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संदर्भ: NLDC/SO/FRO/2026-27/R2

दिनांक: 13th Apr 2026

सेवा में/ To,

All the Stakeholders

विषय/Subject: Revised Assessment of Frequency Response Obligation (FRO) of each control area under RLDC jurisdiction for FY 2026-27 – Reg.

महोदय/महोदया,

NLDC, in consultation with RLDCs, has assessed Frequency Response Obligation (FRO) of each control area under RLDC jurisdiction for FY 2026-27 in compliance with Reg. 30 (10) (f) and as per Annexure-2 of the CERC (Indian Electricity Grid Code), Regulations 2023. The FRO has been assessed based on minimum All India target frequency response characteristics (FRC), giving due consideration to generation and load within each control area during CY 2025 and the details as given in Table 4 under Reg. 30 (10) (g) of CERC (IEGC), 2023.

The FRO of each control area under RLDC jurisdiction for FY 2026-27 is enclosed herewith. It may also be downloaded from this link: <https://grid-india.in/en/reports/primary-response/fro>

Note: FRO has been revised based on the updated average generation data of Bihar, Odisha, and West Bengal, along with corrections to the names and capacities considered for FRO of some control areas.

सधन्यवाद,


13/04/2026 भवदीय,
(मनोज कुमार अग्रवाल/Manoj Kumar Agrawal)
कार्यपालक निदेशक, रा.भा.प्रे.कें./Executive Director, NLDC

Copy for kind information:

1. Chairman and Managing Director, GRID-INDIA
2. Director (Market Operation), GRID-INDIA
3. Director (System Operation), GRID-INDIA
4. Secretary, Central Electricity Regulatory Commission
5. Member Secretary, NPC/NRPC/WRPC/SRPC/ERPC/NERPC, CEA
6. Executive Director, NRLDC/WRLDC/SRLDC/ERLDC/NERLDC, GRID-INDIA

Grid Controller of India Limited
National Load Despatch Centre

Frequency Response Obligation (FRO) of each control area
under RLDC jurisdiction for FY 2026-27

Revision No. 2

Issue Date: 13th April, 2026

I. Calculation of Frequency Response Obligation (FRO) of each control area:

As per Annexure-2 of IEGC, 2023, the minimum Frequency Response Obligation (FRO) of each control area in MW/Hz has been calculated as:

FRO = (Control Area average Demand + Control Area average Generation) * minimum all India Target Frequency Response Characteristic/ (Sum of average demand of all control areas + Sum of average generation of all control areas)

The relevant terms and their definitions, used in the assessment of FRO are available at **Section-IV**

1. Identification of Control Areas {in accordance with IEGC Reg.3 (Definitions) and IEGC Reg.43 (Control area jurisdiction of Load Despatch Centre)}:

Total Control Areas considered for FRO assessment	Control Areas for whom FRO shall be nil i.e. FRO=0	Control Areas for whom FRO has been assessed
173	7	166

- a) All Indian states (28 Nos.)
- b) Union Territories viz. Delhi, Chandigarh, J&K and Ladakh, DD & DNH and Puducherry (05 Nos.)
- c) Control Areas viz. Balco (Bulk Consumer), AMNSIL, RIL Jamnagar and DVC (04 Nos.)
- d) Regional Thermal (Coal/Lignite) Generating Entity of 200 MW and above (86 Nos.)
- e) Regional Hydro Generating Entity of 25 MW and above (37 Nos.)
- f) Regional Gas based Generating Entity of Gas Turbine above 50 MW (09 Nos.)
- g) Regional Pumped storage plants (PSP) of 25 MW and above (02 Nos.)
- h) Transnational Control Areas viz. Nepal and Bhutan (02 Nos.)

Note: Bangladesh and Myanmar are exempted and not been considered for FRO assessment due to asynchronous connection with India

FRO shall be nil in case of a control area not having any generation resources viz. Chandigarh, Goa, DD & DNH, Puducherry, Sikkim, Manipur and BALCO (Bulk Consumer).

As per Reg. 30(10) (h) of CERC (IEGC), 2023 quoted below, the WS sellers, nuclear generating stations and hydro generating stations (with pondage up to 3 hours or Run of the river projects) have been excluded from assessment of FRO and have the option to provide primary response.

- 1. *“WS Sellers commissioned after the date as specified in CEA Technical Standards for Connectivity shall have the option to provide primary response individually through ESS or through a common ESS installed at its pooling station.*
- 2. *Nuclear generating stations and hydro generating stations (with pondage up to 3 hours or Run of the river projects) shall be exempt from mandatory primary response. They may*

provide the primary response to the extent possible, considering the safety and security of machines and humans.”

2. Data Source used for averaging over Calendar Year 2025:

Particulars	Data Source
Average Generation of Generating Stations	Interface Energy Meter
Average Generation of State/UT Control Areas	Daily Power Supply Position data, as reported to RLDCs
Average Demand of State/UT/Bulk Consumer Control Areas	
Average Demand and Generation of Transnational Control Areas	Interface Energy Meter

3. Reference Contingency ([Link for Reference Contingency 2026-27](#)) and Minimum All India Target Frequency Response Characteristic (as per Annex-2 of IEGC, 2023) for Generation/Load loss in Indian Power System for FY 2026-27:

FY 2026-27	Solar Hours	Non-Solar Hours
Reference Contingency (MW)	7000	4500
Minimum All India Target FRC (MW/Hz)	23,333	15,000

Minimum All India Target Frequency Response Characteristic = Quantum of load or generation loss in reference contingency divided by frequency deviation value of 0.3 Hz

II. Assessment of Frequency Response Obligation (FRO) of control areas for FY 2026-27:

FRO has been assessed for **166 control areas** for solar as well as non-solar hours. The table is enclosed as **Annexure-I**

III. Calculation of Frequency Response Performance (FRP) of each control area:

The performance of each control area in providing frequency response characteristic shall be calculated for each reportable event. Each control area shall separately assess their frequency response characteristic and share with RLDC along with high resolution data of at least one (1) second for regional entity generating stations and ten (10) second for state control area. The concerned generating station and state control area shall furnish the requisite data to the LDCs within two days of notification of reportable event by the NLDC.

Frequency Response Performance (FRP) = Actual Frequency Response Characteristic (AFRC)/ Frequency Response Obligation (FRO)

FRC Calculation shall be done in accordance with Methodology for Computation of Primary Frequency Response Obligation and Performance, available as Annexure-V of NLDC Operating Procedure.

Timeline for FRC and FRP computation during events

Particulars	Stipulated Timeline*
Submission of high resolution data by regional entity generating stations and state control area to RLDCs [#]	2 working days after the event
FRC and FRP computation by NLDC	3 working days after the event
FRC and FRP computation by RLDC, SLDC and Generating Units	6 working days after the event

**Timeline for data submission and FRC computation are excluding the day of event*

In case of delay in data submission by regional entity generating stations and state control area to RLDCs, SCADA data available at RLDCs shall be used for FRC and FRP calculations.

IV. Definitions as per CERC (IEGC) Regulations, 2023

S.No.	Particulars	Definitions
1	‘Control Area’	means an electrical system bounded by interconnections (tie lines), metering and telemetry which controls its generation and/or load to maintain its interchange schedule with other control areas and contributes to regulation of frequency as specified in these regulations;
2	‘Event’	means an unscheduled or unplanned occurrence in the grid including faults, incidents and breakdowns;
3	Free Governor Mode of Operation	Means the mode of operation of governor where machines are loaded or unloaded directly in response to grid frequency i.e. machine unloads when grid frequency is more than 50 Hz and loads when grid frequency is less than 50 Hz. The amount of loading or unloading is proportional to the governor droop.
4	‘Frequency Response Characteristics’ or ‘FRC’	Means automatic, sustained change in the power consumption by load or output of the generators that occurs immediately after a change in the load-generation balance of a control area and which is in a direction to oppose any change in frequency. Mathematically it is equivalent to $FRC = \text{Change in Power } (\Delta P) / \text{Change in Frequency } (\Delta f)$;
5	‘Frequency Response Obligation’ or ‘FRO’	means the minimum frequency response a control area has to provide in the event of any frequency deviation;
6	‘Frequency Response Performance’ or ‘FRP’	means the ratio of actual frequency response with frequency response obligation;
7	‘Governor Droop’	in relation to the operation of the governor of a generating unit means the percentage drop in system frequency which would cause the generating unit under governor action to change its output from no load to full load;
8	‘Load’	means the active, reactive or apparent power consumed by a utility/installation of consumer;
9	‘Maximum Continuous Rating’ or ‘MCR’	means the maximum continuous output in MW at the generator terminals guaranteed by the manufacturer at rated parameters;
10	‘Nadir Frequency’	means minimum frequency after a contingency in case of generation loss and maximum frequency after a contingency in case of load loss;
11	‘Primary Reserve’	means the maximum quantum of power which will immediately come into service through governor action of the generator or frequency controller or through any other resource in the event of sudden change in frequency as specified in clause (10) of Regulation 30 of CERC (IEGC), 2023;
12	‘Reference contingency’	means the maximum positive power deviation occurring instantaneously between generation and demand and considered for estimation of reserves;
13	Reportable Event	Means any load or generation loss incident involving net change of more than 1000 MW of load or generation or a frequency change involving 0.1 Hz or more. The event shall be notified by the NLDC.

Frequency Response Obligation of Control Areas in Northern Region for FY 2026-27

Northern Region					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Chandigarh*	0	213	0	0
2	Delhi	301	4319	297	191
3	Haryana	1987	7940	638	410
4	Himachal Pradesh	915	1488	154	99
5	J&K(UT) and Ladakh(UT)	574	2341	187	120
6	Punjab	3927	8646	808	519
7	Rajasthan	6248	12760	1221	785
8	Uttar Pradesh	10898	18405	1882	1210
9	Uttarakhand	656	1892	164	105

Sl. No.	Entity Name (Registered User in NRLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	ADHPL	192	95	6	4
2	Anta GPP	419	146	9	6
3	Auraiya GPP	663	143	9	6
4	Bairasiul HPS	180	106	7	4
5	Bhakra Complex	1415	743	48	31
6	Budhil HPS	70	52	3	2
7	Chamera-I HPS	540	293	19	12
8	Chamera-II HPS	300	218	14	9
9	Chamera-III HPS	231	156	10	6
10	Dadri GPP	830	219	14	9
11	Dadri NCTPS	840	433	28	18
12	Dadri Stage-II NCTPS	980	555	36	23
13	Dehar HEP	990	329	21	14
14	Dhauliganga HPS	280	178	11	7
15	Dulhasti HPS	390	249	16	10
16	IGSTPS	1500	798	51	33
17	Kishanganga HEP	330	256	16	11
18	Koldam HEP	800	674	43	28
19	Koteshwer HPS	400	161	10	7
20	KWHPS	1045	605	39	25
21	Nathpa-Jhakri HPS	1500	994	64	41
22	Parbati-II HEP	800	291	19	12
23	Parbati-III HEP	520	191	12	8
24	Pong HEP	396	218	14	9
25	Rampur HEP	412	265	17	11

*FRO shall be nil in case of a control area not having any generation resources

Sl. No.	Entity Name (Registered User in NRLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
26	Rihand-I STPS	1000	733	47	30
27	Rihand-II STPS	1000	786	51	32
28	Rihand-III STPS	1000	805	52	33
29	Sainj HEP	100	40	3	2
30	Salal HPS	690	384	25	16
31	SEWA-II	120	94	6	4
32	Singoli-Bhatwari HEP	99	68	4	3
33	Singrauli STPS	2000	1499	96	62
34	SORANG HEP	100	46	3	2
35	Tanakpur HPS	94	56	4	2
36	Tanda Stage II	1320	906	58	37
37	Tehri HPS	1000	624	40	26
38	Tehri PSP	1000	349	22	14
39	Unchahar-I TPS	420	232	15	10
40	Unchahar-II TPS	420	263	17	11
41	Unchahar-III TPS	210	139	9	6
42	Unchahar-IV TPS	500	350	22	14
43	Uri HPS	480	263	17	11
44	URI 2 HEP	240	158	10	7

*FRO shall be nil in case of a control area not having any generation resources

Frequency Response Obligation of Control Areas in Western Region for FY 2026-27

Western Region					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Arcelor Mittal Nippon Steel India Limited	345	761	71	46
2	Bharat Aluminium Company Ltd (Bulk Consumer)*	0	535	0	0
3	Chhattisgarh	2168	4914	455	292
4	DNHDD*	0	1257	0	0
5	Goa*	0	618	0	0
6	Gujarat	6840	18169	1606	1033
7	Madhya Pradesh	4230	11865	1034	665
8	Maharashtra	13812	23800	2416	1553
9	RIL Jamnagar	1168	214	89	57

Sl. No.	Entity Name (Registered User in WRLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	ACB (India) Limited (MCCPL)	300	251	16	10
2	Adani Power Limited - Raipur TPP	1370	874	56	36
3	Adani Power Limited - Raigarh TPP	600	523	34	22
4	BALCO	1200	843	54	35
5	DB Power Limited	1200	973	62	40
6	DGEN CCPP	1200	576	37	24
7	Dhariwal Infrastructure Limited	600	472	30	20
8	Gadarwara	1600	1013	65	42
9	Gandhar	657	164	11	7
10	GMR Warora Energy Limited	600	471	30	19
11	Jaypee Nigrie STPP	1320	1114	72	46
12	Jhabua Power Limited	600	433	28	18
13	Jindal Stage-1	1000	621	40	26
14	Jindal Stage-2	2400	1976	127	82
15	KAWAS	656	137	9	6
16	Khargone	1320	757	49	31
17	KSK Mahanadi Power Company Ltd.	1800	1240	80	51
18	KSTPS 1 & 2	2100	1705	110	70
19	KSTPS 3	500	450	29	19
20	LANCO	600	465	30	19
21	Lara	1600	1333	86	55
22	Mahan Energen Limited	1200	896	58	37
23	Mauda Stage-1	1000	689	44	28
24	Mauda Stage-2	1320	936	60	39

*FRO shall be nil in case of a control area not having any generation resources

Sl. No.	Entity Name (Registered User in WRLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
25	MB Power (MP) Limited	1200	940	60	39
26	NSPCL	500	387	25	16
27	RGPPL	1968	540	35	22
28	RKM Powergen Private Limited	1440	824	53	34
29	SASAN	3960	3200	206	132
30	Sipat Stage-1	1980	1577	101	65
31	Sipat Stage-2	1000	738	47	30
32	SKS Power Generation(C.G) Limited	600	449	29	19
33	Solapur	1320	723	46	30
34	SSP	1450	602	39	25
35	The Tata Power Company Limited	4000	2704	174	112
36	TRN Energy Private Limited	600	406	26	17
37	Vedanta Limited	600	443	28	18
38	VSTPS Stage-1	1260	884	57	37
39	VSTPS Stage-2	1000	758	49	31
40	VSTPS Stage-3	1000	758	49	31
41	VSTPS Stage-4	1000	769	49	32
42	VSTPS Stage-5	500	405	26	17

*FRO shall be nil in case of a control area not having any generation resources

Frequency Response Obligation of Control Areas in Southern Region for FY 2026-27

Southern Region					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Andhra Pradesh (AP)	5396	9107	931	599
2	Karnataka (KAR)	5243	10992	1043	670
3	Kerala (KER)	1132	3554	301	193
4	Puducherry*	0	402	0	0
5	Tamil Nadu (TN)	3921	15003	1215	781
6	Telangana (TG)	4599	10117	945	608

Sl. No.	Entity Name (Registered User in SRLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Coastal Energen Pvt. Ltd	1200	700	45	29
2	Greenko AP01 IREP Pvt Limited	1200	846	54	35
3	IL & FS Tamil Nadu Power Company Limited	1200	687	44	28
4	LANCO Kondappalli Power Pvt. Ltd Stage II.	366	183	12	8
5	Meenakshi Energy Limited	700	220	14	9
6	NEW NEYVELI THERMAL POWER PLANT	1000	596	38	25
7	NLC Tamil Nadu Power Limited	1000	557	36	23
8	NLC TPS I Expansion	420	249	16	10
9	NLC TPS II Expansion	500	185	12	8
10	NLC TPS II Stage I	630	208	13	9
11	NLC TPS II Stage II	840	300	19	12
12	NTPC Kudgi Super Thermal Power Plant	2400	1175	75	48
13	NTPC Simhadri Stage I	1000	609	39	25
14	NTPC Simhadri Stage II	1000	631	41	26
15	NTPC Talcher Stage II	2000	1464	94	60
16	NTPC Tamil Nadu Energy Company Ltd, Chennai	1500	874	56	36
17	NTPC Telangana	1600	1023	66	42
18	Ramagundam Stage I & II	2100	1134	73	47
19	Ramagundam Stage III	500	344	22	14
20	SEIL Energy India Limited	1320	874	56	36
21	SEIL Energy India Limited Project -2	660	524	34	22

*FRO shall be nil in case of a control area not having any generation resources

Frequency Response Obligation of Control Areas in Eastern Region for FY 2026-27

Eastern Region					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Bihar	412	5277	365	235
2	DVC	4331	2831	460	296
3	Jharkhand	435	1732	139	89
4	Odisha	3166	4890	517	333
5	Sikkim*	0	60	0	0
6	West Bengal	5464	8208	878	564

Sl. No.	Entity Name (Registered User in ERLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	APNRL	540	393	25	16
2	BARH-STG-1	1980	943	61	39
3	BARH-STG-2	1320	915	59	38
4	BRBCL	1000	689	44	28
5	DARLIPALLI	1600	1279	82	53
6	DIKCHU	96	83	5	3
7	FARKKA-I & II	1600	998	64	41
8	FKSTPP-III	500	369	24	15
9	GMR	700	577	37	24
10	JIPL	1200	984	63	41
11	JSW Utkal Energy	700	402	26	17
12	KAHALGAON-stg 1	840	564	36	23
13	KAHALGAON-stg 2	1500	1133	73	47
14	MPL	1050	750	48	31
15	NKSTPP	1980	1203	77	50
16	NPGC	1980	1399	90	58
17	PUVNL	800	600	39	25
18	TALCHER stg-1	1000	757	49	31

*FRO shall be nil in case of a control area not having any generation resources

Frequency Response Obligation of Control Areas in North Eastern Region for FY 2026-27

North Eastern Region					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Arunachal Pradesh	10	136	9	6
2	Assam	236	1539	114	73
3	Manipur*	0	132	0	0
4	Meghalaya	118	238	23	15
5	Mizoram	34	86	8	5
6	Nagaland	9	113	8	5
7	Tripura (including Bangladesh's radial load)	77	273	22	14

Sl. No.	Entity Name (Registered User in NERLDC)	Capacity considered for FRO (MW)	Avg. Generation (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	BONGAIGAON TPP (NTPC)	750	458	29	19
2	DOYANG, NEEPCO	75	50	3	2
3	KAMENG, NEEPCO	600	349	22	14
4	KOPILI, NEEPCO	200	162	10	7
5	LOKTAK, NHPC	105	88	6	4
6	PALATANA, OTPC	727	424	27	17
7	PARE, NEEPCO	110	59	4	2
8	PANYOR, NEEPCO	405	237	15	10
9	Subansiri Lower H.E. Project	750	579	37	24

*FRO shall be nil in case of a control area not having any generation resources

Frequency Response Obligation of Nepal & Bhutan for FY 2026-27

Transnational					
Sl. No.	States	Avg. Generation (MW)	Avg. Demand (MW)	FRO (MW/Hz)	
				Solar Hours	Non-Solar Hours
1	Nepal	391	176	36	23
2	Bhutan	1000	219	78	50

*FRO shall be nil in case of a control area not having any generation resources