

पावर सिस्टम ऑपरेशन कारपोरेशन लिमिटेड

(पावरग्रिड की पूर्ण स्वामित्व प्राप्त सहायक कंपनी)

POWER SYSTEM OPERATION CORPORATION LIMITED

(A wholly owned subsidiary of POWERGRID)



पंजीकृत एवं केन्द्रीय कार्यालय : बी - 9, कुतुब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली - 110 016

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संदर्भ संख्या:-POSOCO/NLDC/GM/

दिनांक: 23.08.2012

सेवा में,

वितरण सूची के अनुसार

विषय:- निष्पादन रिपोर्ट - जुलाई 2012

महोदय,

आई०ई०जी०सी०-2010 के प्रावधान के अनुसार, - जुलाई 2012 माह की अखिल भारतीय प्रणाली की निष्पादन रिपोर्ट

धन्यवाद

भवदीय

(अवधेश मणि)

अपर महाप्रबंधक

(रा०भा०प्रे०के०)

संलग्नक: मासिक प्रणाली रिपोर्ट

POWER SYSTEM OPERATION CORPORATION LTD
NATIONAL LOAD DESPATCH CENTRE



OPERATIONAL PERFORMANCE REPORT FOR THE
MONTH OF JULY 2012

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SUMMARY OF REPORT FOR THE MONTH OF JULY 2012

- During the month of July 2012, the overall system was running normal to the large extent except few events / incidents. The maximum of all India peak demand met was 115403MW (on 04-07-2012) which is 2.74% more as compared to last year July month demand (112241MW) and 2.30% less as compared to June 2012 demand (118066MW).
- For 73.59% of time, the NEW grid frequency was in the IEGC band (49.5 – 50.2) against 78.66% of the time in the last month (June 2012). For SR Grid, the frequency remained within the IEGC band for 92.18% of the time against 91.03 % of the time in the last month (June 2012).
- All India energy consumption was 77152 MU at the average of 2572 MUs/day which is 2.99% less than that of last month (June 2012) average energy consumption (79472 MUs, Average 2649 MUs/day) and 5.44% more than the last year July month average energy consumption (75398MUs, Average 2432 MUs/day).
- There was around 13.74% decrement in average all India Hydro generation compared to last year & 7.34% increment compared to last month.
- Regarding wind generation, there was around 0.6% increment in average all India wind generation compared to last month. July 2012 average wind generation was 160 MUs/day against 159MUs/day in June 2012.
- During the month two major Grid Disturbance occurred on 30th and 31st July 2012 which resulted into collapse of Northern Region on 30.07.12 and Northern , Eastern & North Eastern region on 31.07.12 respectively. Details are in Important Events / Disturbances .

ALL INDIA REGIONWISE GENERATING INSTALLED CAPACITY (MW) OF POWER UTILITIES INCLUDING ALLOCATED SHARES IN JOINT AND CENTRAL SECTOR UTILITIES

(As on 31-07-12)

SL. NO.	REGION	THERMAL			Nuclear	HYDRO (Renewable)	R.E.S.@ (MNRE)	TOTAL	
		COAL	GAS	DSL					TOTAL
1	Northern	29923.50	4671.26	12.99	34607.75	1620.00	15423.75	4437.65	56089.15
2	Western	41929.50	8254.81	17.48	50201.79	1840.00	7447.50	8146.69	67635.98
3	Southern	23032.50	4962.78	939.32	28934.60	1320.00	11338.03	11769.32	53361.95
4	Eastern	22337.88	190.00	17.20	22545.08	0.00	3882.12	410.71	26837.91
5	N. Eastern	60.00	824.20	142.74	1026.94	0.00	1200.00	228.00	2454.94
6	Islands	0.00	0.00	70.02	70.02	0.00	0.00	6.10	76.12
7	All India	117283.38	18903.05	1199.75	137386.18	4780.00	39291.40	24998.46	206456.04

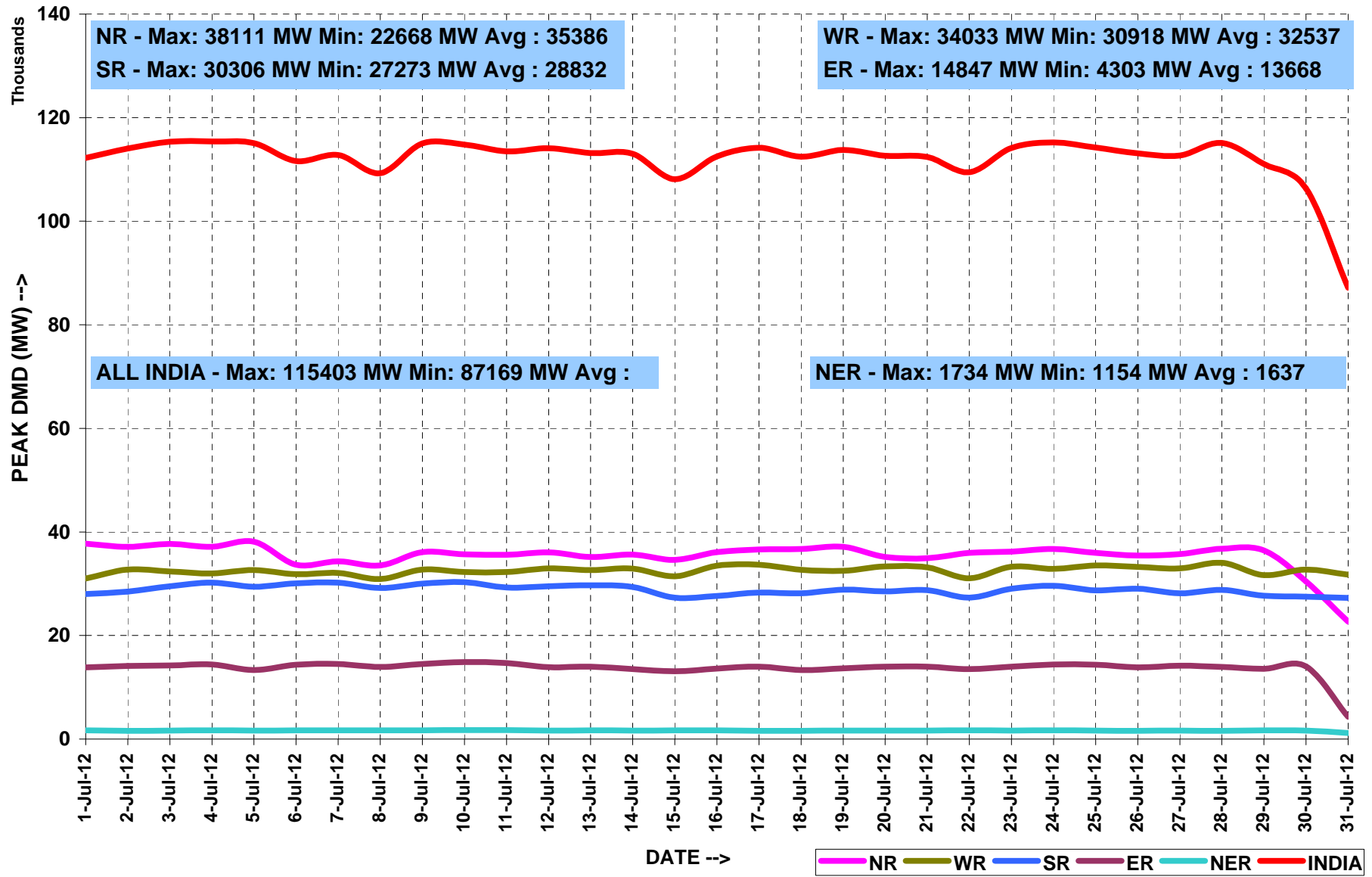
PEAK DEMAND MET AT NATIONAL LEVEL

MONTH:- JULY 2012

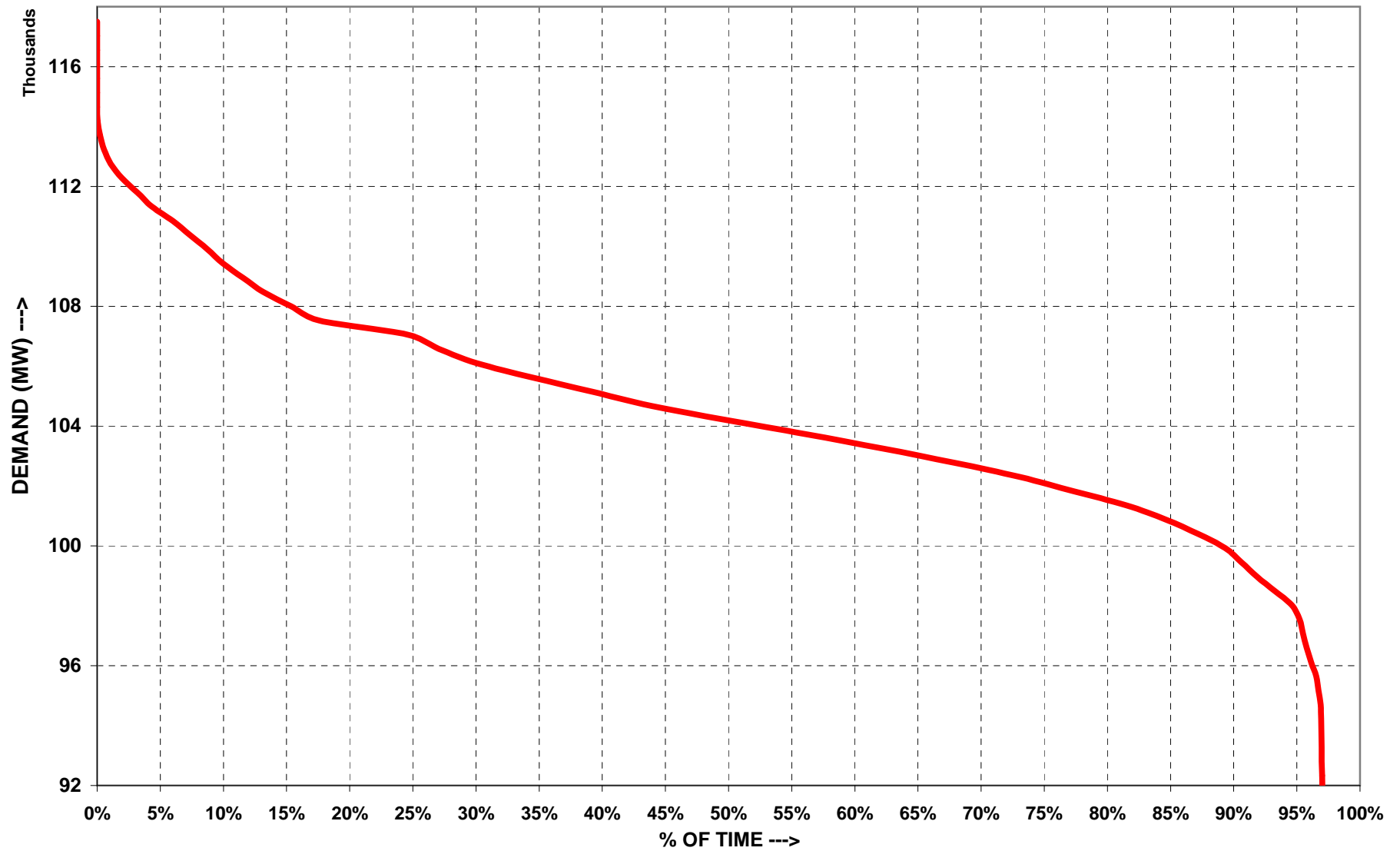
All figures in MW

Date	NR	WR	SR	ER	NER	TOTAL
7/1/2012	37744	30979	27998	13841	1674	112236
7/2/2012	37128	32717	28480	14126	1590	114041
7/3/2012	37674	32338	29511	14226	1615	115364
7/4/2012	37136	31989	30194	14416	1668	115403
7/5/2012	38111	32616	29406	13310	1650	115093
7/6/2012	33669	31852	30065	14342	1672	111600
7/7/2012	34329	32062	30220	14495	1667	112773
7/8/2012	33531	30918	29192	13927	1688	109256
7/9/2012	36106	32727	30007	14482	1693	115015
7/10/2012	35658	32253	30306	14847	1734	114798
7/11/2012	35584	32254	29277	14669	1718	113502
7/12/2012	36042	32989	29519	13905	1652	114107
7/13/2012	35151	32653	29703	13958	1681	113146
7/14/2012	35612	32916	29343	13531	1629	113031
7/15/2012	34622	31422	27308	13082	1675	108109
7/16/2012	36078	33498	27643	13594	1677	112490
7/17/2012	36623	33689	28281	13966	1611	114170
7/18/2012	36702	32681	28139	13350	1600	112472
7/19/2012	37105	32484	28871	13639	1650	113749
7/20/2012	35180	33333	28509	13976	1631	112629
7/21/2012	34907	33153	28736	13960	1651	112407
7/22/2012	35947	31032	27307	13515	1663	109464
7/23/2012	36210	33270	29043	13965	1657	114145
7/24/2012	36700	32867	29595	14394	1661	115217
7/25/2012	35966	33545	28698	14363	1646	114218
7/26/2012	35421	33245	29036	13828	1587	113117
7/27/2012	35747	32974	28147	14156	1659	112683
7/28/2012	36734	34033	28811	13947	1591	115116
7/29/2012	36416	31673	27697	13557	1699	111042
7/30/2012	30451	32713	27486	14048	1617	106315
7/31/2012	22668	31771	27273	4303	1154	87169
MAXIMUM	38111	34033	30306	14847	1734	115403
MINIMUM	30451	30918	27307	13082	1587	106315
AVERAGE	35809	32563	28884	13980	1654	112890

PEAK DEMANDS MET DURING THE MONTH OF JULY' 2012



ALL INDIA LOAD DURATION CURVE FOR JULY' 2012



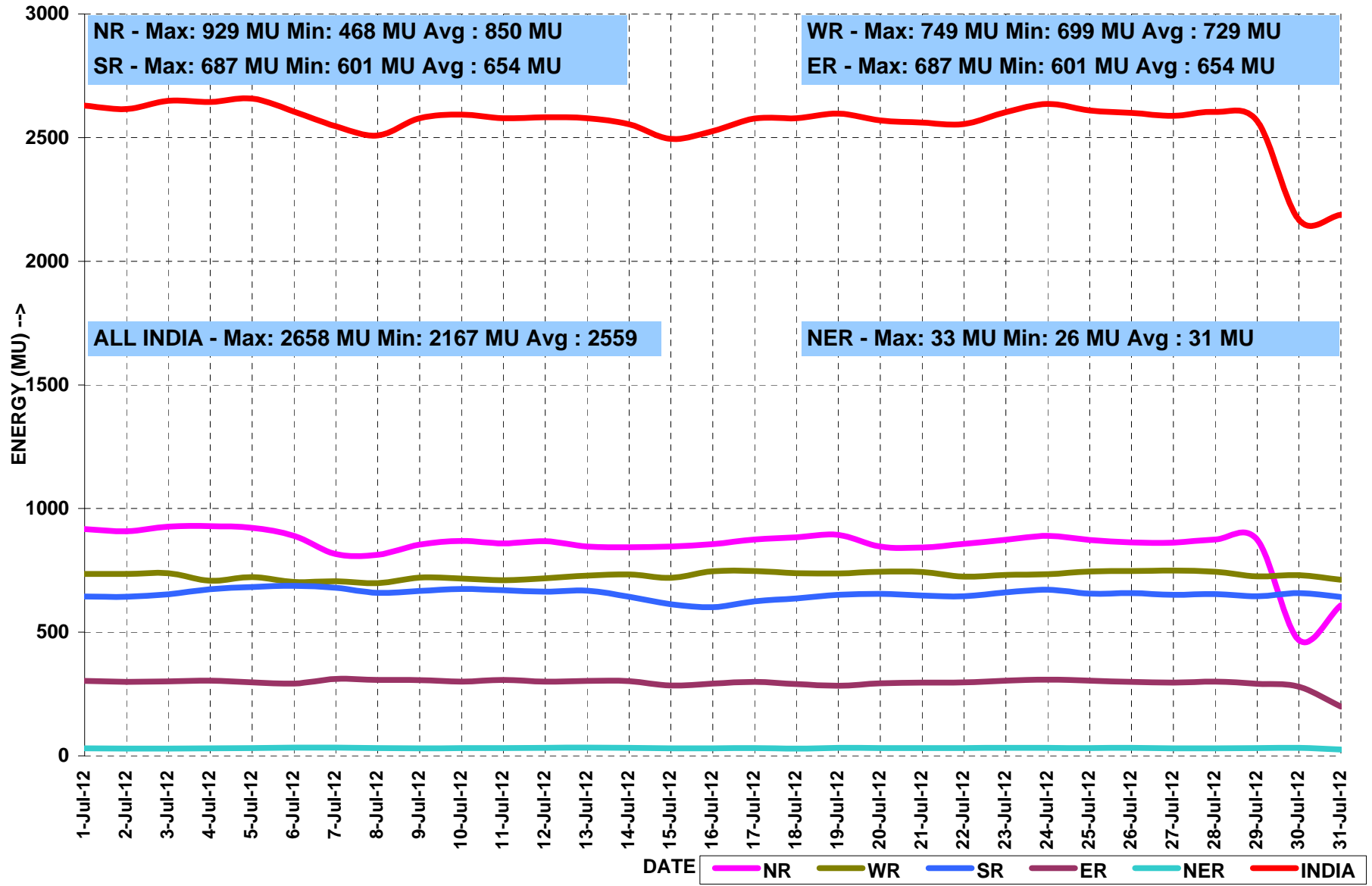
ENERGY MET AT NATIONAL LEVEL

MONTH:- JULY 2012

All figures in MU

Date	NR	WR	SR	ER	NER	TOTAL
7/1/2012	917	735	644	303	30	2629
7/2/2012	908	736	643	299	30	2616
7/3/2012	927	738	653	301	30	2649
7/4/2012	929	708	674	304	30	2644
7/5/2012	922	723	683	298	31	2658
7/6/2012	890	703	687	292	33	2605
7/7/2012	816	706	680	311	33	2546
7/8/2012	813	699	659	307	32	2509
7/9/2012	854	721	667	306	31	2579
7/10/2012	869	717	675	300	31	2593
7/11/2012	859	711	669	307	32	2578
7/12/2012	868	718	664	300	33	2582
7/13/2012	846	729	668	303	33	2579
7/14/2012	844	733	643	302	32	2554
7/15/2012	847	720	613	284	31	2495
7/16/2012	856	746	601	293	31	2527
7/17/2012	875	747	625	299	31	2577
7/18/2012	884	739	636	290	30	2578
7/19/2012	893	737	651	283	32	2597
7/20/2012	846	744	655	293	31	2569
7/21/2012	843	743	648	296	31	2560
7/22/2012	857	725	645	297	31	2555
7/23/2012	874	732	661	304	32	2603
7/24/2012	889	735	672	308	32	2636
7/25/2012	873	746	656	304	32	2610
7/26/2012	863	747	658	299	32	2600
7/27/2012	862	749	651	296	30	2588
7/28/2012	875	744	654	300	31	2604
7/29/2012	874	726	645	291	32	2567
7/30/2012	468	731	658	279	32	2167
7/31/2012	609	712	642	199	26	2188
TOTAL	25740	21885	19638	8948	940	77152
MAXIMUM	929	749	687	311	33	2658
MINIMUM	468	699	601	279	30	2167
AVERAGE	858	730	655	298	31	2572

ENERGY MET DURING THE MONTH OF JULY' 2012

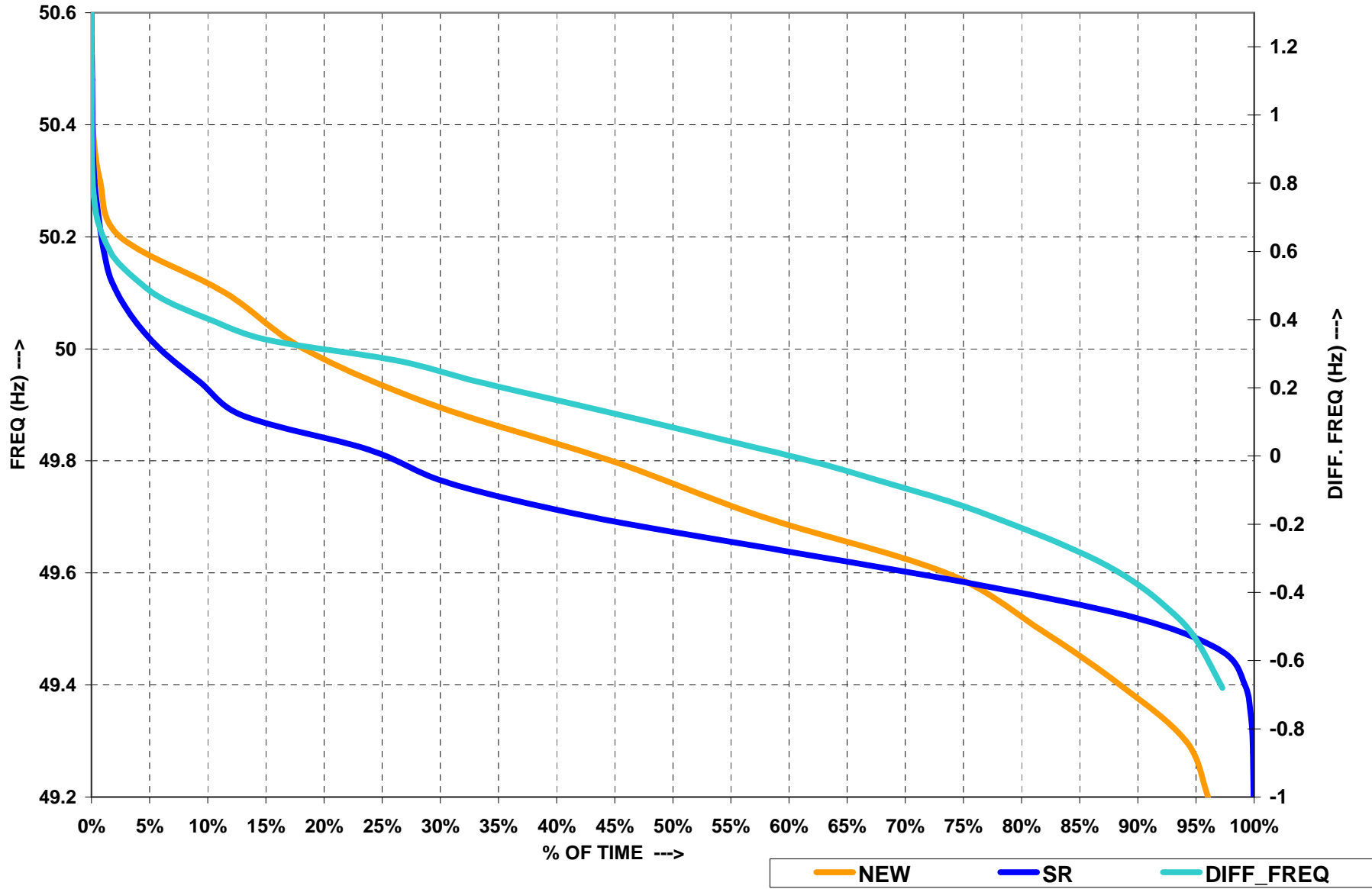


FREQUENCY PROFILE FOR THE MONTH OF JULY 2012

SR GRID										
FREQUENCY PROFILE		< 48.5	48.5 - 49.5	< 49.5	49.5 - 50.2	>50.2		Max. Freq	Min. Freq	Avg. Freq
% TIME	Apr-12	0.00	7.79	7.79	91.28	0.93		50.66	48.66	49.69
	May-12	0.00	5.61	5.61	94.01	0.38		50.63	48.81	49.7
	Jun-12	0.00	7.83	7.83	91.03	1.14		50.79	48.86	49.68
	Jul-12	0.00	0.00	6.95	92.18	0.87		50.61	48.81	49.69

NEW GRID										
FREQUENCY PROFILE		< 48.5	48.5 - 49.5	< 49.5	49.5 - 50.2	>50.2		Max. Freq	Min. Freq	Avg. Freq
% TIME	Apr-12	0.00	2.38	2.38	93.68	3.94		50.66	49.08	49.9
	May-12	0.00	10.82	10.82	87.82	1.36		50.75	48.82	49.8
	Jun-12	0.00	19.95	19.95	78.66	1.39		50.68	48.75	49.7
	Jul-12	0.00	24.38	24.38	73.59	2.03		51.21	49.79	49.68

FREQUENCY DURATION CURVES FOR JULY' 2012



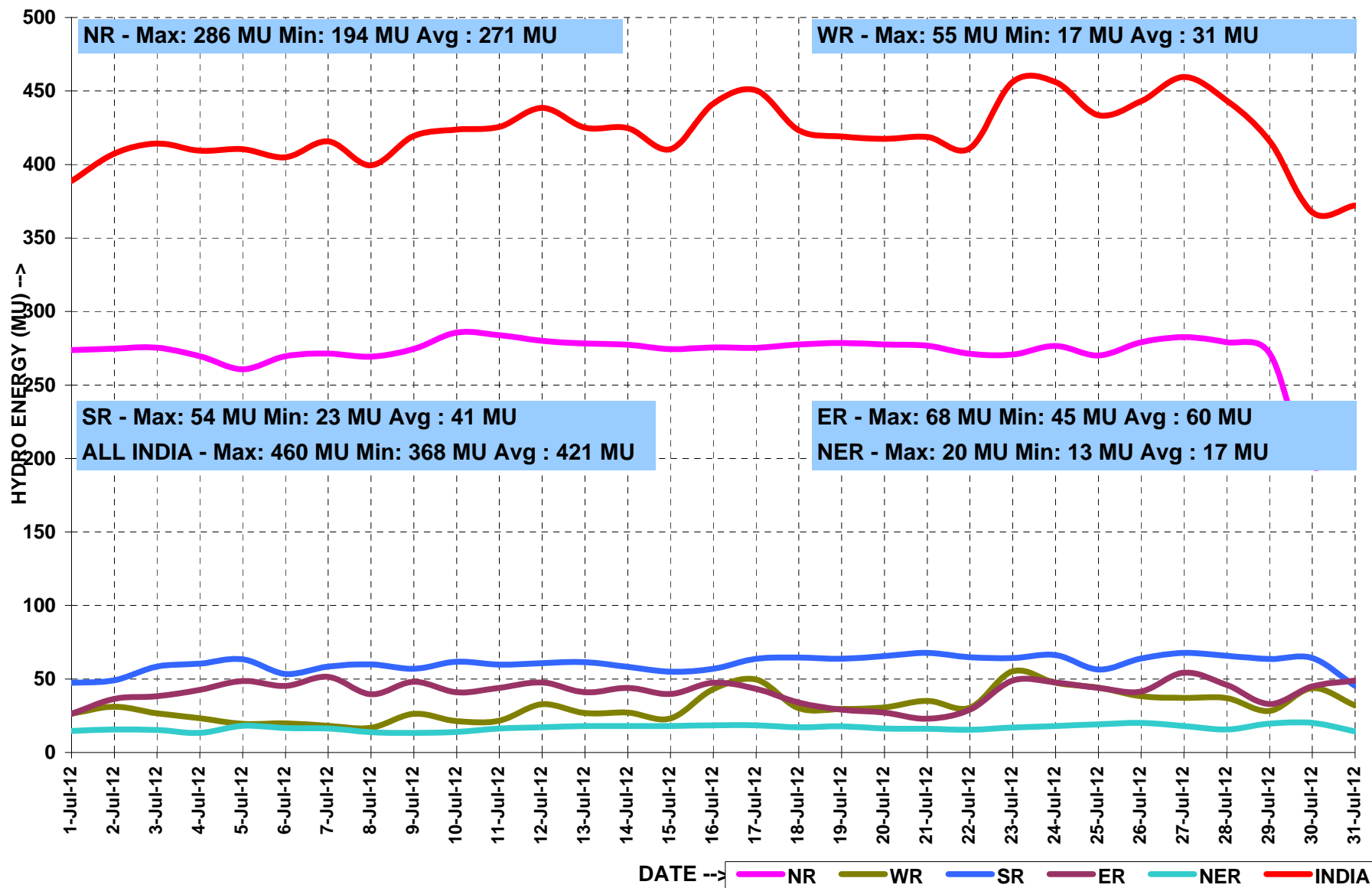
HYDRO GENERATION AT NATIONAL LEVEL

MONTH:- JULY 2012

All figures in MU

Date	NR	WR	SR	ER	NER	TOTAL
7/1/2012	274	26	26	48	15	389
7/2/2012	275	31	37	49	16	407
7/3/2012	275	27	38	59	15	414
7/4/2012	270	23	43	61	13	409
7/5/2012	261	19	49	64	18	410
7/6/2012	270	20	45	54	17	405
7/7/2012	271	18	51	59	16	416
7/8/2012	269	17	40	60	14	399
7/9/2012	275	26	48	57	13	419
7/10/2012	286	21	41	62	14	424
7/11/2012	284	22	44	60	16	426
7/12/2012	280	33	48	61	17	439
7/13/2012	278	27	41	61	18	425
7/14/2012	277	27	44	58	18	425
7/15/2012	274	23	40	55	18	410
7/16/2012	276	43	47	57	18	441
7/17/2012	275	50	43	64	18	450
7/18/2012	278	30	34	65	17	423
7/19/2012	279	30	29	64	18	419
7/20/2012	278	31	27	66	16	417
7/21/2012	277	35	23	68	16	419
7/22/2012	271	30	29	65	16	411
7/23/2012	271	55	49	64	17	456
7/24/2012	277	48	48	66	18	456
7/25/2012	270	44	44	56	19	434
7/26/2012	279	38	41	64	20	443
7/27/2012	283	37	54	68	18	460
7/28/2012	279	37	46	66	16	443
7/29/2012	272	28	33	64	20	416
7/30/2012	194	44	45	64	20	368
7/31/2012	232	32	49	45	14	372
TOTAL	8175	941	1228	1825	506	12674
MAXIMUM	286	55	54	68	20	460
MINIMUM	194	17	23	48	13	368
AVERAGE	273	31	41	61	17	422

HYDRO ENERGY DURING THE MONTH OF JULY' 2012



WIND GENERATION AT NATIONAL LEVEL

MONTH:- JULY 2012

All figures in MU

Date	NR	WR	SR	ER	NER	TOTAL
7/1/2012	18	29	101	...	...	148
7/2/2012	12	17	102	...	...	131
7/3/2012	13	38	103	...	...	153
7/4/2012	27	37	107	...	...	170
7/5/2012	25	44	99	...	...	169
7/6/2012	29	56	101	...	...	185
7/7/2012	31	59	94	...	...	184
7/8/2012	10	38	87	...	...	135
7/9/2012	6	30	87	...	...	123
7/10/2012	7	28	92	...	...	126
7/11/2012	9	25	91	...	...	125
7/12/2012	17	31	86	...	...	134
7/13/2012	33	50	91	...	...	174
7/14/2012	31	55	67	...	...	154
7/15/2012	24	48	43	...	...	115
7/16/2012	6	36	25	...	...	67
7/17/2012	8	38	49	...	...	95
7/18/2012	26	61	83	...	...	170
7/19/2012	34	76	96	...	...	206
7/20/2012	15	72	103	...	...	189
7/21/2012	7	52	97	...	...	156
7/22/2012	4	63	99	...	...	166
7/23/2012	23	70	103	...	...	196
7/24/2012	31	73	107	...	...	210
7/25/2012	25	71	99	...	...	195
7/26/2012	12	72	112	...	...	196
7/27/2012	9	64	98	...	...	171
7/28/2012	14	68	98	...	...	180
7/29/2012	26	75	102	...	...	203
7/30/2012	16	71	97	...	...	184
7/31/2012	16	65	98	...	...	180
TOTAL	546	1543	2719	...	...	4808
MAXIMUM	34	76	112	...	...	210
MINIMUM	4	17	25	...	...	67
AVERAGE	18	51	91	...	...	160

ACTUAL POWER SUPPLY POSITION - JULY 2012

REGION	STATE	Requirement/Availability in MU/DAY			Requirement/Availability in MU				Peak Demand/Peak Met in MW			
		Requirement	Energy met	Surplus(+)/ Deficit(-)	Requirement	Energy met	Surplus(+)/ Deficit(-)	% Shortage	Requirement	Peak Demand	Surplus(+)/ Deficit(-)	% Shortage
NR	Chandigarh	6	6	0	180	180	0	0	340	340	0	0
	Delhi	99	99	0	3068	3067	-1	0	5727	5642	-85	-1
	Haryana	139	125	-14	4317	3877	-440	10	8066	6725	-1341	-17
	H.P.	23	23	-1	728	707	-21	3	1166	1152	-14	-1
	J&K	38	28	-9	1176	882	-294	25	2277	1708	-569	-25
	Punjab	208	184	-24	6457	5704	-753	12	10079	9074	-1005	-10
	Rajasthan	142	138	-4	4398	4286	-112	3	7765	7690	-75	-1
	U.P.	262	218	-44	8122	6745	-1377	17	13840	11975	-1865	-13
	Uttarakhand	32	30	-2	987	921	-65	7	1749	1571	-178	-10
	NFF/Railway	2	2	0	69	69	0	0	102	102	0	0
	TOTAL	952	853	-99	29502	26438	-3064	10	44172	41790	-2382	-5
WR	Gujarat	238	235	-3	7371	7286	-84	-1	12025	11758	-267	-2
	Madhya Pradesh	103	95	-9	3208	2935	-273	-9	6249	5508	-741	-12
	Chhattisgarh	62	61	-1	1912	1882	-30	-2	3030	2866	-164	-5
	Maharashtra	322	312	-10	9986	9675	-311	-3	15776	14982	-794	-5
	Goa	7	7	0	219	218	-1	0	450	418	-32	-7
	D&D	6	6	0	183	177	-6	-3	274	241	-33	-12
	DNH	14	14	0	433	425	-8	-2	605	596	-9	-1
	TOTAL	752	729	-23	23311	22598	-713	-3	36111	33689	-2422	-7
SR	AP-TRANSCO	252	209	-43	7817	6481	-1336	-17	10722	9508	-1214	-11
	KPTCL	176	150	-25	5441	4656	-785	-14	9131	7831	-1300	-14
	KSEB	56	54	-1	1725	1682	-43	-2	3331	3268	-63	-2
	TNEB	257	235	-23	7981	7272	-709	-9	11863	11105	-758	-6
	PONDY	6	6	0	197	188	-9	-5	314	311	-3	-1
	TOTAL	747	654	-93	23161	20279	-2882	-12	35640	30831	-4809	-13
ER	Bihar	38	34	-38	1170	1055	-115	-10	2450	1740	-710	-29
	JSEB	19	18	0	580	571	-9	-2	1085	991	-94	-9
	GRIDCO	50	49	0	1535	1523	-12	-1	2480	2460	-20	-1
	DVC	69	63	-6	2143	1956	-187	-9	3500	3164	-336	-10
	West Bengal	129	130	1	4000	4016	16	0	6454	7043	589	9
	TOTAL	304	294	-10	9428	9121	-307	-3	16600	15153	-1447	-9
NER	Arunachal Pradesh	2	2	0	52	50	-2	0	112	110	-3	0
	Assam	20	18	-2	614	567	-47	0	1109	1072	-37	0
	Manipur	2	2	0	50	48	-3	0	117	112	-4	0
	MeSEB	5	4	0	146	136	-10	0	280	279	-1	0
	Mizoram	1	1	0	34	32	-2	0	65	61	-4	0
	Nagaland	2	2	0	52	49	-3	0	96	94	-1	0
	Tripura	3	3	0	97	90	-6	0	181	178	-3	0
	TOTAL	34	31	-2	1046	973	-73	0	1960	1906	-53	0

SCHEDULE AND DRAWAL OF CONSTITUENTS - JULY 2012

REGION	STATE	SCHEDULE (MU)	ACTUAL DRAWAL (MU)	Over drawal(+)/ Under Drawal(-) (MU)	SCHEDULE (MU/DAY)	ACTUAL DRAWAL (MU/DAY)	Over drawal(+)/ Under Drawal(-) (MU/DAY)
NR	Chandigarh	205	191	-14	7	6	0
	Delhi	2406	2152	-254	78	69	-8
	Haryana	2080	2491	412	67	80	13
	H.P.	114	72	-42	4	2	-1
	J&K	461	410	-51	15	13	-2
	Punjab	3521	3696	175	114	119	6
	Rajasthan	1407	1603	196	45	52	6
	U.P.	3012	3900	888	97	126	29
	Uttarakhand	303	370	67	10	12	2
NFF/Railway	61	69	8	2	2	0	
WR	Gujarat	1143	942	-201	37	30	-6
	Madhya Pradesh	1414	1323	-91	46	43	-3
	Maharashtra	3004	2865	-139	97	92	-4
	Chhattisgarh	412	426	14	13	14	0
	Goa	208	203	-5	7	7	0
	D&D	182	177	-5	6	6	0
	D&NH	439	425	-13	14	14	0
SR	APTRANSCO	1389	1513	124	45	49	4
	KPTCL	1108	1146	39	36	37	1
	KSEB	1029	1141	112	33	37	4
	TNEB	1823	1734	-89	59	56	-3
	PONDY	197	188	-9	6	6	0
	GOA(SR)	57	46	-12	2	1	0
ER	Bihar	1174	1075	-99	38	35	-3
	JSEB	362	312	-50	12	10	-2
	DVC	-387	-455	-68	-12	-15	-2
	GRIDCO	594	661	66	19	21	2
	Sikkim	863	825	-38	28	27	-1
	WBSEB	30	30	0	1	1	0
NER	Arunachal Pradesh	64	49	-15	2	2	0
	Assam	396	403	7	13	13	0
	Manipur	68	49	-19	2	2	-1
	MeSEB	71	63	-8	2	2	0
	Mizoram	36	27	-9	1	1	0
	Nagaland	33	36	3	1	1	0
	Tripura	37	33	-4	1	1	0

Inter-Regional Exchanges (2012-2013)

All figs. in MUs
ALL FIGURES ARE IN MUs

		Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Total FINANCIAL YEAR2012-13 (Till June'12)
*	WR-NR	HVDC Vindhyachal B/B	22.31	146.15	203.64	198.81								570.91
		HVDC Mundra-M'garh				221.62								221.62
		220KV Aur.-Mal.	0.33	0.00	1.51	9.17								11.00
		220KV Kota/Morak-Badod	6.94	40.25	11.71	42.95								101.84
		400KV Agra-Gwalior	460.85	610.16	697.97	712.15								2481.14
		400KV Kankroli-Jerda	4.20	20.06	72.81	66.97								164.04
		400KV Bhinmal-Jerda	3.30	40.92	72.65	94.51								211.38
*	ER-NR	400KV Barh - Balia	114.24	214.97	175.75	122.11								627.07
		HVDC Sasaram B/B (Bypass wef 1 DEC'08)	22.34	63.33	58.57	180.46								324.70
		400KV Mzp-Gkp	309.11	484.33	447.30	670.69								1911.42
		220/132kV	105.31	98.91	105.40	98.24								407.85
		400KV Patna-Balia	224.55	320.90	299.47	370.14								1215.05
		400kV Pusauli- Balia	0.00	0.00	7.54	13.48								21.02
		400KV Biharshariff-Balia	208.57	293.31	274.10	330.85								1106.83
*	NR-WR	HVDC Vindhyachal B/B	70.00	17.02	16.83	19.77								123.62
		220KV Aur.-Mal.	30.53	32.46	17.41	10.57								90.97
		220KV Kota/Morak-Badod	7.12	0.67	0.80	0.00								8.59
		400KV Agra-Gwalior	0.00	0.00	0.00	0.00								0.00
		400KV Kankroli-Jerda	86.94	14.45	11.31	5.92								118.62
		400KV Bhinmal-Jerda	68.76	8.67	12.42	8.51								98.37
*	NR-ER	400KV Barh - Balia	0.00	0.00	0.00	0.00								0.00
		220/132kV	27.60	26.92	26.92	28.05								109.50
		400KV Mzp-Gkp	0.00	0.00	0.00	0.00								0.00
		HVDC Sasaram B/B (Bypass wef 1 DEC'08)	64.08	22.02	39.74	6.49								132.33
		400KV Patna-Balia	0.00	0.00	0.00	0.00								0.00
		400kV Pusauli- Balia				3.69								3.69
		400KV Biharshariff-Balia	0.00	0.00	0.00	0.00								0.00
*	NR-Nepal		19.17	11.91	11.91	13.25								56.24
**	ER-SR	HVDC-Gaz.	157.65	108.00	195.80	349.42								810.87
		HVDC-Tal.	1571.43	1605.35	1427.68	1289.96								5894.42
**	SR-ER	HVDC-Gaz.	1.64	1.16	2.83	0.42								6.05
***	ER-WR	AC links	190.04	206.00	102.00	62.64								560.68
***	WR-ER	AC links	423.07	426.00	601.00	707.19								2157.26
***	ER-NER	AC links	250.18	232.00	106.00	114.95								703.13
***	NER-ER	AC links	0.55	0.00	0.00	21.01								21.56
**	SR-WR	Chandrapur HVDC	0.00	0.00	0.00	0.00								0.00
**	WR-SR	Chandrapur HVDC	564.51	542.48	566.08	654.82								2327.89
	TOTAL		5015	5588	5567	6429	0	0	0	0	0	0	0	22600
	ER-SR	Tal.-Kol. Interconnector	227.01	247.0	349.0	359.0								1182.01
	Net IR	(Excl. Tal.-II)	3217	3736	3790	4780	0	0	0	0	0	0	0	15523

** Data is taken from SRLDC

*** Data is taken from ERLDC

STOA (BILATERAL AND COLLECTIVE) & UI BILLING DETAILS- JULY' 2012

BILATERAL SHORT TERM OPEN ACCESS

Description	Name of RLDC	No. of Transactions	Energy Approved(MU)
JULY'12	NR	430	2844
	WR	105	802
	SR	112	1120
	ER	158	518
	NER	21	37
TOTAL		826	5321

COLLECTIVE SHORT TERM OPEN ACCESS

MONTH	NO. of Buyers/Sellers	Approved Energy (MU)
APR'12	1676	1337
MAY'12	1535	1478
JUN'12	1650	1630.38
JULY'12	1938	1572
TOTAL	6799	6018

MONTHLY UI BILLING DETAILS

REGION	(RS. IN CRORES)				
	NORTH	WEST	EAST	SOUTH	NORTH EAST
(Upto 29th APR'12)	342	249	161	69	17
(Upto 27th MAY'12)	937	630	363	135	32
(Upto 01st JULY'12)	1,913	1,109	807	219	56
(Upto 15th JULY'12)	2,252	1,287	1,017	262	71

POWER MARKET INFORMATION
EXCHANGES THROUGH POWER EXCHANGES (IEX & PXI) - JULY' 2012

S. No.	STATE	Through Power Exchange in MU	
		Sale	Purchase
1	Punjab	0.00	284.51
2	Haryana	0.00	112.72
3	Rajasthan	45.08	289.23
4	Delhi	87.54	21.19
5	Uttar Pradesh	0.00	144.62
6	Uttarakhand	0.00	11.54
7	Himachal Pradesh	339.45	2.41
8	J & K	8.73	0.00
9	UT Chandigarh	4.95	2.55
10	AD Hydro	22.26	0.00
11	KW	178.51	0.00
12	Shree Cement	10.23	0.00
13	Nathpa Jhakri	0.00	0.00
14	Baira Siul HEP(BS0)	3.48	0.00
15	Chamera-I HEP(CM1)	11.77	0.00
16	Chamera-II HEP(CM2)	12.27	0.00
17	Dhauliganga HEP(DG0)	11.57	0.00
18	Dulahasti HEP(DU0)	13.97	0.00
19	Salal HEP(SL0)	23.44	0.00
20	Sewa-II NHPC(SW2)	1.20	0.00
21	Tanakpur HEP(TP0)	3.59	0.00
22	Uri HEP(UR0)	16.55	0.00
23	MP	46.97	18.85
24	Maharashtra	76.54	49.09
25	Gujarat	95.96	352.19
26	Chattisgarh	62.62	0.00
27	Goa	21.48	0.00
28	Daman and Diu	0.00	0.00
29	Dadra & Nagar Haveli	0.00	0.00
30	JD	12.59	0.00
31	LANCO AMK	108.55	0.00
32	ACB India Limited	8.15	0.00
33	Jindal Steel and Power Ltd	51.10	0.00
34	Balco-II	2.28	0.00
35	Andhra Pradesh	31.39	43.44
36	Karnataka	107.26	6.55
37	Kerala	0.00	96.32
38	Tamilnadu	0.00	84.54
39	Pondicherry	0.00	0.00
40	Goa	0.00	0.00
41	LANCO_KONDPLY	0.00	0.00
42	SIMHAPURI	15.81	0.00
43	MINAXI	0.00	0.01
44	West Bengal	12.68	26.79
45	Orissa	12.19	3.63
46	Bihar	0.00	0.00
47	Jharkhand	0.00	0.00
48	Sikkim	14.67	0.00
49	DVC	60.09	0.00
50	STERLITE	14.84	0.00
51	Maitlon Power Ltd	3.25	0.00
52	Arunachal Pradesh	0.00	0.00
53	Assam	0.93	19.44
54	Manipur	0.00	0.00
55	Meghalaya	1.38	1.87
56	Mizoram	4.61	0.00
57	Nagaland	0.00	0.00
58	Tripura	0.00	0.77
59	ASSAM GBPP	3.19	0.00
60	KOPILI	0.80	0.00
61	Agartala GTPP(AG0)	0.89	0.00
62	Loktak	7	0.00

IMPORTANT EVENTS / DISTURBANCES – JULY 2012

(1) Grid Disturbance on 30th July, 2012

On 30th July, 2012 there was a grid disturbance in the NEW grid at 02:33:11 hrs that led to the separation of the NR grid from the rest of the NEW grid and eventually NR system collapsed with load loss of approximately 36000 MW.

Pre-Disturbance Conditions

The details of the generation-demand and power export/import scenario in the four regions of the NEW grid on 30.07.2012 at 02:00 hrs are given below.

S.No.	Region	Generation	Demand	Import	Remarks
1	NR	32636 MW	38322MW	5686MW	
2	ER	12452 MW	12213MW	(-)239MW	Bhutan import 1127 MW
3	WR	33024 MW	28053MW	(-)6229MW	
4	NER	1367 MW	1314MW	(-) 53MW	
Total	NEW Grid	79479 MW	79902MW		

The grid frequency, just prior to the disturbance, was 49.68 Hz. A number EHV lines were out prior to the disturbance and the same are listed here.

List of EHV Lines out on 30.07.2012 prior to Disturbance (400 kV and above and Inter-Region 220 kV and above)

SI No	Line	Voltage (kV)	Region	Out From Date	Remarks
	NR				
1	Fatehpur-Gaya	765	NR	27/07/12	Planned
2	Agra-Bassi-3	400	NR	28/07/12	Planned
3	Agra-Bassi-2	400	NR	28/07/12	Planned
4	Agra-Gwalior 2	400	WR-NR	28/07/12	Planned
5	Zerda-Kankroli	400	WR-NR	28/07/12	Planned
6	Agra-Fatehpur	765	NR	26/07/12	Constr Work
7	Bhiwadi-Neemrana	400	NR	23/07/12	HV Trip
8	Barh-Balia	400	ER-NR	29/07/12	HV Trip
9	Bhinmal-Kankroli	400	NR	29/07/12	Forced
10	Badod-Kota	220	WR-NR	29/07/12	Forced
11	Manesar-Neemrana	400	NR	15/07/12	Control HV
12	Bhilwara-Chhabra	400	NR	20/07/12	Control HV

13	Neemrana-Sikar	400	NR	20/07/12	Control HV
14	Barh-Balia 2	400	ER-NR	28/07/12	Control HV
15	Akal-Barmer 1	400	NR	28/07/12	Control HV
16	Chhabbra-Hindaun 2	400	NR	30/07/12	Control HV
17	Jodhpur II – RajWest 2	400	NR	30/07/12	Control HV
	WR				
1	Bina-Gwalior 2	400	WR	27/07/12	Planned
2	Nagda-Shujalpur 1	400	WR	07/07/12	Forced
3	Parli-Parli 2	400	WR	19/07/12	Forced
4	Satna-Bina 2	400	WR	26/07/12	Control HV
5	Damoh-Birsingpur 2	400	WR	13/07/12	Control HV
6	NAGda-RAjgarh 1	400	WR	20/07/12	Control HV
7	Seoni-Bina 1	765	WR	03/07/12	Control HV
8	Seoni-Wardha 2	765	WR	23/07/12	Control HV
9	Bina – Indore	400	WR	21/07/12	Possibly Bina-Nagda
10	Korba-Birsingpur	400	WR	05.07.12	Control HV
11	Birsingpur-Balco	400	WR	22/06/12	Control HV
12	Raigarh-Raipur 1	400	WR	20/07/12	Control HV
13	Raigarh-Raipur 2	400	WR	21/07/12	Control HV
14	Jabalpur-Itarsi 2	400	WR	20/07/12	Control HV
15	Itarsi-Khandwa 2	400	WR	20/07/12	Control HV
16	Nagda-Dehgam 1	400	WR	28/07/12	Control HV
17	Wardha-Akola-1	400	WR	20/07/12	Control HV
18	Parl(PG)-Sholapur 1	400	WR	23/07/12	Control HV
19	Bhadrawati-Parli 1	400	WR	21/07/12	Control HV
20	Aur'bad -Bhusawal	400	WR	27/06/12	Control HV
21	Aur'bad-Deepnagar	400	WR	03/07/12	Control HV
22	Karad-Kolhapur	400	WR	28/07/12	Control HV
23	Birsingpur-Katni	400	WR	14/06/12	Control HV
24	SSP-Rajgarh 2	400	WR	25/07/12	Control HV
25	ISP-Nagda	400	WR	24/07/12	Control HV
26	Itarsi-Bhopal	400	WR	29/07/12	Control HV
	ER				
1	Ranchi-MPL D/c	400	ER	27/07/12	Planned
2	Binaguri-Purnea 1	400	ER	18/07/12	Planned
3	Sagardighi-Durgapur	400	ER	25/07/12	Forced
4	Maithon-Durgapur 1	400	ER	28/07/12	Forced
5	Baripada-Mendhasal	400	ER	14/07/12	Forced

Sequence of Events on 30th July, 2012

Following are the sequence of the events, which took place on 30th July, 2012, leading to the Northern Grid blackout:

Sl.No.	Date & Time	Event
1.	30/07/2012 02:33:11.907 AM	400kV Bina – Gwalior-1 Line Tripped, Zone 3 tripping, Main-II
2.	30/07/2012 02:34	220 kV Gwalior-Malanpur 1. As per MP SLDC time is 02:34, but is manual timing . (This line has tripped probably just prior to sl no 1 above causing Malanpur and Mehgaon loads to be fed from NR system.)
3.	30/07/2012 02:33:13.438 AM	220 kV Bhinmal-Sanchor line, Zone-1 Tripped on Power Swing.++
4.	30/07/2012 02:33:13:927 AM	400 kV Jamshedpur – Rourkela line-2 tripped on Zone-3
5.	30/07/2012 02:33:13:996 AM	400 kV Jamshedpur – Rourkela line-1 tripped on Zone-3
6.	30/07/2012 02:33:15:400 AM	400 kV Gorakhpur-Muzaffarpur-2 tripped on Power Swing
7.	30/07/2012 02:33:15:425 AM	400 kV Gorakhpur-Muzaffarpur-1 tripped on Power Swing at Gorakhpur end. Line remained charged upto 3.03 am at Muzaffarpur end.
8.	30/07/2012 02:33:15:491 AM	400 kV Balia – Biharsharif-2 line tripped on power swing.
9.	30/07/2012 02:33:15:491 AM	400 kV Balia – Biharsharif-1 line tripped on Power swing.
10.	30/07/2012 02:33:15:542 AM	400 kV Patna – Balia (1 & 2) tripped on power swing++.

Restoration Sequence after Grid Disturbance on 30th July 2012

Date	Time of Restoration	Activity	Remarks
30-07-12	03:20	Western region supply extended from 400 kV Zerda TPS to 400 kV Bhinmal S/S.	Start up supply was extended to Rajwest TPS through 220 kV Bhinmal-Dhaurimanna-Rajwest.
30-07-12	03:35	Start up supply to KTPS was extended from western region through 220kV Badod-Morak	
30-07-12	03:40	Start up power to Giral TPS was extended from Bhinmal-Dhaurimanna-Barmer-Giral TPS	Power was extended to wind farm in Rajasthan
30-07-12	03:48	DMRC supply restored through BTPS-Mehrauli-DMRC	
30-07-12	04:07	220 kV Mehgaon-Auraiya charged	

30-07-12	04:21	Start up power extended to Tanda TPS (UP) from 220kV Gorakhpur-Tanda	After two hours Tanda unit 4 came up.
30-07-12	04:23	Western region supply extended from KTPS to Heerapura	Then Heerapura to Khetri to Jhunjhunu to Ratangarh to Suratgarh.
30-07-12	04:25	Dadri Gas self Started.	then supply was extended to 220kV Dadri Thermal through interconnector.
30-07-12	04:28	220 kV Dadri Thermal started up	
30-07-12	04:25	Power supply was extended from Dadri Gas to Dadri NCP through 400/220kV ICT.	
30-07-12	04:50	Anta GPS survived on House load. Later, it was synchronized to grid	
30-07-12	04:53	Power supply was extended from Sasaram in ER to 400kV Sarnath – AnparaTPS-1	Anpara Units started up at 06:47 Hrs
30-07-12	05:12	Power supply extended to ROSA TPS from 400kV Lucknow (PG)	
30-07-12	05:30	Startup power to Ropar TPS was extended through 220kV Bhakra-220/132kV Ganguwal-Kotla-Ropar	Ropar Units Started up at 12:00 Hrs
30-07-12	05:35	ShreeCement Unit#1 & 2 started up	Power was extended through Kota (PG)
30-07-12	05:48	Power supply from Sarojini Nagar (Uttar Pradesh) was restored.	
30-07-12	06:00	Power supply was extended from Sarojini Nagar-Raibareilly to Unchahar	
30-07-12	06:25	Second attempt to extend the Start up power to Singrauli through 400kV Singrauli-Anpara succeeded.	
30-07-12	06:35	Power extended to Rihand STPS through 400kV Singrauli-Rihand-2	
30-07-12	06:45	Start up power to Obra TPS was extended from Pipri (Rihand-Hydro) hydro station (Blackstarted)	
30-07-12	06:48	Badarpur TPS survived and operated in Island mode with Unit#1, 3 & 5 and this island collapsed.	
30-07-12	07:10	BTPS supply was extended through 220 kV Sarita Vihar.	
30-07-12	07:30	Startup power to Jhajjar TPS was extended from Mundka (Bawana-Mundka-Bamnoli)	

30-07-12	07:35	Start up supply to Parichha TPS was extended from 220kV Orai-1	
30-07-12	08:00	220kV FGPP-Samapur line charged.	
30-07-12	08:30	Start up power to Panipat Stage-2 was extended from Rohtak (Bahadurgarh-Luna Mazra-Sampla-Rohtak)	
30-07-12	09:20	Rihand unit 2 lighted up.	Synchronised at 11:20 Hrs
30-07-12	09:32	Start up power to LehraMohabbat TPS (Punjab) was extended from Barnala	
30-07-12	10:08	Singrauli unit#3 synchronized	
30-07-12	10:23	Start up supply to Khedar TPS extended from 400kV Fatehabad (PG)	
30-07-12	10:25	BTPS unit#3 Synchronized	
30-07-12	10:26	ObraTPS unit#9 synchronised	
30-07-12	11:30	Panpat unit#6 synchronized	
30-07-12	15:24	Paricha TPS unit#4 was synchronized	
30-07-12	15:30	Lehra Mohabbat unit#1 was synchronized	
30-07-12	18:56	Jhajjar TPS unit#1 was synchronized	
31-07-12	01:20	Khedar TPS unit#2 synchronized	

(2) Grid Disturbance on 31st July, 2012

While the grid recovered from the black out of 30th July 2011, another major disturbance took place on 31st July 2012 in the NEW grid at 13:00:13 hrs that led to the separation of the NR, NER and ER from the WR and eventually led to the collapse of the NR, ER and NER grids.

Pre-Disturbance Conditions on 31st July 2012

The details of the generation-demand as well as import/export of power in each of the four regions in the NEW grid on 31.07.2012 at 12:30 hrs are given below.

Sl. No	Region	Generation	Demand	Import	Remarks
1	NR	29884MW	33945MW	4061MW	
2	ER	13524MW	13179MW	(-) 345MW	Import from Bhutan 1114 MW.
3	WR	32612MW	28053MW	(-)4559MW	
4	NER	1014MW	1226MW	212MW	
Total	NEW Grid	76934MW	76403MW		

A number of EHV lines were out prior to the disturbance and the same are listed below. It may be noted that even after grid disturbance on the previous day; similar network operating conditions prevailed on this day as well. The frequency, just prior to the disturbance, was 49.84 Hz.

List of EHV Lines Out on 31.07.2012 Prior to Disturbance (400 kV and above and Inter-Region 220 kV and above)

SI No	Line	Voltage (kV)	Region	Out From Date	Remarks
	NR				
1	Bassi-Jaipur 1	400	NR	28/07/12	Planned
2	Agra-Bassi-2	400	NR	28/07/12	Planned
3	Agra-Gwalior 2	400	WR-NR	28/07/12	Planned
4	Zerda-Kankroli	400	WR-NR	28/07/12	Planned
5	Agra-Fatehpur	765	NR	26/07/12	Constr Work
6	Bhiwadi-Neemrana	400	NR	23/07/12	HV Trip
7	Barh-Balia	400	ER-NR	29/07/12	HV Trip
8	Bhinmal-Kankroli	400	NR	29/07/12	Forced
9	Badod-Kota	220	WR-NR	29/07/12	Forced
10	Manesar-Neemrana	400	NR	15/07/12	Control HV
11	Gorakhpur(PG)-Lucknow 2	400	NR	30/07/12	Forced and kept open
12	Kota-Merta 1	400	NR	30/07/12	Forced
13	Heerapura-Hindaun 2	400	NR	30/07/12	Forced
14	Neemrana-Sikar	400	NR	20/07/12	Control HV
15	Barh-Balia 2	400	ER-NR	28/07/12	Control HV
16	Akal-Barmer 1	400	NR	28/07/12	Control HV

17	Chhabbra-Hindaun 2	400	NR	30/07/12	Control HV
18	Barmer-RajWest2	400	NR	30/07/12	Control HV
19	Jodhpur II – RajWest 2	400	NR	30/07/12	Control HV
	WR				
1	Bina-Gwalior 2	400	WR	27/07/12	Planned
2	Parli-Parli 2	400	WR	19/07/12	Forced
3	Damoh-Birsingpur 2	400	WR	13/07/12	Control HV
4	Nagda-Rajgarh 1	400	WR	20/07/12	Control HV
5	Seoni-Bina 1	765	WR	03/07/12	Control HV
6	Seoni-Wardha 2	765	WR	23/07/12	Control HV
7	Bina – Indore	400	WR	21/07/12	Possibly Bina-Nagda
8	Korba-Birsingpur	400	WR	05.07.12	Control HV
9	Birsingpur-Balco	400	WR	22/06/12	Control HV
10	Raigarh-Raipur 1	400	WR	20/07/12	Control HV
11	Itarsi-Khandwa 2	400	WR	20/07/12	Control HV
12	Bachau-Ranchodpur	400	WR	30/07/12	Forced
13	Wardha-Akola-1	400	WR	20/07/12	Control HV
14	Parl(PG)-Sholapur 1	400	WR	23/07/12	Control HV
15	Bhadrawati-Parli 1	400	WR	21/07/12	Control HV
16	Aurangabad-Bhusawal	400	WR	27/06/12	Control HV
17	Aurangabad-Deepnagar 2	400	WR	03/07/12	Control HV
18	Karad-Kolhapur 2	400	WR	28/07/12	Control HV
19	Kolhapur-Mapusa 2	400	WR	26/07/12	Control HV
20	SSP-Rajgarh 2	400	WR	25/07/12	Control HV
21	ISP-Nagda	400	WR	24/07/12	Control HV
22	Itarsi-Bhopal	400	WR	29/07/12	Control HV
23	Adani-Sami 1	400	WR	31/07/12	Control HV
24	Amreli-Jetpur	400	WR	31/07/12	Control HV
25	Asoj-Chorani 1	400	WR	31/07/12	Control HV
	ER				
1	Ranchi-MPL D/c	400	ER	27/07/12	Planned
2	Binaguri-Purnea 1	400	ER	18/07/12	Planned
3	Sagardighi-Durgapur	400	ER	25/07/12	Forced
4	Baripada-Mendhasal	400	ER	14/07/12	Forced

Sequence of Events on 31st July, 2012

The following lines had tripped within an interval of a few hours prior to the grid disturbance.

1. 400 kV Zerda-Bhinmal
2. 400 kV Zerda- Kankroli
3. 220 kV Badod-Modak- tripped a few minutes before the event
4. 220 kV Badod-Kota- tripped a few minutes before the event

In addition Suratgarh TPS unit-1 also tripped around this time.

The following are the sequence of events, which took place on 31st July 2012 leading to the blackouts in the Northern, North-Eastern and Eastern regions.

Sl.No.	Time	Event
1.	31/07/2012 13:00:13	400kVBina – Gwalior-1 line tripped at Bina end on Zone 3 Protection due to load encroachment, 400kV Bina-Gwalior-2 was already out of service.
2.	31/07/2012 13:00:13	220kV Bina – Gwalior-1 line tripped at Bina end due to R&B over current 220kV Bina – Gwalior-2 line tripped at Bina end due to R&B over current
3.	31/07/2012 13:00:13	220kV Shivpuri-Sabalgarh-1 tripped
4.	31/07/2012 13:00:13	132kV Pichhore-Shivpuri tripped
5.	31/07/2012 13:00:13	132kV Pichhore-Chanderi tripped
6. *	31/07/2012 13:00:15:548	220 kV bus coupler tripped at Tarkera tripped (details not available)
7. *	31/07/2012 13:00:13:600	400 kV Jamshedpur-Rourkela-1 tripped at Jamshedpur on Main-1 (RAZFEE) protection, appears to be due to load encroachment. The L-L voltage before trip was about 362 kV and line current as 1.98 kA (appx. loading 1241 MVA)
8. *	31/07/2012 13:00:17:948	400 kV Ranchi- Maithon-1 tripped due to Power Swing.
9.	31/07/2012 13:00:19.605	400 kV Rourkela -Sterlite-2 tripped due to Over voltage (timings need to be confirmed)
10.	31/07/2012 13:00:19.891	400 kV Rourkela-Talcher-2 tripped due to Power Swing
11.	31/07/2012 13:00:19.897	400 kV Rourkela – Talcher-1 tripped due to Power Swing
12.	31/07/2012 13:00:19.908	400 kV Rourkela – Raigarh-3 tripped due to Power Swing and Over voltage
13.	31/07/2012 13:00:19.925	400 kV Rourkela-Ranchi-1 tripped due to Power Swing, D/T received

14.*	31/07/2012 13:00:19:945	400 kV Ranchi-Sipat-2 tripped on Power Swing
15.*	31/07/2012 13:00:19:948	400 kV Raigarh-Rourkela-3 tripped on Power Swing
16.*	31/07/2012 13:00:19:974	400 kV Ranchi-Rourkela-1 tripped on Power Swing
17.*	31/07/2012 13:00:19:981	400 kV Talchar-Rourkela-2 tripped on Power Swing
18.*	31/07/2012 13:00:19:986	400 kV Talchar-Rourkela-1 tripped on Power Swing
19.*	31/07/2012 13:00:20:017	400 kV Ranchi-Raghunathpur tripped on Power Swing
*Events taken from the POSOCO & POWERGRID report submitted to CEA, which are based on the DR and EL reports.		
20.	31/07/2012 13:00:25.021	400 kV Rourkela-Raigarh-1 tripped on over voltage
21.	31/07/2012 13:00:26.091	400 kV Rourkela-Ranchi-2 tripped due to Power Swing
22.	31/07/2012 13:00:30.625	400 kV Ballabgarh-Kanpur ckt2, tripped due to reactance relay operation.
23.	31/07/2012 13:00:32.444	400 kV Ballabgarh-Kanpur ckt3, tripped due to reactance relay operation.
24.	31/07/2012 13:00:35.558	Suratgarh Unit-6 tripped due to Under frequency problem (timing to be confirmed)
25.	31/07/2012 13:01:14.788	Suratgarh Unit-2 tripped due to under frequency problem (timing to be confirmed)
26.	31/07/2012 13:01:23.793	Vindhyachal HVDC B/B block-1 AC bus north: abnormal frequency trip because of Vidhyachal-Singrauli line tripping, EL or DR not available for Vindhyachal-Singrauli line.
27.	31/07/2012 13:01:25.078	Suratgarh Unit-5 tripped due to Under frequency problem
28.	31/07/2012 13:01:26.003	Vindhyachal HVDC B/B block-2 AC bus north: abnormal frequency trip because of Vidhyachal-Singrauli line tripping
29.	31/07/2012 13:01:26.343	400 kV Kankroli-Jodhpur tripped ICT differential relay pickup due to dip in voltage, SOTF
30.	31/07/2012 13:01:26.633	Nathta-Jhakri Powe Plant U1 tripped due to under frequency.
31.	31/07/2012 13:01:26.779	Nathta-Jhakri Power Plant U3 tripped due to under frequency.
32.	31/07/2012 13:01:26.786	Nathta-Jhakri Power Plant U2 tripped due to under frequency
33.	31/07/2012 13:01:26.823	Nathta-Jhakri Power Plant U4 tripped due to under frequency

34.	31/07/2012 13:01:28.205	Muzaffarpur-Gorakhpur-2, 3ph protection operated and tripped the line
35.	31/07/2012 13:01:27.226	Bhiwadi-Bassi, 400kV line tripped , Z1, Three phase tripping, Bhiwadi end operated
36.	31/07/2012 13:01:27.228	Bhiwadi-Rewari, 220kV tripped, 3Ph distance protection, Z1 Operated
37.	31/07/2012 13:01:27.497	220kV Bassi-IG Nagar tripped, 3Ph fault
38.	31/07/2012 13:01:27.497	220kV Bassi-Bhagru tripped, Z1, three phase fault
39.	31/07/2012 13:01:27.940	220kV, Bassi-Dausa line tripped, Z1, three phase fault
40.	31/07/2012 13:01:28.031	Muzaffarpur-Gorakhpur-1 tripped, Z2 operated
41.	31/07/2012 13:01:28.224	400kV, Agra-Bhiwadi1 tripped, SOTF
42.	31/07/2012 13:01:28.226	400kV, Agra-Bhiwadi2 tripped, SOTF
43.	31/07/2012 13:01:28.363	Wagoora-Kishenpur (1&2) tripped, Power Swing
44.	31/07/2012 13:01:29.072	400kV, Meerat-Koteswar (1&2)tripped, Power swing detected
45.	31/07/2012 13:01:29.686	Mandola-Dadri (1&2) tripped
46.	31/07/2012 13:01:29.726	Kaithal-Patiala line-1 tripped
47.	31/07/2012 13:01:29.742	Dadri-Malerkotla line tripped, Power Swing
48.	31/07/2012 13:01:29.762	Agra-Auraiya-II tripped, Z3, Three Phase
49.	31/07/2012 13:01:29.777	Malerkotla-Patiala tripped, Power swing
50.	31/07/2012 13:01:29.780	Malerkotla-Ludhiana Tripped, Power swing
51.	31/07/2012 13:01:29.816	Moga-Jalandhar (1&2) tripped, Power swing
52.	31/07/2012 13:01:29.832	Moga-Kishenpur-1 tripped, Power swing
53.	31/07/2012 13:01:29.920	Agra-Auraiya-I tripped, Z3, 3Ph
54.	31/07/2012 13:01:30.120	400kV, Ballabgarh-Maharanibagh Tripped, Z1, 3Ph tripping, SOTF
55.	31/07/2012 13:01:30.191	Kaithal-Kaithal-I tripped
56.	31/07/2012 13:01:30.276	Ballabgarh-Gr Noida tripped, Z1, 3phase

57.	31/07/2012 13:01:30.320	Allahabad-Sasaram disturbance, PSB Operated. Another report is also available with different time stamping on the same event. Suspecting time synchronization problem.
58.	31/07/2012 13:01:30.368	Kanpur-Panki-1 tripped, Under voltage
59.	31/07/2012 13:01:30.630	Agra-Bassi-I, SOTF
60.	31/07/2012 13:01:30.689	Kaithal-Kaithal-II tripped
61.	31/07/2012 13:01:30.702	HVDC Balia-Bhiwadi tripped, AC under voltage protection
62.	31/07/2012 13:01:30.833	Balia-Biharshariff tripped, Power Swing
63.	31/07/2012 13:01:31.219	Meramundali-Jeypore tripped
64.**	31/07/2012 13:01:32.684	400kV, Patna-Balia-2 tripped, 3-ph fault
65.	31/07/2012 13:01:42.867	Dadri-Rihand HVDC pole-2 blocked
66.	31/07/2012 13:01:42.871	Dadri-Rihand HVDC pole-1 blocked
67.	31/07/2012 13:03:18.363	Kankroli-Debari, 220kV tripped, Under voltage protection

**After event 64, the NR got practically isolated from the ER+NER and frequency started dropping (observed in the NR system) after a gap of about 1 minutes from the previous major event. The subsequent events of cascaded tripping led the NR, NER and ER system to practically total blackout.

Restoration Sequence after Grid Disturbance on 31st July 2012

1. Northern Region

Date	Time of Restoration	Activity	Remarks
31-07-2012	13:23	RPS HEP (132 kV) – Kota Sakatpura (220 kV) – Kota TPS (220 kV) Charged	Start up supply extended to Kota TPS.
31-07-2012	13:28	Power extended from Anta GPS which survived on house load to 220 kV Kota (Sakatpura)	
31-07-2012	13:30	400kV Zerda-Bhinmal(PG) charged..	Supply extended to Giral/Rajwest TPS via 220kV Bhinamal
31-07-2012	13:33	Uri HEP black started.	Power extended to Wagoora and was operated in island mode.

31-07-2012	13:38	Nathpa Jhakri HEP black started	Supply extended to Abdullpur
31-07-2012	13:41	Power extended from Anta GPS which survived on house load to RAPP-C	
31-07-2012	13:43	400kV Gwalior-Agra charged	
31-07-2012	13:45	220kV Badod- Morak charged	
31-07-2012	13:47	Salal HEP blackstarted	Power extended to 220kV Jammu & 220kV Kishanpur. However this island later collapsed.
31-07-2012	13:57	400kV Agra-Ballabgarh charged	
31-07-2012	14:00	Bhakra(L) blackstarted	
31-07-2012	14:00	Startup power extended to Dadri(Th)	Via 220 kV interconnector between Dadri GPP and Dadri (Th)
31-07-2012	14:02	400kV Ballabgarh-Maharanibgh charged	
31-07-2012	14:02	Salal –Kishanpur system restored	
31-07-2012	14:05	Chamera-I black-started	Power extended to 400kV Jalandhar.
31-07-2012	14:09	Supply was extended from 400kV Ballabgarh to Bamnauli	
31-07-2012	14:15	Power extended to Hiranagar from Salal HEP	
31-07-2012	14:20	Start up supply was extended from 220kV Mehgaon & 220kV Malanpur lines to Auriaya GPS	
31-07-2012	14:20	Tehri HEP black started	Supply extended to Meerut.
31-07-2012	14:21	Startup extended to Anpara TPS	Via 400 kV Singrauli-Anpara
31-07-2012	14:27	From Bamnaulli (Delhi) supply was extended to Mundka	
31-07-2012	14:33	Supply from Mundka was extended to Bawana	
31-07-2012	14:35	Start up extended to Jhajjar TPS	Via 400 kV Jhajjar-Mundka
31-07-2012	14:35	Start up extended to Suratgarh TPS	
31-07-2012	14:38	Faridabad GPS 2nd Unit started and synchronized	

31-07-2012	14:40	From 400/220kV Bamnauli start up supply was extended to Badarpur TPS via 220kV Bamnauli-Dial-Mehrauli-BTPS	
31-07-2012	14:42	Supply extended from Meerut to Mandola	
31-07-2012	14:50	Auraiya GT 2 Synchronised	
31-07-2012	14:54	From Salal HEP power extended to Udampur & Barn	
31-07-2012	14:58	400kV Agra (PG)-Kanpur line charged.	
31-07-2012	15:00	Traction Supply from Dhankaur revived	
31-07-2012	15:01	Startup power extended to Unchahar TPS	Via 220 kV Kanpur-Unchahar
31-07-2012	15:08	A.D. Hydro black started	Startup extended to Malana-II. Power also extended upto Nalagarh
31-07-2012	15:10	Startup to Ropar TPS was extended	Via path Bakhra HEP (220 kV) – Ganguwal (220 kV) – Kotla (132 kV)- Ropar (132 kV)
31-07-2012	15:14	220kV Faridabad GPP-Samaypur line charged	
31-07-2012	15:21	Startup power extended to Unchahar TPS	
31-07-2012	15:23	Due to jerk in the system (220KV Samaypur lines-1&2), GT#1 Tripped on reverse power protection, prior to which it was supplying 70MW	
31-07-2012	15:28	400kv Bus at Kishenpur charged from 220kV Salal system	
31-07-2012	15:35	Supply from Auriaya GPS to 220kV Sikandra (220kV Agra) was revived	
31-07-2012	15:36	GT#1 at Faridabad GPS Synchronized again	
31-07-2012	15:40	Startup Power Extended to Panipat TPS	Via Abdullapur (400 kV) - Yamunnagar TPS (DCRTP) (220 kV) -Younis Nagar (220 kV) – Karnal- Panipat (220 kV)
31-07-2012	15:40	Supply extended from 400kV Vindhyachal TPS to 400kV Vindhyachal through AC bypass mode.	
31-07-2012	15:42	Nathpa Jhakri Unit which was black started tripped	

31-07-2012	15:45	Start up supply extended to Singrauli	Via 400 kV Vindhyachal-Singrauli 2
31-07-2012	15:53	Island formed with Chamera HEP collapsed due to load – generation imbalance in subsystem	
31-07-2012	16:00	Traction supply from Auriaya GPS was revived	
31-07-2012	16:01	Kota TPS Unit 7 Synchronised	
31-07-2012	16:09	Dadri GPS Unit 1 Synchronised	
31-07-2012	16:14	Startup power extended to Lehra Mohabat TPS	Via 220 kV Barnala (PSTCL)
31-07-2012	16:17	Chamera-1 unit black started for 2nd time	Power extended to Jalandhar.
31-07-2012	16:20	Nathpa Jhakri Unit black started for 2nd time	Start up extended to Karcham Wangtoo via Abdullapur
31-07-2012	16:20 to 17:40	Nathpa Jhakri Generating Units Synchronized with the GRID one by one	
31-07-2012	16:25	Power was extended to Ludhiana from Jalandhar	
31-07-2012	16:28	400kV Ludhiana-Patiala line charged from Ludhiana end and synchronized at Patiala end	
31-07-2012	16:30	Traction supply from 220kV Sikandra (220kV Agra) was revived	
31-07-2012	16:41	Startup extended to Khedar TPS from 400kV Fatehabad	
31-07-2012	16:44	Power was extended to Ludhiana from Moga	
31-07-2012	16:57	400kV Dadri-Maharani bagh line charged & start up supply extended to 400kV Dadri	
31-07-2012	17:20	Startup power extended to Tanda TPS	Via Lucknow (PG) (400 kV) - Sultanpur (400 kV) -Tanda (220 kV)
31-07-2012	17:22	STG at Faridabad GPS Synchronized	
31-07-2012	17:31	Panipat Unit 6 Synchronised	
31-07-2012	17:40	Ropar TPS Unit 2 Synchronised	
31-07-2012	17:43	Dadri TPS Unit 3 Synchronised	
31-07-2012	17:45	Startup extended to Chamera-II, Chamera-III & Budhil HEP	
31-07-2012	17:48	Lehra Mohabat TPS Unit 1 Synchronised	

31-07-2012	17:54	Power extended to 220kV Dasuya from Jalandhar(P.G)	
31-07-2012	18:33	Startup Power Extended to Rihand STPS	Via 400 kV Allahabad-Rihand
31-07-2012	18:51	Unchahar TPS Unit 1 Synchronised	
31-07-2012	19:00	Singrauli STPS Unit 1 Synchronised	
31-07-2012	19:04	Tanda TPS Unit 4 Synchronized	
31-07-2012	19:11	Suratgarh Unit 7 Synchronized	
31-07-2012	16:55	Startup extended to Obra TPS	Via Pipri HEP
31-07-2012	----	From Matatila startup extended to Paricha TPS	
31-07-2012	19:26	Obra TPS Unit 1 Synchronised	
31-07-2012	20:58	Khedar TPS Synchronised	
31-07-2012	21:59	Anpara TPS Unit 1 Synchronised	
31-07-2012	22:08	Jhajjar TPS Unit 1 Synchronised	
31-07-2012	23:53	Rihand STPS Unit 3 Synchronised	

2. Eastern Region

Date	Time of Restoration	Activity	Remarks
31-07-2012	13:20	Power extended from Bokaro Steel to DVC substation at Panchet .	Via 132kV Bokato-CTPS-Ramkanali-Panchet route. Building of DVC Subsystem
31-07-2012	13: 20	Power extended power to Maithon HPS and Chandrapura TPS	
31-07-2012	13:22	Power extended to West Bengal from CESC from Howrah /Dhrampur	West Bengal system was developed in synchronism with CESC
31-07-2012	13:22	Startup power extended to Kolaghat TPS	132 kV CESC Howrah-Howrah (WB)-220 kV Howrah-Kolaghat
31-07-2012	13:24	Startup power extended to Bandel TPS	Via 132 kV CESC Howrah-Liluah-Rishra-Bighati-Bandel
31-07-2012	13:36	Startup power was availed from Southern grid through 400kV Jeypore-Gajuwaka-I after bypassing HVDC Gajuwaka through AC mode.	200 MW power was extended to Southern part of Odisha
31-07-2012	13:40	Power extended to Rourkella	Via Tarkera-Rourkella 220kV and back charging ICT of Rourkella

31-07-2012	13:43	Teesta Unit# 3 Black Started	
31-07-2012	13:54	Indravati HPS Black Started	Power extended upto Therubali.
31-07-2012	13:55	Bakreshwar Tripped	
31-07-2012	13:55	Bandel Tripped	
31-07-2012	13:58	400kV Teesta-Binaguri-I charged	
31-07-2012	14:02	Teesta Unit #3 tripped on generator protection (3rdharmonics,U/V)	
31-07-2012	14:10	Rengali HPS started	
31-07-2012	14:10	Startup power extended to Talcher STPP (TSTPP)	Via 220 kV Tarkera – Barkot – Rengali(O) – Rengali (PH) – TSTPP
31-07-2012	14:12	Again startup power extended to Bandel	
31-07-2012	14:16	Indravati Island Tripped on Overvoltage	
31-07-2012	14:20	Startup power extended to Talcher TPS (TTPS)	Via TSTPP – TTPS
31-07-2012	14:20 to 15:55	400kV Sipat-Ranchi-MPL corridor charged	
31-07-2012	14:25	Start up power was extended to Bakreswar	Via 132 kV Satgachia -220 kV Satgachia-Bakrewar
31-07-2012	14:27	Startup Power Extended to Sagardighi	132 kV Satgachia-Katwa-Gokarno-220 kV Gokarno - Sagardighi
31-07-2012	14:28	Startup Power extended to Patratu TPS	Via 220 kV Ranchi-Hatia-Patratu-Tenughat
31-07-2012	14:30	Power Extended to Indravati from Southern Region	
31-07-2012	14:30	Power extended to Tenughat TPS	Via 220 kV Ranchi-Hatia-Patratu-Tenughat
31-07-2012	14:31	Teesta Unit #3 again black started	
31-07-2012	14:32	Teesta Unit #3 again tripped on generator protection (3rdharmonics,U/V)	
31-07-2012	14:32	400kV Teesta-Binaguri-I tripped on direct trip received from Binaguri	
31-07-2012	14:50	Patratu TPS Tripped	
31-07-2012	14:50	Tenughat TPS Tripped	
31-07-2012	14:55	Teesta Unit #2 black started	

31-07-2012	15:00	400kV Teesta-Binaguri-I charged	
31-07-2012	15:00	Again Patratu TPS extended Power	Via 220 kV Ranchi-Hatia-Patratu-Tenughat
31-07-2012	15:10	Teesta Unit #2 tripped on generator protection (3rdharmonics,U/V)	
31-07-2012	15:02	Again Power extended to Tenughat TPS	Via 220 kV Ranchi-Hatia-Patratu-Tenughat
31-07-2012	15:04	Start up power was extended to Santaldih	132 kV Bandel-Satgachia-Mahachanda-Mankar-Bidhannagar-220 kv Bidhannagar- Santaldih
31-07-2012	15:20	400kV Teesta-Binaguri-I manually opened	
31-07-2012	15:32	Teesta Unit #3 again black started	
31-07-2012	15:41	400kV Teesta-Binaguri-I charged.	Teesta Unit # 3 loaded to 4.1 MW at 15:43:44 for 01 sec
31-07-2012	15:46	Teesta Unit #3 again tripped on generator protection (3rdharmonics, U/V).	
31-07-2012	15:55	Startup power extended to Maithon Power Limited (MPL).	Via 400 kV Sipat-Ranchi-MPL
31-07-2012	15:58	Power extended to Birpara from 220kV Salakati NER	132kV load at Birpara was released to control Overvoltage
31-07-2012	16:00	Recovery of Orissa load along with traction supply	
31-07-2012	16:06	400kV Teesta-Binaguri-I manually opened	
31-07-2012	16:10	Teesta Unit #2 black started.	
31-07-2012	16:20	400kV Teesta-Binaguri-I charged	
31-07-2012	16:21	400kV Teesta-Binaguri-I tripped on direct trip received from Binaguri	Unit loaded to 6.9 MW at 16:21 momentarily
31-07-2012	16:26	Teesta Unit #2 tripped on excitation failure.	
31-07-2012	16:30	Teesta Unit #2 black started	
31-07-2012	16:35	Power supply extended to Maithon 400kV	Via 400 kV MPL-Maithon
31-07-2012	16:38	400kV Teesta-Binaguri-I charged and subsequently tripped on over voltage.	

31-07-2012	16:39	DVC Island synchronized with the island formed by extending power from WR System at Maithon system	Via 220kV Maithon-Kalyaneswari. Gradually load was released by DVC to mines and traction.
31-07-2012	16:52	Startup power extended to Kahalgaon STPS	Via 400 kV Maithon-Kahalgaon I.
31-07-2012	17:00	Full demand met by JSEB including traction	Loads at Chandil / Hatia were extended power from Ranchi
31-07-2012	17:03	Charging of Rourkela-Jamshedpur I	Western assistance was further strengthened
31-07-2012	17:25	Startup Power extended to Tala from Malbase and generation started.	Sikkim demand of around 100MW was fully released
31-07-2012	17:35	Startup power extended to Farakka STPS	Via 132 kV Kahalgaon-Lalmatia-Farakka
31-07-2012	18:24	Power extended to Purnea (BSEB) via Dalkhola – Purnea 220kV line	
31-07-2012	18: 30	Power extended to NJP and then to Gangtok of Sikkim as well as Rangit HPS of NHPC	
31-07-2012	18:39	Power extended to Malda via 220 kV CTS System	Loads of North Bengal were gradually released
31-07-2012	18:54	HVDC Talcher-Kolar was closed and power from Kolar(Southern Grid) was availed to the tune of 200MW.	
31-07-2012	19:25	400/220kV kV Binaguri-Purnea-Malda loop was closed	
31-07-2012	19:34	Power extended from Biharshariff (PG) to Biharshariff, BSEB	Biharsahariff – Fatuah loads of South Bihar were gradually released.
31-07-2012	19:42	Talcher Unit 2 Synchronised	
31-07-2012	19:54 (sync)	Startup Power extended to Chukha	Power extended to Malbase also
31-07-2012		Power extended to Basochu HPS (Bhutan)	
31-07-2012	20:10	400kV Malda-Farakka Charged from Malda	
31-07-2012	20:35	400kV Malda-Farakka synchronized from Farakka end.	NER system was synchronized with WR/ER system
31-07-2012	20:50	400kV Teesta-Binaguri-II charged from Binaguri end by availing supply from Chukha and NER.	

31-07-2012	20:53	Teesta Unit #1 synchronised	
31-07-2012	21:02	Power extended to Muzaffarpur via 400 kV Purnea Muzaffarpur	North Bihar load was released through Muzaffarpur at 21:15
31-07-2012	21:16	Teesta Unit #2 synchronised	
31-07-2012	21:28	Gazuwaka-Jeypore was opened from Jeypore after balancing of 100-150MW of drawal from Southern Grid	
31-07-2012	21:30	Mehndashal-Meramundali Line Closed	Subsystem formed from extending power from SR was synchronized with rest of the grid
31-07-2012	21:40	Power extended to Bidhannagar via Maithon-Durpagur 400kV section	
31-07-2012	22:12	Power extended from Biharshariff (PG) to Pusauli .	Loads at Dehri, Arah and Khagaul were released
31-07-2012	22:14	Patratu Unit#4 Synchronised	
31-07-2012	22:30	Full supply received by BSEB	Demand of over 1600 MW met by BSEB
31-07-2012	23:01	Radial load to Northern Grid released from Pusauli.	
31-07-2012	23:04	220kV Bidhannagar-Bakreswar closed.	West Bengal including CESC island was synchronized with rest of the grid
31-07-2012	23:15	Patratu Unit#10 Synchronised	
31-07-2012	23:31	Teesta Unit #3 synchronised	
31-07-2012	23:34	400kV Teesta-Binaguri-I charged	
01-08-2012	00:02	Tenughat Unit#2 Synchronised	
01-08-2012	00:13	Kahalgaon Unit 7 Synchronised	
01-08-2012	01:42	Farakka Unit Synchronised	
01-08-2012	02:13	Talcher Unit # 3 Synchronised	
01-08-2012	02:06	MPL Unit 2 Synchronised	
01-08-2012	02:21	Kahalgaon Unit # 2 Synchronised	

3. North Eastern Region

Date	Time of Restoration	Activity	Remarks
31-07-2012	1302	AGTPP (Tripura) black started unit # 2	
31-07-2012	1308	AGTPP extended power to Tripura	Via 132 kV AGTPP – Agartala-I
31-07-2012	1312	Power extended to Lakwa TPS (Assam) from NTPS	
31-07-2012	1315	AGTPP power was extended to Mizoram	
31-07-2012	1323	AGTPP power was extended to south Assam	
31-07-2012	1326	Startup Power extended to Khandong (PH)	
31-07-2012	1334	Power was extended to Khliehriat (Meghalaya),	
31-07-2012	1337	Startup Power extended to Kopili (PH).	
31-07-2012	1350	Umiaum Stage -1 unit # 2 black started	
31-07-2012	1355	Power extended to Loktak from AGTPP hrs via 132 kV Jiribam – Loktak II.	
31-07-2012	1402	132 kV NTPS – Tinsukia was charged	
31-07-2012	1402	Loktak synchronised unit # 3.	
31-07-2012	1403	Power extended from Loktak to Manipur	Via 132 kV Loktak – Imphal(PG)-Imphal(S).
31-07-2012	1408	Kopili (PH) unit synchronized their units	
31-07-2012	1412	Khandong (PH) unit synchronized their units	
31-07-2012	1413	LTPS extended its power to Mariani (Assam)	
31-07-2012	1413	Kopili extended power to Misa.	
31-07-2012	1418	Power extended to Nagaland	Via 132 kV Imphal – Dimapur(PG) – Dimapur(s).
31-07-2012	1422	Misa extended power to Samaguri(Assam).	
31-07-2012	1427	Misa extended power to Dimapur(PG)	

31-07-2012	1426	Samaguri extended power to Sarusajai via 220 kV Samaguri – Sarusajai -I .	
31-07-2012	1428	Power was extended to Guwahati (Assam)	
31-07-2012	1429	Samaguri extended power to Balipara (PG)	
31-07-2012	1435	Power was extended to Langpi.	
31-07-2012	1456	Langpi Unit # 1 synchronized.	
31-07-2012	1457	400 kV Misa – Balipara-I was charged at	
31-07-2012	1458	Balipara extended power to Gohpur (Assam) via 132 kV Balipara – Gohpur	
31-07-2012	1500	Doyang Unit 3 synchronised	
31-07-2012	1500	Balipara extended power to Itanagar (Arunachal) via 132 kV Gohpur – Nirjuli	<i>75 % of NER load was restored.</i>
31-07-2012	1516	Power extended to AGBPP (Kathalguri) via 220 kV Mariani – AGBPP	
31-07-2012	1536	AGBPP Unit 6 Synchronised	
31-07-2012	1544	400 kV Bongigaon – Balipara I was charged	
31-07-2012	1546	400/220 kV ICT at Bongaigaon was charged and power extended to Salakati (PG).	
31-07-2012	1558	Power was extended to ER through 220 kV Salakati – Birpara-I.	
31-07-2012	1659	Power extended to Ranganadi via 400 kV Balipara - Ranganadi II	
31-07-2012	1715	Ranganadi Unit 1 Synchronised	

VOLTAGE PROFILE - JULY 2012

Sl. No.	REGION	SUBSTATION	Maximum(kV)	Minimum(kV)
1	ER	FARAKKA	429	409
2		KAHALGAON	436	409
3		TALCHER	419	406
4		BINAGURI	426	396
5		PURNEA	427	398
6		MUZAFFARPUR	427	377
7		JAMSHEDPUR	435	417
8		RENGALI	415	402
9		JEYPORE	429	399
1	NR	NALLAGARH	417	379
2		BHIWADI	433	388
3		BALLABGARH	423	382
4		ALLAHABAD	434	397
5		HISSAR	418	376
6		BAWANA	422	387
7		KANPUR	421	382
1	WR	ASOJ	421	400
2		ITARSI	428	406
3		JETPUR	438	397
4		KARAD	432	409
5		KASOR	421	406
6		BINA	431	394
7		GWALIOR	428	396
8		DHULE	436	408

VOLTAGE PROFILE - JULY 2012

Sl. No.	REGION	SUBSTATION	Maximum(kV)	Minimum(kV)
1	SR	SRIPERUMPUDUR	419	369
2		NEYVELI	414	390
3		SALEM	417	383
4		BANGALORE	422	380
5		HOSUR	416	386
6		RAMAGUNDAM	418	400
7		VIJAYAWADA	432	400
8		TIRIVANDRUM	424	381
9		HYDERABAD	429	400
1	NER	MISA	424	385
2		BALIPARA	417	403
3		BONGAIGAON	411	391
4		SALAKATI 220 kV	234	212
5		HAFLONG 132 kV	147	130
6		AIZWAL 132 kV	138	128
7		KUMARGHAT 132 kV	135	125
8		IMPHAL 132 kV	144	131
9		Khlieriat_PG 132 kV	141	131