

Frequency Response Characteristic Calculation for All India based on NLDC SCADA Data

EVENT:

On 15-Jan-2024, at 13:59 hrs phase-to-phase (R-B) fault occurred on 400 kV Bhadla (Raj)-Bikaner (Raj)-1 line due to conductor snapping between tower location no. 456-457. This fault led to reduction in active power of RE plants connected to Bhadla, Bikaner, and Fatehgarh stations. As per the SCADA data, around 2000 MW generation reduction was observed in NR Solar generation (NR solar dropped from 17185MW to 15112MW).

S No	Particulars	Dimension	NR	ER	WR	NER	SR
1	Actual Net Interchange before the Event (05:16:04)	MW	10942	-7198	-7395	-15	3596
2	Actual Net Interchange after the Event (05:17:28)	MW	12361	-7480	-8099	-17	2960
3	Change in Net Interchange (2-1)	MW	1419	-281	-704	-2	-636
4	Generation Loss (+) / Load Throw off (-) during the Event	MW	2000	0	0	0	0
5	Control Area Response (3 - 4)	MW	-581	-281	-704	-2	-636
6	Frequency before the Event	HZ	50.06	50.06	50.06	50.06	50.06
7	Frequency after the Event	HZ	50.02	50.02	50.02	50.02	50.02
8	Change in Frequency (7 - 6)	HZ	-0.041	-0.041	-0.041	-0.041	-0.041
9	Frequency Response Characteristic (5 / 8)	MW/Hz	14173	6862	17169	61	15521
10	Net System Demand met before the Event	MW	61245	18541	65024	1651	48851
11	Internal Generation before the Event (10 - 1)	MW	50303	25739	72419	1665	45255
12	Ideal load response assuming 4% per Hz (0.04*Row 10)	MW/Hz	2450	742	2601	66	1954
13	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 11)	MW/Hz	20121	10296	28968	666	18102
14	Composite ideal response (12 + 13)	MW/Hz	22571	11037	31569	732	20056
15	Percentage ideal response	%	62.8%	62.2%	54.4%	8.3%	77.4%

(*) - Data may be constant/suspected during the event
 Note: +ve exchange=> import ; (-)ve exchange => export

only interchange of 132kv Surjamani-comilla D/c.

Total Change in (MW)	2000
FRC for NEWS GRID (dp/df) MW/Hz	48780
Power Number (net change in MW/maximum change in frequency)	10959

Source Wise Generation (MW)	GAS	HYDRO	NUCLEAR	Thermal	WIND	SOLAR
		2387	4274	4668	140466	1171

Percentage of Non responsive generation to Primary frequency response (nuclear+ wind+ solar) as a percentage of total generation	24.42%
Percentage of non rotating generation (wind+ solar) as a percentage of total generation	22.03%