC-3. For any required action in PGCIL S/s, NRLDC has to coordinate with only 3 nodal points and thus implementing the required corrective measures or any action is quick.
6. Similarly, NTPC has 8-10 plants under NTPC Lucknow region control area and 6-7 plants in NTPC Noida region control area, this made the coordination and action quicker.
7. Representative from ReNew power stated that they have planned the 24×7 Centralized Control centre for Western Rajasthan RE plants and same shall be implemented soon.
8. Representative from Tata Power apprised to the forum that it has developed a centralized control centre at Mumbai for all the Renewable asset of Tata power but it's for scheduling part only and Tata Power is developing the centralized control centre at Western Rajasthan for operation of Renewable plant also.

Forum suggested all the major RE developers having capacity >500MW-1000MW to explore the feasibility of implementing 24×7 Centralized Control centre on priority basis to make the grid operation smoother.

A.7 As per clause-49(11) of IEGC-23, all regional entities have to closely check their transaction Schedule and point out errors, if any, to the concerned LDC. It may also be noted that the entities must report any discrepancy within 5 days after the date of scheduling:

Representative from NRLDC stated the relevant IEGC 2023 clause on the subject matter of A.7

Relevant clause is quoted below.

Quote

(11) Discrepancy in schedule

- a) *All regional entities, open access customers, injecting entities and drawee consumers shall closely check their transaction Schedule and point out errors, if any, to the concerned LDC.*
- b) *The final schedules issued by RLDC shall be open to all regional entities and other regional open access entities for any checking and verification, for a period of 5 days. In case any mistake or omission is detected, the RLDC shall make a complete check and rectify the same.*

Unquote

Keeping in view of the above, it is hereby requested to all the generators to closely monitor the schedules in WBES portal. Generators are also requested to kindly ensure that the quantum reflected in buyers schedule is also accurate.

MS-NRPC directed all the RE generators to comply the clause-49(11) of IEGC-2023 and to report any discrepancy strictly within 5 days after the date of scheduling

A.8 Compliance during trial run to minimize trial run delay:

Representative from NRLDC apprised following to the forum and requested RE developers to ensure the following requirement to avoid any delay in trial-run;

1. All telemetry data of Solar Blocks, Inverter, PPC, etc. should be verified day-ahead of trial run date.
2. Solar Plant should test its PPC functionality before trial run.
3. Plant should corroborate its Data same day of trial run to verify the successful trial run data and if not successful, plant will be able to repeat trial run without fresh trial run notice **within 48 hours** of trial run.
4. In case of repeats trial run, fresh trial run notice should be provided with valid reasons for failure of trial run for performing repeat trial run.

Representative from NRLDC read the extract from IEGC 2023, referring to the **clause 22 (3) of IEGC 2023** "Trial Run of Wind / Solar / ESS / Hybrid Generating Station", he highlighted that if Solar/Wind plants failed to demonstrate the rated capacity test within one year of COD then capacity shall be de-rated in accordance with sub-clause (h) of clause (3) of this Regulation.

Extract from regulation is as follows (IEGC 2023 Clause 22 (3));

कार्यवृत्तः उ.क्षे.वि.स.की नवीकरणीय ऊर्जा उप-समिति की 1^{वीं} बैठक

“If it is not possible to demonstrate the rated capacity of the plant due to insufficient solar irradiation, COD may be declared subject to the condition that the same shall be demonstrated immediately when sufficient solar irradiation is available after COD, within one year from the date of COD”

“Provided that if such a generating station is not able to demonstrate the rated capacity when sufficient solar irradiation is available after COD, the generating company shall de-rate the capacity in terms of sub-clause (h) of clause (3) of this Regulation”

The following tests shall be performed at the point of interconnection:

- i. Frequency response of machines as per the CEA Technical Standards for Connectivity.*
- ii. Reactive power capability as per OEM rating at the available irradiance or the wind energy, as the case may be.*

*Provided that the generating company may submit offline simulation studies for the specified tests, in case testing is not feasible before COD, subject to the condition that tests shall be performed **within a period of one year from the date of achieving COD.***

Status of all the RE plants who has declared COD after Oct’23 (IEGC 2023) is given in below table, table shows the COD date, status of rated capacity demonstration (with 0.95 lead to 0.95 lag PF at POI) and status of Frequency response test. **All RE plants are requested to perform the pending testing of Reactive power capability and Frequency response within one year of COD.**

Table-3: COD date, status of rated capacity demonstration (with 0.95 lead to 0.95 lag PF at POI) and status of Frequency response test of RE plants in Northern Region

Plant	Plant Capacity (MW)	Trial run capacity	Trial run certificate date	COD date	The rated capacity of the plant Demonstration date (with 0.95PF lag to lead at POI)	Frequency response test performance date
Rising Sun Energy (K) Private Limited	190	164	01-Nov-23	03-Nov-23	30-Mar-24	Pending
		26	01-Apr-24	03-Apr-24		
ALTRA XERGI POWER PVT LTD	380	259.6	30-Jan-24	01-Feb-24	22-Aug-24	Pending
		120.4	07-Feb-24	09-Feb-24		
AMP ENERGY GREEN SIX PRIVATE LIMITED	100	100	22-Jan-24	24-Jan-24	05-Jun-24	Pending
AMP	100	100	07-Jun-24	11-Jun-24	05-Jun-24	Pending

ENERGY GREEN FIVE PRIVATE LIMITED						
Grian Energy Private Limited	100	100	02-Feb-24	06-Feb-24	29-Jul-24	Pending
Onevolt Energy Private Limited	100	100	31-Jan-24	02-Feb-24	29-Jul-24	Pending
Amplus Ages Private Limited	100	100	06-Feb-24	08-Feb-24	29-Jul-24	Pending
RENEW SURYA PRATAP PRIVATE LIMITED	200	175	22-Feb-24	24-Feb-24	08-May-24	Pending
		22	31-Mar-24	02-Apr-24		
		3	16-May-24	18-May-24		
RENEW SURYA VIHAAN PRIVATE LIMITED	100	50	27-Mar-24	31-Mar-24	08-May-24	Pending
		48	27-Mar-24	31-Mar-24		
		2	16-May-24	22-May-24		
RENEW SURYA AAYAN PRIVATE LIMITED	300	193	27-Mar-24	31-Mar-24	Pending	Pending
		97	27-Mar-24	31-Mar-24		
		10	05-Jun-24	08-Jun-24		
ADANI SOLAR ENRGY RJ TWO PRIVATE LIMITED	180	59.95	23-Feb-24	25-Feb-24	12-Sep-24	Pending
		105.05	21-Mar-24	11-Apr-24		
		15	19-Sep-24			
ADEPT RENEWABLE TECHNOLOGY PVT LTD	110	110	01-Mar-24	03-Mar-24	18-Apr-24	Pending
TRANSITION ENERGY SERVICES PRIVATE LIMITED	84.4	60	04-Mar-24	06-Mar-24	28-May-24	Pending
		24.4	08-Mar-24	15-Mar-24		
Transition Green Energy Private	100	100	05-Jun-24	07-Jun-24	28-May-24	Pending

Limited						
Transition Sustainable Energy Services Private Limited	50	50	30-May-24	01-Jun-24	24-May-24	Pending
RENEW SURYA ROSHNI PRIVATE LIMITED	400	285	31-Mar-24	11-Apr-24	Pending	Pending
		95	18-Jun-24	21-Jun-24		Pending
BANDERWALA_TPSL	300	200	27-Mar-24	31-Mar-24	09-Sep-24	Pending
		100	13-Sep-24			
Anta Solar Power Plant NTPC Ltd	90	57	19-Apr-24	26-Apr-24	29-May-24	Pending
		33	31-May-24	31-May-24		
SERENTIC A RENEWABLES INDIA 4 PRIVATE LIMITED(SRI4PL)	180	125	14-May-24	18-May-24	Pending	Pending
		37	12-Jun-24	15-Jun-24		
		6	06-Sep-24	08-Sep-24		
Phalodi Solar Plant ASERJ2PL	150	92.5	28-Jun-24	01-Jul-24	21-Jun-24	Pending
		57.5	28-Jun-24	01-Jul-24		
AYANA RENEWABLE POWER THREE PRIVATE LIMITED (ARP3PL)	272	97.16	04-Jun-24	15-Jun-24	Pending	Pending
		97.16	24-Jul-24	10-Aug-24		
Juniper Green Cosmic Private Limited	100	100	08-Oct-24	10-Oct-24	Pending	Pending

A.9 Adherence to Schedule (Over injection during high frequency)

1. As observed in the plots shown by NRLDC that many times when frequency was continuously outside the IEGC band (<49.90 or >50.05Hz), RE plants were in significant deviation w.r.t their schedule.
2. Where in it was demonstrated the case on **14th Sept'24** where frequency was on higher side (>50.05Hz) for significant duration, despite bringing ISGS thermal units in its technical minimum, frequency remained in the higher side. In this high frequency duration, some of the RE plants were also over injecting.

3. Further, it was discussed that with huge RE penetration, flexibility is one of the major issues, on such high frequency duration over injection from RE plants hampers the grid operation and need to be addressed by RE developers.
4. Plots showing aggregated deviation of RE plants from its schedule (pooling station wise) during high frequency duration and its impact on grid frequency is shown in **Annexure-III**.
5. **Plants were asked not to over-inject especially during high-frequency period. All the plants admitted to ensure this.**

A.10 Pending Reactive Power capability testing:

Representative from NRLDC stated that there are 4 numbers of RE plants Renew Surya Ravi Pvt. Ltd. (300MW), Azure Power Mapple Pvt. Ltd. (300MW), Mahindra Renewable Pvt. Ltd. (MRPL) (250MW) and Mega Surya Urja Pvt. Ltd. (MSUPL) (250MW) which have installed reactive power compensation devices for compliance of CEA technical standards for connectivity to the grid clause B2(1) are yet to demonstrate the successful reactive power capability testing, details of reactive power compensation device is given below:

Sl. No.	Plant Name	Equipment Name	Reactive Power compensation device	Charging date
1	Renew Surya Ravi Pvt. Ltd.	Switchable Capacitor bank at 33kV	11X8 MVar (88MVAR switchable capacitor bank) and 15.84MVA additional Inverter	11-10-2023 and 12-10-2023
2	Mega Surya Urja Pvt. Ltd.	SVG at 33kV	2*40MVar (80MVar Static VAr generator (SVG))	16-03-2024
3	Mahindra Renewable Pvt. Ltd.	SVG at 33kV	2*40MVar (80MVar Static VAr generator (SVG))	16-03-2024
4	Azure Power Mapple Pvt. Ltd.	Additional Inverters	24MVA additional inverters	01-02-2024

Despite continuous follow-up no plant has successfully demonstrated the reactive power capability testing as per CEA technical standards for grid connectivity clause B2(1) as quoted below:

Quote

The generating station shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within the limits of 0.95 lagging to 0.95 leading.

Unquote

- i. Representative from Renew Surya Ravi Pvt. Ltd. stated that the reactive power capability testing will tentatively be done in upcoming **next 10-15 days**.
- ii. Representative from Mega Surya Urja Pvt. Ltd. And Mahindra Renewable Pvt. Ltd. cited the reason of delay as issue of humming sound and harmonic violation in Power transformer during SVG testing in the plant and ensured to be responding based upon their management view.
- iii. Representative from Azure Power Mapple Pvt. Ltd. was not present in the meeting.

A.11 Reliable Telemetry from RE Plants

Reliability and accuracy of SCADA data and its associated communication system is essential for monitoring and coordinating operations of a large electricity grid. It helps in visualization and management of the critical grid element failure/grid incident in real time and minimizes the possibility of any untoward incidences/disturbances. NRLDC has been regularly pursuing all for ensuring availability of real-time data.

Table-4: List of stations having issues in telemetry data reporting

Polling station	Plant	Issue
Bhadla	Bhadla Renew	Complete plant data is not reporting
	ACME	PPC AND 33 kV Side data is suspected
	Auraiya Solar	33 KV Side Data Partial Suspected
	Bhadla Azure P6	PPC & WMS data is suspected
	Bhadla Azure P9	Plant data is suspected
	Aure power 34	PPC data is suspected
	Azure Mapple	WMS & 33KV side analog data is suspected
Fatehgarh 2	Devikot	WMS and PCC Parameter are incorrect
	RSUPL	WMS & 33KV side analog data is incorrect
	Renew Sun Bright	PPC data is suspected
Bikaner 1	renew Surya Ravi	Complete plant data is not reporting
	Renew Bikaner	PPC data is suspected and 33 KV Side Plant data Suspected
	TPGEL	PPC data is suspected
	Azure 43 RSS	plant data is wrong
	Ayana	WMS, PPC & 33KV side analog data is suspected
	AVADA 350 MW	WMS Parameter are not updating correctly
	AVADA 240 MW	WMS Parameter are not updating correctly
Bhadla 2	AHPPL	Complete plant data is incorrect
	AMP Energy 5 LTD	PPC and WMS Parameter are not updating correctly
	MSUPL	PPC data is suspected
Fatehgarh 1	NIDAN NTPC	WMS, PPC & 33KV side analog data is suspected
Fatehgarh 3	RSVPL	PPC and WMS Parameter are not updating correctly

Table-5: List of Stations for which PMU data is not reporting since long:

PMU	Remark
NR1PGESURL_IP001	Not reporting

NR1PGADNHB_IP001	Not reporting
NR1PGAHEJ2_IP001	Not reporting
NR1PGAWPS1_IP001	poor quality
NR1PGRSRPL_P001	Not reporting
NR1PGABCRL_IP001	poor quality
NR1PGMSUPL_IP001	poor quality
NR1PGRSVPL_IP001	IP related issue
NR1NTDVKOT_NT001	Not reporting

All concerned were requested to please take up for ensuring real-time data to NRLDC.

MS NRPC expressed serious concern regarding non-availability of telemetry data and PMU data and directed all RE Plants to ensure the healthiness of real-time telemetry data reporting to NRLDC. All RE developers have ensured to resolve the ongoing telemetry and PMU related issue at the earliest.

A.12 Requirement of Firewall at Sub-station end

The Guidelines on “*Interfacing Requirements*” focus on the general data acquisition systems for RTUs, SAS Gateway computers, communications and AMI metering systems required for reliable, secure and economic operations of the control centre(s) was issued by CERC in Jan 2024.

Clause 6 of the interface guidelines is as given below:

“The communication service provider while providing the interfaces for the data exchange between the control centres, between the user station and the Control Centre must comply with CERT-In, NCIIPC (National Critical Information Infrastructure Protection Centre) guidelines for the interface being provided to the end user in accordance with CEA (Technical Standards for Communication System in Power System Operations) Regulations, 2020. Necessary firewall/router as per requirement shall be provided by the respective users while connecting the remote equipment with the control centre network. Direct connectivity with the operational network be avoided while connecting the remote station and shall be through firewall with necessary VLAN configuration.”

As per above guidelines it is essential that firewall shall be installed at Sub-station end. All new sub-stations are being connected through firewall only and same has been incorporated in connection agreement also. However, firewalls are not available at many plants as tabulated below.

Table-6: List of RE plants where firewalls are not available

Sl.no	SITE
Bhadla2	AVADA 320
Bhadla	ACME
	ADANI BHADLA
	AZURE MAPPLE
	Saurya Urja
BIKANER 765	AVADA
	AYANA RE THREE 300 MW
	RENEW BIKANER 250
	SBSR 300 MW
FATEHGARH-2	Adani Hybrid1

	Adani Hybrid2
	Adani Hybrid3
FATEHGARH 1	ADANI SOLAR PSS1
	ADANI SOLAR PSS2
	NIDAN
FATEHGARH3	RENEW VIHAN/PRATAP

All RE Generators as mentioned in above table were requested to please take up the matter and ensure installation of necessary firewalls.

All representatives from different RE plants have assured the integration of firewalls in upcoming and existing RE plants.

A.13 Prolonged Infirm Injection of Regional RE Generators

1. Representative of NRLDC apprised the forum about various clause related to injection and scheduling of infirm power stipulated in CERC (Indian Electricity Grid Code) Regulations, 2023 and its amendment thereof. During infirm injection, Generators are also scheduling their infirm power. However, some of the generators are delaying their trial run, testing and COD though the majority of the plants are able to declare their COD well within **forty-five days**.
2. As per **clause 19(2)** of IEGC First Amendment Regulations 2024 notified on **23.10.24**, Injection of **infirm power shall not exceed 45 (forty-five) days** from the date of first-time energization and integration (FTC) approval for REGS and ESS (except Hydro PSP ESS). Generators are eligible to interchange infirm power with the grid prior to declaration of COD for pre-commissioning activities, testing and commissioning after obtaining prior permission of the concerned Regional Load Despatch Centre. The generating station shall necessarily furnish specific testing or commissioning activity to be carried out during the interchange of infirm power with the grid.

Regulations **19(1), 19(2) and 19(7)** of Central Electricity Regulatory Commission (Indian Electricity Grid Code) Regulations, 2023 and its amendments thereof provide as under:

“19. DRAWAL OF START UP POWER AND INJECTION OF INFIRM POWER

(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.

(2) The period for which such inter-change shall be allowed shall be as follows:-

“(b) Injection of infirm power shall not exceed one year from the date of first synchronization for generating stations other than REGS and ESS (except Hydro PSP ESS).

(c) Injection of infirm power shall not exceed 45 (forty-five) days from the date of first time energization and integration (FTC) approval for REGS and ESS (except Hydro PSP ESS)."

(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."

3. However, it has been observed that RE generators after obtaining standing clearance, are either not issuing trial run notice or not demonstrating trial run on the scheduled date and extending the trial run date multiple times. Some RE generators after performing the trial run and are delaying the submission of corroborated data to NRLDC, thereby extending the duration of infirm power injection.
4. NRLDC representative apprised the forum that majority of the RE plants are able to declare COD well within 45 days of FTC approval. However, some plants e.g. Ayana Renewable Power Three Pvt Ltd., TPSL Banderwala SECI 100_INF, Adani Green Energy Twenty-Five Limited have extended their infirm power injection for **more than 45 days**. The duration of infirm injection and the time taken from FTC approval to COD by various RE generators is attached in **Annexure-IV**.
5. Member Secretary, NRPC and NRLDC representative requested the individual RE generators to elaborate the reasons for prolonged injection of infirm power and delay in declaration of COD after issuance of successful trial run certificate by NRLDC.
6. Representative from TPSL Banderwala submitted that the plant has PPA with SECI for setting up a 600 MW Wind-Solar Hybrid project (100 MW Solar in Rajasthan, 300 MW Solar in Karnataka & 200 MW Wind in Karnataka). Connectivity for 200 MW Wind is at 400/220 kV Gadag-II PS, Karnataka, which is expected to be commissioned in Feb'2026. Under the SECI PPA, commissioning of a single component is not allowed. Under the SECI PPA, the project can achieve COD only after demonstrating successful trial run of the proportionate rated capacity of each component. As per TPSL, it is anticipated that there will be delay in commissioning of the 200 MW wind capacity connected to Gadag-II PS. The COD of the entire project (including 100 MW Solar component in Rajasthan) can be declared only after the commissioning of 200 MW wind capacity at Gadag-II PS.
7. NRLDC representative submitted that as per clause 19(3) of IEGC First Amendment Regulations 2024, extension of period for injection of infirm power beyond the stipulated period may be allowed for REGS and ESS (except Hydro PSP) for a period up to three months by respective RLDC on an application(s) made by such generating station or ESS (except Hydro PSP ESS) to the RLDC

along with detailed reasons, at least 10 days in advance of the completion of the stipulated period. **For extension beyond three months, generating station may approach CERC** along with detailed reasons, **at least 15 days in advance** of the completion of the stipulated period.

A.14 Deviation and Ancillary Service (DAS) Pool Account

1. NRLDC representative has requested that Payments related to Deviation and Reactive Energy Charges are to be made in the DAS Pool account **strictly within due date**. However, payments of some entities are being delayed for even more than 20 days.
2. **NRLDC representative further requested to RE Developers that the payment has to be made strictly as per Table-I of the DSM and Reactive Energy Statement issued by NRPC.**
3. Payment for Deviation and Reactive Energy charges are to be made separately. At times, entities are making the combined payment for both Deviation and Reactive Energy charges.
4. RE Developers were advised to make the payments in respective accounts only. Many-a-times, payments of Deviation and Reactive Charges are made to RLDC F&C Account and vice-versa. **(i.e. Altra Xergi Power Pvt. Ltd.)**
5. NRLDC representative apprised the forum that Many RE Developers are not signing the pool account reconciliation statement. **(ACME Heergarh, ACME CSEPL, Azure, AVADA, Ayana, EDEN, Megasolis, Mega Urja, Thar Urja, Clean Solar Power CSP Bhadla etc)**. Reconciliation Statement is to be signed by the entities and uploaded in Reconciliation Portal (poolar.nrlc.in) of NRLDC within due date. The Accounts shall stand deemed reconciled in case of no response from the pool members is received within the due date.
6. NRLDC representative apprised the forum that ABC Renewable, Transition Energy, Adept Renewable, AMP Green Energy 6 have not opened LC for FY 2024-25 as per the DSM Regulation despite repeated follow up and asked to open the required LC.
7. Newly registered RE developers are requested to submit the request letter only from authorised signatory along with relevant documents for updation of bank account in NRLDC FAS system for receiving payments related to deviation and reactive charges.
8. NRLDC representative apprised the forum that identification of Payments made to Pool Account has been become very difficult in absence any nomenclature in bank statement. It was requested that Plant name along with week no has to be mentioned in description/remarks while making the payment.

A.15 Follow up on action points decided in 25th April'24 NRPC special meeting on RE related issues

1. Status regarding installation of high-resolution data recording & archiving facility in RE plants and configuring low/high voltage (<0.9 PU and >1.1 PU) as DR trigger in relays at 33 kV and lower level in collector system wherever possible.
As updated to the forum: It was informed to the forum that no status received yet from any plant. It was agreed that NRLDC/NRPC will make a format and circulate it to RE developers and RE developers shall submit the status **within 30 days**.
2. Rajasthan had to expedite the installation of already approved PMUs of Rajasthan (At Jodhpur, Kankani and other S/s) and to plan the PMUs for RE pooling stations.

As updated to the forum: As informed to the forum, **PMUs of Rajasthan has been integrated and reporting to NRLDC PMU server.**

Updates of other follow up agenda regarding LVRT/HVRT non-compliance, Voltage Oscillation issues, Power Quality Testing etc. are mentioned above in respective agenda sections.

A.16 Clarification on issuance of Standing Clearance by NRLDC for sale of power from solar project (part component of hybrid project) under infirm post obtaining the successful trial run certificate (Tata Power Renewable Energy Ltd.)

1. Representative from **TPSL Banderwala** submitted that the plant has PPA with SECI for setting up a 600 MW Wind-Solar Hybrid project (100 MW Solar in Rajasthan, 300 MW Solar in Karnataka & 200 MW Wind in Karnataka). Connectivity for 200 MW Wind is at 400/220 kV Gadag-II PS, Karnataka, which is expected to be commissioned in Feb'2026. Under the SECI PPA, commissioning of a single component is not allowed. Under the SECI PPA, the project can achieve COD only after demonstrating successful trial run of the proportionate rated capacity of each component. As per TPSL, it is anticipated that there will be delay in commissioning of the 200 MW wind capacity connected to Gadag-II PS. **The COD of the entire project (including 100 MW Solar component in Rajasthan) can be declared only after the commissioning of 200 MW wind capacity at Gadag-II PS.**
2. NRLDC representative submitted that as per **clause 19(3) of IEGC First Amendment Regulations 2024**, extension of period for injection of infirm power beyond the stipulated period may be allowed for REGS and ESS (except Hydro PSP) **for a period up to three months by respective RLDC** on an application(s) made by such generating station or ESS(except Hydro PSP ESS) to the RLDC along with detailed reasons, at least 10 days in advance of the completion of the stipulated period. **For extension beyond three months, generating station may approach CERC** along with detailed reasons, **at least 15 days in advance** of the completion of the stipulated period.

A.17 Table Agenda 1: NO Further margin for RE evacuation in Rajasthan RE complex (Fatehgarh-Bhadla Complex)

Representative from NRLDC apprised following to the forum;

1. As on 24.10.24, total 16947MW (~17GW) of ISTS connected RE generation in Rajasthan RE complex is being scheduled. Out of 16947MW, **15908MW** is being scheduled as Firm Power (**COD Declared**) and **1039MW** is being scheduled as **Infirm Power**.
2. Out of **16947MW** ISTS connected RE plants at Rajasthan RE complex, **GNA of 11230MW is effective** (Complete ATS commissioned) and **GNA of 5717MW is yet to be effective** (Complete ATS is yet to be commissioned).

Pooling station	Total Capacity (MW) commissioned as on 22.10.24 and approved under effective GNA and Non-effective GNA	NR	
		Capacity Approved under effective GNA & Non-effective GNA	
		GNA effective (Complete ATS commissioned)	*GNA Non-effective (Complete ATS not yet commissioned)
Bhadla(PG)	3280	3280	0
Bikaner(PG)	3528	2865	663
Fatehgarh-II(PG)	3360	2940	420
Bhadla-II(PG)	2572	440	2132
Fatehgarh-I Adani Pooling	1505	1505	0
Bikaner-II PS	1322	0	1322
Fatehgarh-III PS	1380	200	1180
Total	16947	11230	5717

**Out of 5717MW, 620MW was in MTOA and GNA made effective under MTOA category in transition and being scheduled under effective GNA category, remaining 5097MW is being scheduled as Non-effective GNA category using NRLDC NOC.*

3. The 5717MW quantum is being evacuated based on present grid condition & available margin. However, complete Associated Transmission system (ATS) is yet to be commissioned for this 5717MW. **This 5717MW is already stressing the grid and leading to the issue of Voltage oscillation/voltage fluctuation in the RE complex.**
4. **Presently full 5717MW is being evacuated and no curtailment is being imposed.** However, no further margin is available to accommodate more RE in the complex. Therefore, without commissioning of 765kV Bhadla-II-Ajmer D/C line, no further RE can be evacuated from the complex and it get saturated at 17GW (NR ISTS connected) capacity.
5. Most credible contingency are as follows;
 - i. N-1 contingency of 765kV Bhadla-II(PG)-Ajmer(PG) D/C line
 - ii. N-1 contingency of 400kV Bhadla(RS)-Bikaner(RS) D/C line
 - iii. N-1 contingency of 765kV Bikaner(PG)-Khetri D/C line
6. 765kV Bhadla-II –Ajmer D/C line remains loaded ~**2100-2300MW** during peak solar hour.
7. Maximum allowable loading in 765kV Bhadla-II(PG)-Ajmer (PG) D/C line is 2400MW each ckt. Angular separation may exceed 30 under N-1 contingency of 765kV Bhadla-II(PG)-Ajmer (PG) D/C line if pre-contingency loading remains 2400MW each ckt. Sensitivity on one ckt under N-1 contingency of other ckt is ~36%.

765kV Bhadla-II(PG)-Ajmer(PG) D/C line			
Basecase		N-1 contingency	
Loading (MW)	Angular separation (°)	Loading (MW)	Angular separation (°)
2371	20.47	3230	28.59

8. Huge injection is leading to depletion of effective SCR at Fatehgarh-II (PG) also at Bhadla-II (PG), high frequency low amplitude oscillation in the system from RE plants side is causing the hunting detection in STATCOM and reaction of STATCOM translating the high frequency low amplitude oscillation to high frequency high amplitude oscillation.
9. Any further NOC at Fatehgarh-II, Bhadla-II, Fatehgarh-I and Fatehgarh-III will aggravate the issue of voltage oscillation in the system, will lead to angular separation instability under N-1 contingency and compromise the stability of the system. However, no further NOC shall be granted during peak solar for RE evacuation in the complex till commission of 765kV Bhadla-II-Sikar-II D/C line
10. **765kV Bhadla-II-Sikar-II D/C line needs to be expedited to avoid any RE curtailment**, also commissioning of 765kV Khetri-Narela D/C line, LILO of 765kV Meerut-Bhiwani at 765kV Narela S/s and 400kV Narela-Maharanibagh D/C needs to be expedited for upcoming RE capacity at Bikaner-II PS.

The Meeting ended with a vote of thanks to the Chair.

Annexure-A

Participants for the 1st RE Sub-Committee Meeting of NRPC on 24.10.2024

S. No.	Name	Designation	Organization
1	V.K. Singh	Member Secretary	NRPC
2	D. K. Meena	Suprintending Engineer (O&P)	NRPC
3	Reeturaj Pandey	Executive Engineer (Protection)	NRPC
4	Omkishor	Executive Engineer	NRPC
5	Lokesh Agarwal	Assistant Executive Engineer (Protection)	NRPC
6	Kaushik Pandit Rao	Assistant Executive Engineer (Protection)	NRPC
7	Vipul Kumar	Assistant Executive Engineer	NRPC
8	Akash Jain	Assistant Engineer	NRPC
9	Somara Lakra	Chief General Manager	NRLDC
10	Manas R. Chand	Deputy General Manager	NLDC
11	Himanshu Kumar	Assistant Manager	NLDC
12	Kamaldeep	Deputy General Manager	NRLDC
13	Ibtesam Asif	Deputy Manager (SO)	NRLDC
14	Kavita Parihar	Senior Deputy General Manager	NRLDC
15	Vicor Bhattacharya	AGM & Head of AM, O&M	AMPIN ENERGY TRANSITION PL
16	Neel Kamal	Manager (O&M)	AMPIN ENERGY
17	Kiran Tidke	Senior Manager (O&M)	EXEL GREEN POWER THAR SURYA PVT. LTD.
18	Saurabh Patil	Senior Manager (D&E)	MSPL (MAHINDRA SUSTEN)
19	Manish Deo Pandey	Senior Manager	RENEW SOLAR URJA (INDIGRID)
20	Rohit Srivastava	Assistant General Manager	RENEW POWER
21	Arsh Khanna	Manager	RENEW
22	Kailash Pandey	Vise President	RENEW
23	Subhajit Roy	Senior Manager	RENEW
24	Ritu Kaira	Assistant Manager	RENEW
25	Agam Kumar	Assistant General Manager	RENEW
26	Sumit Kumar	Senior Manager	RENEW
27	Sivanarayana. G	General Head-F&S	TATA POWER RENEWABLE
28	Ashwini Patil	Chief-PD, (O&M)	TATA POWER
29	Vinod Kumar	Station Head	TATA POWER
30	Sagar Potdar	Manager	TATA POWER
31	Alpesh Prajapati	General Manager	AVAADA
32	Chandan Banerjee	Deputy General Manager	AVAADA
33	Dr. Aravindh M. A.	Se-D	MNRE
34	A. S. Parira	Se-E	MNRE
35	Shiv Verma	Regional Head (Rajasthan)	ADANI
36	Sanjay Bhatt	Assistant Vise President	ADANI GREEN
37	Suresh Mistri	Manager	AGEL
38	Manish Athaiya	Chief Engineer (LD)	RVPN
39	Pankaj Tandon	Executive Engineer	RVPN
40	R. K. Agarwal	Consultant	SECI
41	Vineet Kumar	Deputy General Manager	SECI

42	Sandeep Patil	General Manager	TRUBOARD (SERENTICA RENEWABLE)
43	Manish Tak	Assistant Manager	AMPIUS
44	Prachi	Deputy Manager	ACME
45	Aman Chaturvedi	Assistant Manager	ABC RENEWABLE ENERGY RJ 01
46	Manish Sharma	Assistant Manager	JSW, MYTRAH
47	Kashish Bhambhani	General Manager	CTUIL
48	Yashpal Choudhary	Deputy General Manager	POWERGRID (PGCIL)
49	Vijay Kumar Gupta	AEN (SOLD)	SLDC (Rajasthan)
50	Rinku Yadav	Senior Manager	AYANA POWER
51	Neeraj Kumar Verma	Assistant Vice President (Com. & Res.)	Sekura Energy Pvt. Ltd.

Annexure-I

Sr. No.	Name of REGS	Capacity of REGS (MW)	Name of ISTS Pooling Station where REGS is connected	No. of times REGS found Non-compliant	% of Non compliance of REGS (Nos. of times non-compliant w.r.t total nos. of event occurred)	Inverters/WTG Make	Inverter/WTG Model No	Inverter/WTG Rating in MVA @50 deg	Number of Inverters	Inverters total Capacity (MW) in Plant
1	Renew Sun Waves Pvt. Ltd.	300	Fatehgarh-II (PG)	16	94%	SUNGROW	SG250HX-IN	0.2	1500	300
2	Adani Hybrid Energy Jaisalmer Two Ltd.	300	Fatehgarh-II (PG)	15	88%	SUNGROW	SG250HX-IN	0.2	1500	300
3	ReNew Solar Urja Pvt. Ltd.	300	Fatehgarh-II (PG)	14	82%	SUNGROW	SG250HX-IN	0.2	751	150
						TBEA	TS208KTL-HV	0.208	680	141
4	Clean Solar Power (Jodhpur) Pvt. Ltd.	250	Bhadla (PG)	12	71%	SUNGROW	SG250HX-IN	0.2	1250	250
5	Azure Power Forty Three Pvt. Ltd.	600	Bikaner (PG)	11	65%	SUNGROW	SG3125HV	3.125	96	300
						SUNGROW	SG250HX-IN	0.2	1500	300
6	Renew Surya Ravi Pvt. Ltd.	300	Bikaner (PG)	11	65%	SUNGROW	SG250HX-IN	0.2	1500	300
7	ACME Chittorgarh Solar Energy Pvt. Ltd.	250	Bhadla (PG)	11	65%	TBEA	TC3750KF	3.75	56	210
						TBEA	TC5000KF	5	2	10
						TBEA	TS208KTL	0.208	144	30
8	Adani Solar Energy Jaisalmer One Pvt. Ltd.	450	Fatehgarh-II (PG)	10	59%	SUNGROW	SG3125HV	3.125	67	209
						KEHUA	SPI3125K-B-HUD	3.125	64	200
						KEHUA	SPI3125K-B-H2	3.125	4	13
9	AMP Energy Green Five Pvt. Ltd.	100	Bhadla-II (PG)	5	63%	FIMER	PVS980	4.421	26	115
10	AMP Energy Green Six Pvt. Ltd.	100		9	53%	SUNGROW	SG320HX	0.295	340	100
						FIMER	PVS980	4.421	2	9
11	Adani Hybrid Energy Jaisalmer Three Ltd.	300	Fatehgarh-II (PG)	9	53%	HUAWEI	SUN2000-185KTL-INH0	0.16	1563	250
						TBEA	TS208KTL-HV	0.208	240	50
12	ABC Renewable Pvt. Ltd	300	Bhadla-II (PG)	9	53%	TBEA	TC3125KF	3.125	96	300
13	Altra Xergi Power Pvt. Ltd.	380	Fatehgarh-III	8	47%	SUNGROW	SG4400UD-20	4.4	94	414
14	Avaada Sunrays Pvt. Ltd.	320	Bhadla-II (PG)	8	47%	SINENG	SP-250K-INH	0.2	1600	320
15	Devikot Solar plant NTPC Ltd.	240	Fatehgarh-II (PG)	7	41%	TBEA	TC2500KF	2.5	96	240
16	RENEW SOLAR POWER Pvt. Ltd. Bikaner	250	Bikaner (PG)	6	35%	HUAWEI	SUN2000-185KTL-H1	0.16	1563	250
17	TP Surya Pvt. Ltd.	110	Bikaner (PG)	6	35%	SUNGROW	SG3125HV-32	3.125	42	131
18	ReNew Solar Energy (Jharkhand Three) Pvt. Ltd.	300	Fatehgarh-II (PG)	6	35%	HUAWEI	SUN2000-185KTL-INH0	0.16	1875	300
19	Avaada Sustainable RJ Pvt. Ltd.	300	Bikaner (PG)	5	29%	SINENG	EP-3125-HA-UD	3.125	96	300
20	RENEW SOLAR POWER Pvt. Ltd. Bhadla	50	Bhadla (PG)	5	29%	HUAWEI	SUN2000-95KTL-INH0	0.09	556	50
21	SB ENERGY FOUR PVT. LTD.	200	Bhadla (PG)	5	29%	KEHUA	SPI3125K-B-H	3.125	64	200
22	Azure Power Forty One Pvt. Ltd.	300	Bhadla (PG)	5	29%	HUAWEI	SUN2000-185KTL-INH0	0.16	1875	300
23	Tata Power Renewable Energy Ltd.	300	Bhadla (PG)	5	29%	SUNGROW	SG3125HV	3.125	48	150
						TMEIC	PVH-L2500EQ-2	2.5	60	150
24	Thar Surya One Pvt. Ltd.	300	Bikaner (PG)	4	24%	GAMESA	GAMESA E - 2.25MVA-SB-I	2.25	120	270
						GAMESA	GAMESA E - 2.5MVA-SB-I	2.5	12	30
25	Tata Power Green Energy Ltd. (TPGEL)	225	Bikaner (PG)	4	24%	SUNGROW	SG3125HV-32	3.125	72	225
26	ACME Heeragarh Powertech Pvt. Ltd	300	Bhadla-II (PG)	4	24%	SUNGROW	SG3125HV-31	3.125	48	150
						SINENG	EP3125-HA-UD	3.125	48	150
27	One Volt Energy Pvt. Ltd.	100	Bikaner-II	4	24%	SUNGROW	SG3300UD-20	3.3	28	92
						SUNGROW	SG4400UD-20	4.4	4	18
						SUNGROW	SG1100UD-20	1.1	1	1
28	Grian Energy Pvt. Ltd.	100	Bikaner-II	4	24%	SUNGROW	SG3300UD-20	3.3	30	99
						SUNGROW	SG4400UD-20	4.4	4	18
29	Adani Solar Energy RJ Two Pvt. Ltd. (Phalodi)	150	Bhadla (PG)	2	22%	WATTPOWER	WP-330KTL-H1	0.275	613	169

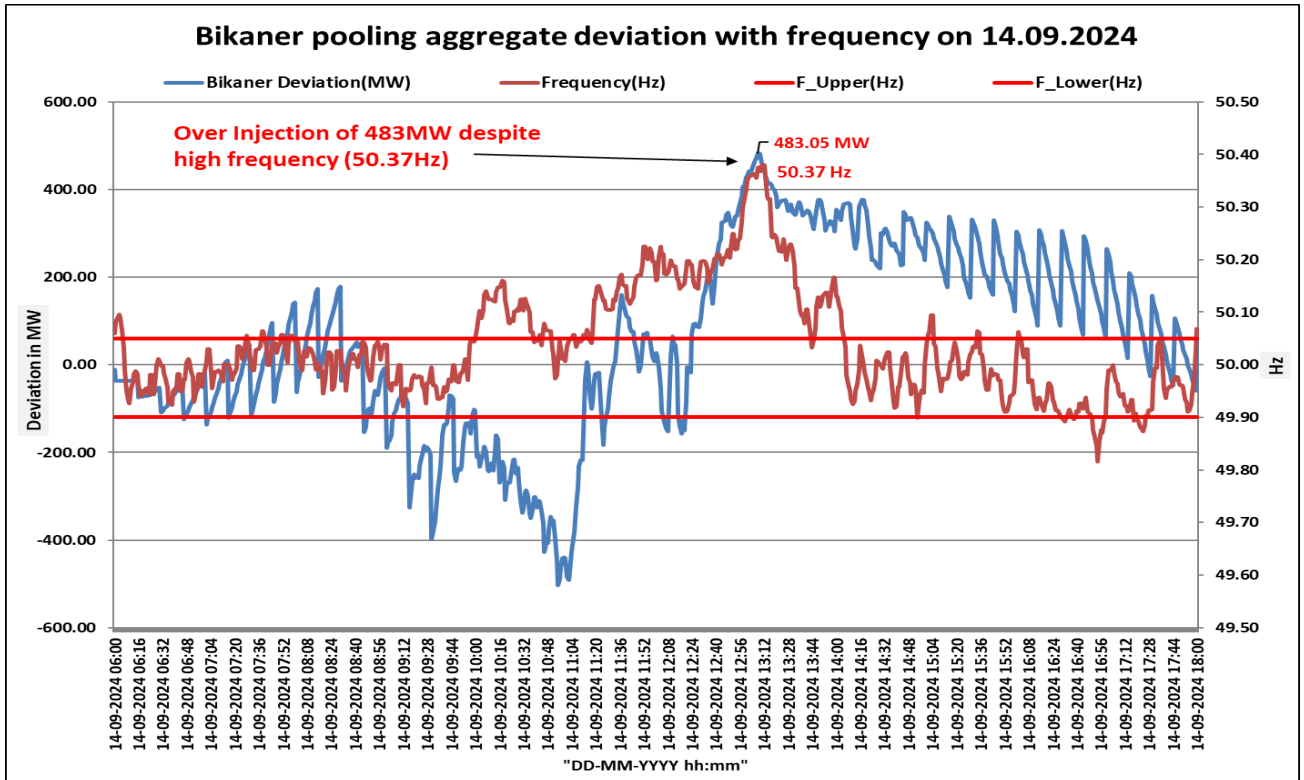
30	Serentica Renewables India 4 Pvt. Ltd.	180	Bikaner-II	2	22%	SUNGROW	SG3300UD-20	3.3	64	211
31	Amplus Ages Pvt. Ltd.	100	Bikaner-II	3	19%	SUNGROW	SG3300UD-20	3.3	30	99
						SUNGROW	SG4400UD-20	4.4	4	18
32	SBSR Power Cleantech Eleven Pvt. Ltd.	300	Bikaner (PG)	3	18%	KEHUA	SPI3125K-B-H	3.125	96	300
33	Renew Sun Bright Pvt. Ltd.	300	Fatehgarh-II (PG)	3	18%	HUAWEI	SUN2000-185KTL-INH0	0.16	1875	300
34	Kolayat Solar Plant NTPC Ltd.	400	Bhadla-II (PG)	3	18%	KEHUA	SPI3125K-B-H	3.125	128	400
35	Nokhra Solar Plant NTPC Ltd.	300	Bhadla-II (PG)	3	18%	TBEA	TC3125KF	3.125	48	150
						SINENG	EP-3125-HA-UD	3.125	48	150
36	Rising Sun Energy-K Pvt. Ltd.	190	Bhadla-II (PG)	3	18%	SINENG	EP-3125-HB-UD	3.125	56	175
						SINENG	EP-2500-HA-UD	2.5	16	40
37	Ayaana Renewable Power One Pvt. Ltd.	300	Bikaner (PG)	2	12%	SUNGROW	SG3125HV	3.125	96	300
38	AZURE POWER INDIA Pvt. Ltd., Bhadla	200	Bhadla (PG)	2	12%	SUNGROW	SG3125HV	3.125	32	100
						TMEIC	PVH-L2500EQ	2.5	40	100
39	SB Energy Six Pvt. Ltd.	300	Bhadla (PG)	2	12%	SINENG	EP3125-HA-UD	3.125	96	300
40	Adani Renewable Energy (RJ) Ltd. Rawara	200	Bhadla (PG)	2	12%	HUAWEI	SUN2000-95KTL-INH0	0.09	2223	200
41	Adani Solar Energy Jodhpur Two Ltd., Rawara	50	Bhadla (PG)	2	12%	HUAWEI	SUN2000-185KTL-H1	0.16	313	50
42	Azure Power Maple Pvt. Ltd.	300	Bhadla (PG)	2	12%	HUAWEI	SUN2000-200KTL-H2	0.185	1748	323
43	Nedan Solar Plant NTPC Ltd.	296	Fatehgarh-I	2	12%	HUAWEI	SUN2000-185KTL-INH0	0.16	1850	296
44	Renew Surya Vihan Pvt. Ltd.	100	Fatehgarh-III	2	12%	WATTPOWER	WP-330KTL-H1	0.275	466	128
45	Banderwala Solar Plant TP Surya Ltd.	300	Bikaner-II	1	11%	SUNGROW	SG4400UD-20	4.4	81	356
46	Transition Sustainable Energy Services Pvt. Ltd.	50	Bikaner-II	1	11%	SUNGROW	SG3300UD-20	3.3	18	59
47	Transition Green Energy Pvt. Ltd.	100	Bikaner-II	1	11%	SUNGROW	SG3300UD-21	3.3	36	119
48	Adani Solar Energy RJ Two Pvt. Ltd. (Devikot)	180	Fatehgarh-II (PG)	1	8%	WATTPOWER	WP-330KTL-H1	0.275	715	197
49	Adept Renewable Technologies Pvt. Ltd.	110	Bikaner-II	1	8%	SUNGROW	SG3300UD-20	3.3	40	132
50	TRANSITION ENERGY SERVICES PVT. LTD.	84	Bikaner-II	1	8%	SUNGROW	SG3300UD-20	3.3	30	99
51	Renew Surya Partap Pvt. Ltd.	200	Fatehgarh-III	1	8%	WATTPOWER	WP-330KTL-H1	0.275	938	258
52	Renew Surya Ayaan Pvt. Ltd.	300	Fatehgarh-III	1	8%	WATTPOWER	WP-330KTL-H1	0.275	677	186
						TBEA	TS300KTL-HV-C1	0.293	620	182
53	Renew Surya Roshni Pvt. Ltd.	400	Fatehgarh-III	1	8%	WATTPOWER	WP-330KTL-H1	0.275	1751	482
54	Avaada sunce energy Pvt. Ltd.	350	Bikaner (PG)	1	6%	SINENG	EP-3125-HA-UD	3.125	112	350
55	Avaada RJHN Pvt. Ltd.	240	Bikaner (PG)	1	6%	SINENG	EP-3125-HA-UD	3.125	44	138
						SINENG	SP-250K-INH	0.2	513	103
56	Adani Solar Enegrty Four Pvt. Ltd.	50	Bhadla (PG)	1	6%	HUAWEI	SUN2000-185KTL-H1	0.16	313	50
57	Eden Renewable Cite Pvt. Ltd.	300	Fatehgarh-II (PG)	1	6%	SUNGROW	SG3125HV	3.125	96	300
58	Adani Hybrid Energy Jaisalmer Four Ltd.	700	Fatehgarh-I	1	6%	HUAWEI	SUN2000-185KTL-H1	0.16	3750	600
59	Ayana Renewable Power Three Pvt. Ltd.	194	Bikaner (PG)	0	0%	SUNGROW	SG3125HV-32	3.125	112	350
60	Azure Power Thirty Four Pvt. Ltd.	130	Bhadla (PG)	0	0%	TMEIC	PVH-L2500EQ-2	2.5	52	130
61	Clean Solar Power (Bhadla) Pvt. Ltd	300	Bhadla (PG)	0	0%	Huawei	SUN2000-95KTL-INH0	0.09	3336	300
62	Mahindra Renewable Pvt. Ltd.	250	Bhadla (PG)	0	0%	SUNGROW	SG3125HV-20	3.125	80	250
63	Adani Hybrid Energy Jaisalmer One Ltd.	390	Fatehgarh-II (PG)	0	0%	HUAWEI	SUN2000-185KTL-H1	0.16	2250	360
64	Mega Surya Urja Pvt. Ltd.	250	Bhadla-II (PG)	0	0%	SINENG	EP3125-HA-UD	3.125	80	250

Annexure-II

Sl. No.	Name of the plant	Capacity (MW)	Pooling station	Last capacity commissioned	Power quality field test report submitted to NRLDC
				Date	
1	RENEW SOLAR POWER Pvt. Ltd. Bhadla	50	Bhadla(PG)	05-05-2019	NO
2	AZURE POWER INDIA Pvt. Ltd., Bhadla	200	Bhadla(PG)	05-05-2019	NO
3	SB ENERGY FOUR PRIVATE LIMITED, Bhadla	200	Bhadla(PG)	17-05-2019	NO
4	Adani Renewable Energy (RJ) limited Rawara	200	Bhadla(PG)	23-08-2019	NO
5	Azure Power Thirty Four Pvt. Ltd.	130	Bhadla(PG)	09.09.2019	NO
6	RENEW SOLAR POWER Pvt. Ltd. Bikaner	250	Bikaner	28-10-2019	NO
7	ACME Chittorgarh Solar Energy Pvt Ltd	250	Bhadla(PG)	03-01-2020	NO
8	Clean Solar Power (Bhadla) Pvt. Ltd	300	Bhadla(PG)	29-02-2020	NO
9	Adani Solar Energy Four Private Limited	50	Bhadla(PG)	19-04-2020	NO
10	Adani Solar Energy Jodhpur Two Limited, Rawara	50	Bhadla(PG)	13-09-2020	NO
11	Azure Power Forty Three Pvt. Ltd._RSS	300	Bikaner	10-02-2021	NO
12	SB Energy Six Private Limited, Bhadla	300	Bhadla(PG)	18-06-2021	NO
13	Eden Renewable Cite Private Limited	300	Fatehgarh-II(PG)	14-08-2021	NO
14	Mahindra Renewable Private Limited	250	Bhadla(PG)	20-08-2021	NO
15	Tata Power Renewable Energy Ltd. (TPREL)	300	Bhadla(PG)	24-08-2021	NO
16	Renew Sun Waves Private Limited	300	Fatehgarh-II(PG)	08-10-2021	NO
17	Renew Sun Bright (RSEJ4L)	300	Fatehgarh-II(PG)	18-11-2021	NO
18	ReNew Solar Energy (Jharkhand Three) Private Limited	300	Fatehgarh-II(PG)	11-12-2021	NO
19	ReNew Solar Urja Private Limited	300	Fatehgarh-II(PG)	20-12-2021	NO
20	Azure Power Forty Three Pvt. Ltd._PSS	300	Bikaner	01-01-2022	NO
21	Ayaana Renewable Power One Pvt. Ltd.	300	Bikaner	02-01-2022	YES
22	Azure Power Forty One Pvt limited	300	Bhadla(PG)	09-03-2022	NO
23	Avaada Sunce energy Pvt limited	350	Bikaner	08-04-2022	NO
24	Clean Solar Power (Jodhpur) Pvt. Ltd.	250	Bhadla(PG)	23-04-2022	NO
25	Avaada Sustainable RJ Pvt. Ltd.	300	Bikaner	12-05-2022	NO
26	Avaada RJHN_240MW	240	Bikaner	12-05-2022	NO
27	ACME Heergarh Powertech Pvt. Ltd	300	Bhadla-II(PG)	25-05-2022	NO
28	Adani Hybrid Energy Jaisalmer One Ltd._390MW	390	Fatehgarh-II(PG)	27-05-2022	NO
29	ABC Renewable Pvt. Ltd	300	Bhadla-II(PG)	05-06-2022	YES
30	Mega Surya Urja Pvt. Ltd. (MSUPL)	250	Bhadla-II(PG)	25-06-2022	NO
31	Tata Power Green Energy Ltd. (TPGEL)	225	Bikaner	02-08-2022	NO
32	Nedan Solar NTPC	296	Fatehgarh-I	05-08-2022	NO
33	Adani Hybrid Energy Jaisalmer Two Ltd._300MW	300	Fatehgarh-II(PG)	29-09-2022	NO
34	Adani Hybrid Energy Jaisalmer Three Ltd._300MW	300	Fatehgarh-II(PG)	29-09-2022	NO
35	NTPC Kolayat_400kV	400	Bhadla-II(PG)	30-09-2022	NO

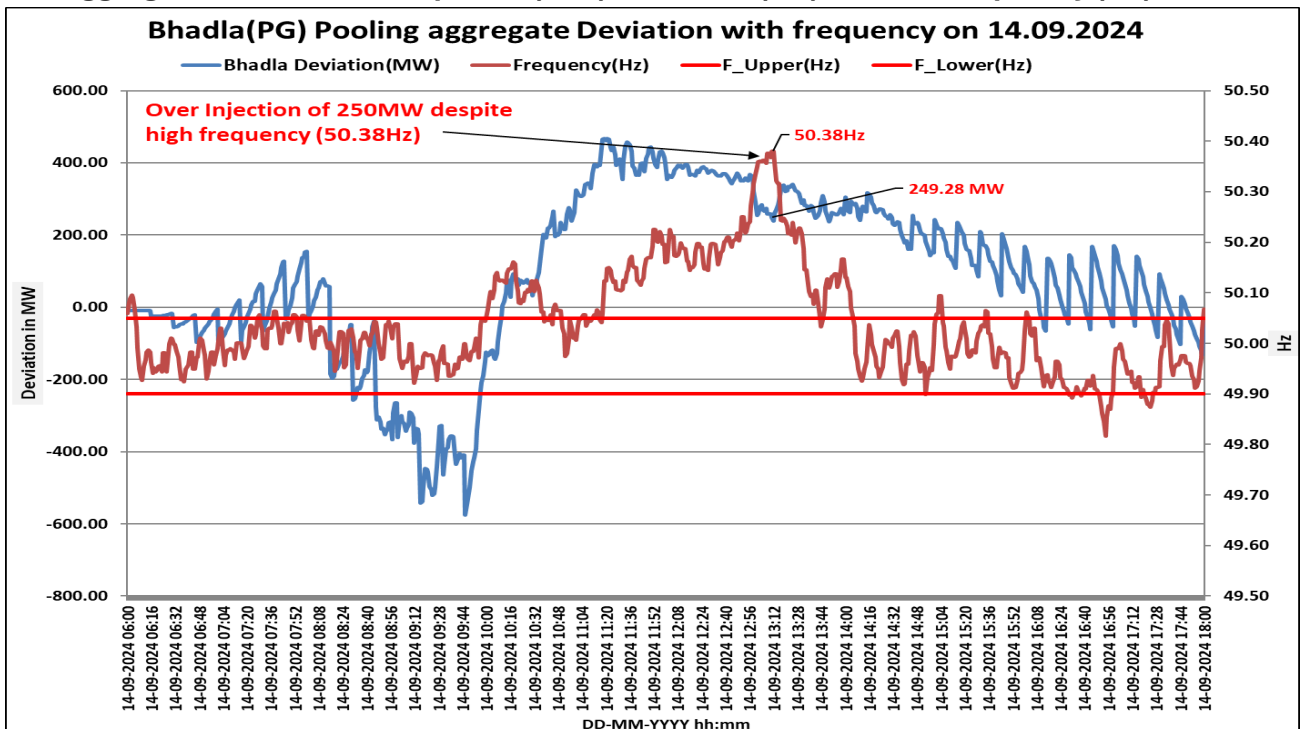
36	Adani Hybrid Energy Jaisalmer Four Ltd.	700	Fatehgarh-I	07-10-2022	NO
37	Adani Solar Energy Jaisalmer One Pvt. Ltd._450MW	450	Fatehgarh-II(PG)	23-10-2022	NO
38	Thar Surya Pvt. Ltd.	300	Bikaner	26-11-2022	YES
39	Avaada Sunrays Pvt. Ltd.	320	Bhadla-II(PG)	14-12-2022	NO
40	NTPC Devikot Solar plant_240MW	240	Fatehgarh-II(PG)	15-12-2022	NO
41	Azure Maple Pvt. Ltd.	300	Bhadla(PG)	30-03-2023	NO
42	Renew Surya Ravi Pvt. Ltd.	300	Bikaner	31-03-2023	NO
43	Tata Power Green Energy Ltd. (TPGEL)	110	Bikaner	29-05-2023	NO
44	NTPC Nokhra_300MW	300	Bhadla-II(PG)	03-06-2023	NO

Aggregate deviation of RE plants (MW) at Bikaner (PG) Vs Grid Frequency (Hz)



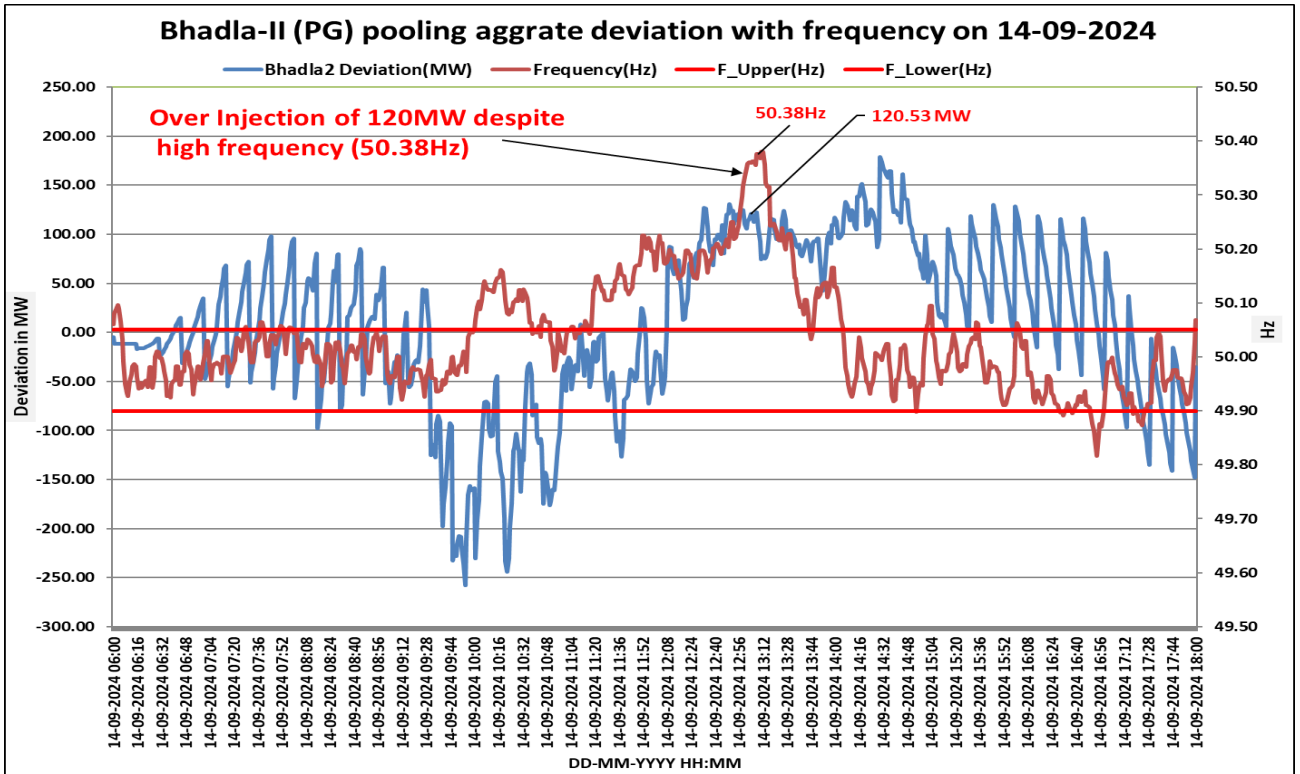
Aggregate Over Injection of RE plants pooling at Bikaner (PG) observed as **483MW** despite high frequency (**50.37Hz**) on 14th Sept'24.

Aggregate deviation of RE plants (MW) at Bhadla (PG) Vs Grid Frequency (Hz)



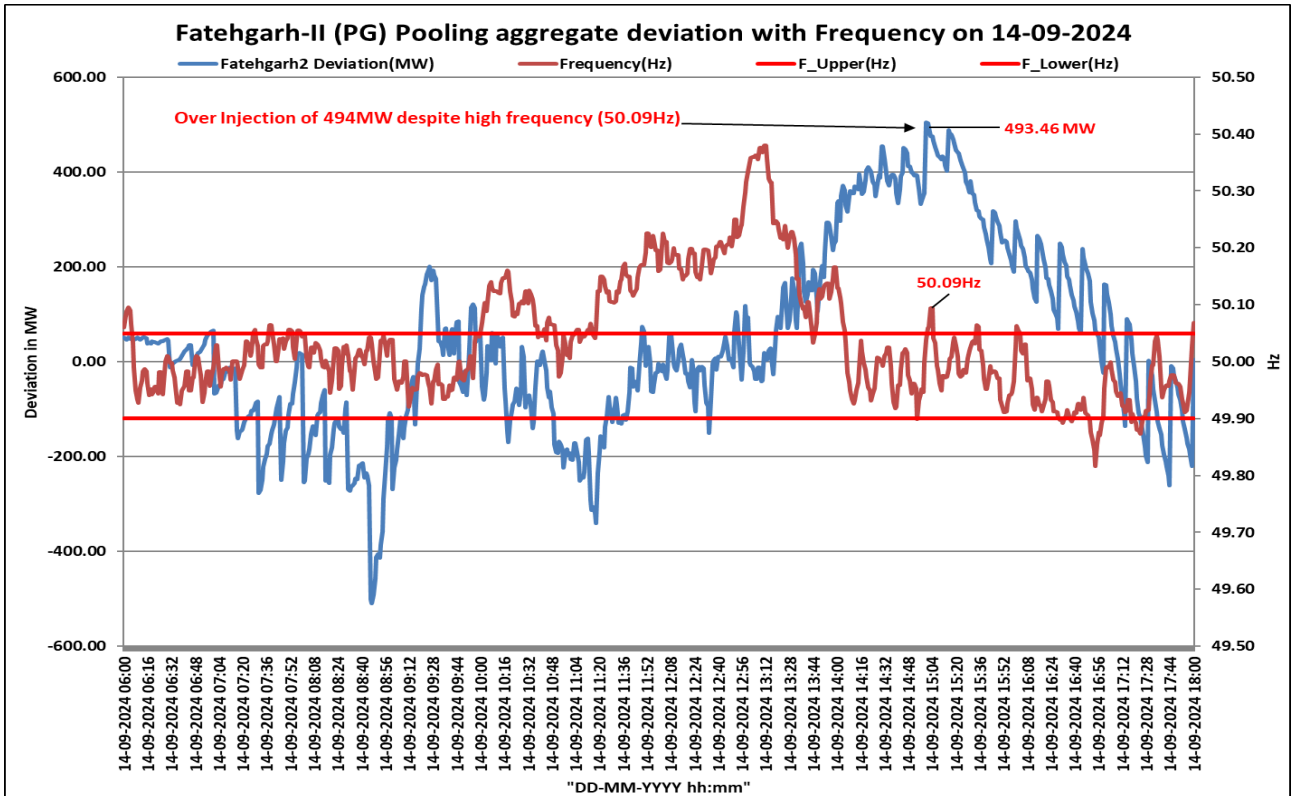
Aggregate Over Injection of RE plants pooling at Bhadla (PG) observed as **250MW** despite high frequency (**50.38Hz**) on 14th Sept'24.

Aggregate deviation of RE plants (MW) at Bhadla-II (PG) Vs Grid Frequency (Hz)



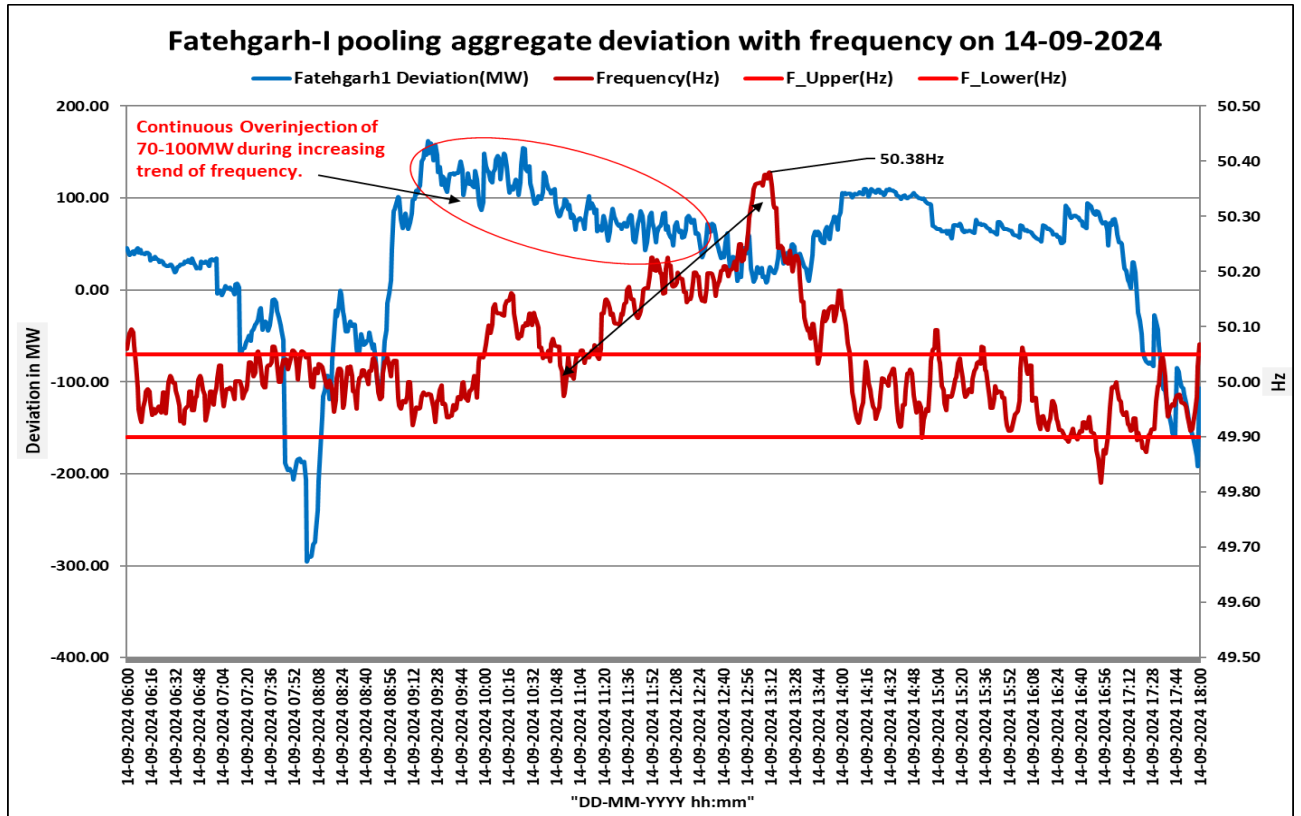
Aggregate Over Injection of RE plants pooling at Bhadla-II (PG) observed as **120MW** despite high frequency (**50.38Hz**) on 14th Sept'24.

Aggregate deviation of RE plants (MW) at Fatehgarh-II (PG) Vs Grid Frequency (Hz)



Aggregate Over Injection of RE plants pooling at Fatehgarh-II (PG) observed as **494MW** despite high frequency (**50.09Hz**) on 14th Sept'24.

Aggregate deviation of RE plants (MW) at Fatehgarh-I (PS) Vs Grid Frequency (Hz)



Continuous Over injection of **70-130MW** during increasing trend of frequency, also at frequency of **50.2Hz**, over injection of **~80MW**.

Annexure-IV

Duration of infirm injection and the time taken from FTC approval to COD as on 06.12.2024

S. No.	Name of The Generating Station	Pooling Station	Capacity (MW)	FTC to COD Duration (Days)	Scheduling of Infirm Power Duration (Days)	Trial Run to COD Duration (Days)
1	Ayana Renewable Power Three Pvt Ltd	Bikaner	97.16	59	51	11
			50	97	85	17
			47.16	97	71	17
			58.3 (42.68)	Trial run yet to be done and REIA NOC yet to be submitted	107*	
2	TPSL Banderwala SECI 100_INF	Bikaner-II	100	Trial Run Certificate issued but COD yet to be declared	219*	
3	Adani Green Energy Twenty-Five Limited	Bhadla-II	262	Trial Run Certificate issued but COD yet to be declared	43*	
4	Acme Deoghar Solar Power Private Limited	Fatehgarh-I	253		56*	
5	Acme Phalodi Solar Energy Private Limited	Fatehgarh-I	272		48*	
6	TPSL 200MW TPTCL Banderwala	Bikaner-II	200	18	10	4
7	Onevolt Energy Private Limited	Bikaner-II	100	35	27	2
8	Adept Renewable Technologies Private Limited	Bikaner-II	110	27	19	2

9	Serentica Renewables India 5 Private Limited	Bikaner-II	110	23	17	3
10	Juniper Green Cosmic Private Limited	Bikaner-II	100	27	23	2

**Yet to declare COD*