

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

EVENT: On 28th March 2023, As reported KSTPS 400kV Bus-4 was under Emergency shutdown. At 10:37 hrs, 400kV Bus-1,2 & 3 also got tripped due to fault in 400kV Bus-3 and resulted in black out of KSTPS Station. During the event generation loss of around 2416 MW observed and same has been considered in FRC Calculation.

S No	Particulars	Dimension	NR	ER	WR	NER	SR
1	Actual Net Interchange before the Event (10:37:32)	MW	-2552	-7664	-2406	605	11316
2	Actual Net Interchange after the Event (10:38:32)	MW	-2801	-7843	-1273	601	10552
3	Change in Net Interchange (2-1)	MW	-249	-179	1133	-3.7	-765
4	Generation Loss (+) / Load Throw off (-) during the Event	MW	0	0	2416	0	0
5	Control Area Response (3 - 4)	MW	-249	-179	-1283	-4	-765
6	Frequency before the Event	HZ	50.00	50.00	50.00	50.00	50.00
7	Frequency after the Event	HZ	49.93	49.93	49.93	49.93	49.93
8	Change in Frequency (7 - 6)	HZ	-0.069	-0.069	-0.069	-0.069	-0.069
9	Frequency Response Characteristic (5 / 8)	MW/Hz	3608	2598	18597	54	11082
10	Net System Demand met before the Event	MW	44788	21092	64114	1948	61089
11	Internal Generation before the Event (10 - 1)	MW	47341	28756	66520	1343	49773
12	Ideal load response assuming 4% per Hz (0.04*Row 10)	MW/Hz	1792	844	2565	78	2444
13	Ideal generator response assuming 5% droop.....40% per Hz (40% of Row 11)	MW/Hz	18936	11502	26608	537	19909
14	Composite ideal response (12 + 13)	MW/Hz	20728	12346	29172	615	22353
15	Percentage ideal response	%	17.4%	21.0%	63.7%	8.8%	49.6%

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

Total Change in (MW)	2416
FRC for NEWS GRID (dp/df) MW/Hz	35014
Power Number (net change in MW/maximum change in frequency)	12080

Source Wise Generation (MW)	GAS	HYDRO	NUCLEAR	Thermal	WIND	SOLAR
	2418	8627	5122	137108	1171	40331