

पॉवर सिस्टम ऑपरेशन कार्पोरेशन लिमिटेड

(पब्लिसिड की पूर्ण स्वामित्व प्राप्त सार्वजनिक कंपनी)



उत्तरी क्षेत्रीय भार प्रेषण केंद्र

CIN: U40105DL2009GOI188682

Power Supply Position in Northern Region for 11.08.2015
Date of Reporting : 12.08.2015

I. Regional Availability/Demand:

Evening Peak (20:00 Hrs) MW				Off Peak (03:00 Hrs) MW				Day Energy (Net MU)	
Demand Met	Shortage	Requirement	Freq* (Hz)	Demand Met	Shortage	Requirement	Freq* (Hz)	Demand Met	Shortage
43289	2679	45968	50.07	42549	3775	46324	50.06	1002.7	49.43

* Half hourly (two 15 minutes block—one block each before and after the designated time) average frequency

II. A. State's Load Details (At States periphery) in MUs:

State	State's Control Area Generation (Net MU)				Drawal Schedule (Net MU)	Actual Drawal (Net MU)	UI (Net MU)	Consumption (Net MU)	Shortages* (MU)
	Thermal	Hydro	Renewable/others \$	Total					
Punjab	60.22	21.93		82.15	124.46	122.81	-1.65	204.96	0.00
Haryana	27.51	0.59		28.10	123.91	121.72	-2.19	149.82	0.00
Rajasthan	114.51	7.31	2.93	124.74	58.17	59.05	0.88	183.79	0.00
Delhi	11.38			11.38	87.23	86.08	-1.15	97.45	0.01
UP	115.81	3.60		127.21	141.26	139.30	-1.96	266.51	41.12
Uttarakhand		25.36		25.36	9.56	9.32	-0.23	34.68	0.03
HP		24.31		24.31	0.23	1.06	0.83	25.36	0.00
J & K		14.44	0.00	14.44	19.63	20.34	0.71	34.78	8.27
Chandigarh				0.00	6.15	5.38	0.27	5.38	0.00
Total	329.42	97.53	2.93	437.68	570.60	565.05	-4.50	1002.73	49.43

* Shortage furnished by the respective constituent. \$ Others include UP Co-generation and JK Diesel

II. B. State's Demand Met in MWs:

State	Evening Peak (20:00 Hrs) MW				Off Peak (03:00 Hrs) MW				# Max(hourly) Demand Met of Day (MW)
	Demand Met	Shortage	UI	STOA/PX transaction	Demand Met	Shortage	UI	STOA/PX transaction	
Punjab	8189	0	-88	1454	8096	0	43	1670	9426
Haryana	6872	0	-444	1919	6341	0	-39	1895	7090
Rajasthan	7498	0	-204	83	7659	0	502	185	8079
Delhi	4154	0	-69	429	3966	0	141	356	4646
UP	11774	2270	400	669	12831	3570	1370	1063	12831
Uttarakhand	1717	0	72	-246	1446	0	26	-436	1717
HP	1216	0	205	-1403	850	0	-10	-1641	1216
J&K	1637	409	126	-474	1161	205	40	-851	1683
Chandigarh	233	0	-25	0	198	0	-31	0	274
Total	43289	2679	-28	2432	42549	3775	2042	2241	43345

* STOA figures are at sellers boundary & PX figures are at regional boundary. # figures may not be at simultaneous hour.

III. Regional Entities :

Entity	Station/Constituent	Inst. Capacity (Effective) MW	Declared Capacity (MW)	Peak MW (Gross)	Off Peak MW (Gross)	Energy (Net MU)	Average Sentout (MW)	Schedule Net MU	UI (OG:(+ve), UG: (-ve))	
									Net MU	Net MU
A. NTPC	Singrauli STPS (5*200+2*500)	2000	1774	2029	1808	42.23	1759	40.85	1.38	
	Rihand I STPS (2*500)	1000	889	945	867	19.47	811	19.12	0.36	
	Rihand II STPS (2*500)	1000	472	496	501	10.76	448	10.24	0.52	
	Rihand III STPS (2*500)	1000	480	514	436	10.27	428	9.99	0.29	
	Dadri I STPS (4*210)	840	810	630	437	11.06	461	11.44	-0.38	
	Dadri II STPS (2*490)	980	970	950	683	16.99	708	17.77	-0.78	
	Unchahar I TPS (2*210)	420	400	393	369	7.20	300	7.92	-0.72	
	Unchahar II TPS (2*210)	420	400	386	316	6.88	287	7.40	-0.52	
	Unchahar III TPS (1*220)	210	200	137	159	3.06	128	3.44	-0.38	
	ISTPP (Jhajjar) (3*500)	1500	1436	607	604	14.09	587	14.13	-0.04	
	Dadri GPS (4*130.19+2*154.51)	830	599	182	238	5.00	208	5.34	-0.34	
	Anta GPS (3*88.71+1*153.2)	419	396	0	0	0.00	0	0.14	-0.14	
	Auraiya GPS (4*111.19+2*109.30)	663	638	154	229	4.32	180	4.45	-0.13	
	Dadri Solar	5	1	0	0	0.01	0	0.03	-0.02	
	Unchahar Solar	10	3	0	0	0.01	0	0.06	-0.05	
	Singrauli Solar	15	3	0	0	0.00	0	0.07	-0.07	
	KHEP	800	830	835	834	20.38	849	19.92	0.46	
Sub Total (A)	12112	10301	8258	7481	172	7156	172	-1		
B. NPC	NAPS (2*220)	440	378	416	415	9.01	375	9.07	-0.06	
	RAPS- B (2*220)	440	389	431	434	9.30	387	9.34	-0.04	
	RAPS- C (2*220)	440	375	411	409	8.74	364	9.00	-0.26	
	Sub Total (B)	1320	1142	1258	1258	27.04	1127	27.41	-0.37	
C. NHPC	Chamera I HPS (3*180)	540	537	554	544	13.16	548	12.89	0.27	
	Chamera II HPS (3*100)	300	300	303	303	7.24	302	7.20	0.04	
	Chamera III HPS (3*77)	231	115	0	233	2.66	111	2.84	-0.17	
	Bairasuil HPS (3*60)	180	170	185	184	3.99	166	3.92	0.07	
	Salal-HPS (6*115)	690	657	669	671	16.16	673	15.76	0.40	
	Tanakpur-HPS (3*40)	94	92	93	95	2.25	94	2.21	0.04	
	Uri-I HPS (4*120)	480	458	467	458	11.20	466	11.00	0.19	
	Uri-II HPS (4*60)	240	230	233	234	5.47	228	5.52	-0.05	
	Dhauliganga-HPS (4*70)	280	280	282	285	6.80	283	6.72	0.08	
	Dulhasti-HPS (3*130)	390	386	399	394	9.35	390	9.26	0.09	
	Sewa-II HPS (3*40)	120	119	122	119	2.86	119	2.86	0.00	
	Parbati 3 (4*130)	520	390	391	239	6.82	284	6.79	0.03	
	Sub Total (C)	4065	3734	3698	3760	88	3664	87	1	
	D.SJVNL	NJPC (6*250)	1500	1283	1579	1086	30.98	1291	30.89	0.09
Rampur HEP (6*68.67)		412	353	428	300	8.57	357	8.47	0.10	
Sub Total (D)		1912	1636	2007	1386	39.55	1648	39.36	0.18	
E. THDC	Tehri HPS (4*250)	1000	1000	1008	750	23.18	966	23.00	0.18	
	Koteshwar HPS (4*100)	400	356	397	282	8.52	355	8.50	0.02	
	Sub Total (E)	1400	1356	1405	1032	31.70	1321	31.50	0.20	
F. BBMB	Bhakra HPS (2*108+3*126+5*157)	1379	1431	1456	1458	34.79	1449	34.34	0.44	
	Dehar HPS (6*165)	990	607	620	620	14.47	603	14.56	-0.09	
	Pong HPS (6*66)	396	361	318	384	8.74	364	8.67	0.06	
	Sub Total (F)	2765	2399	2394	2462	58.00	2416	57.58	0.42	
G. IPP(s)/JV(s)	ALLAIN DUHANGAN HPS(IPP) (2*96)	192	0	218	230	4.88	204	4.90	-0.01	
	KARCHAM WANGTOO HPS(IPP) (4*250)	1000	0	1160	1040	25.10	1046	22.60	2.50	
	Malana Stg-II HPS (2*50)	100	0	111	111	2.63	110	2.48	0.15	
	Shree Cement TPS (2*150)	300	0	298	168	6.23	259	6.79	-0.56	
	Budhil HPS(IPP) (2*35)	70	0	0	75	0.87	36	1.80	-0.93	
Sub Total (G)	1662	0	1787	1624	39.71	1655	38.56	1.15		
H. Total Regional Entities (A-G)	25237	20567	20808	19004	455.68	18987	453.67	2.01		

I. State Entities	Station	Effective Installed Capacity (MW)	Peak MW	Off Peak MW	Energy(MU)	Average(Sent out MW)
Punjab	Guru Gobind Singh TPS (Ropar) (6*210)	1260	900	755	19.38	807
	Guru Nanak Dev TPS(Bhatinda) (2*110+2*120)	460	80	80	1.82	76
	Guru Hargobind Singh TPS(L.mbt) (2*210+2*250)	920	557	386	10.79	449
	Goindwal(GVK)		0	0	0.00	0
	Rajpura (2*700)	1400	710	711	20.50	854
	Talwandi Saboo (1*660)	660	341	345	7.74	322
	Thermal (Total)	4700	2588	2277	60.22	2509
	Total Hydro	1000	915	924	21.93	914
	Total Punjab	5700	3503	3201	82.15	3423
	Haryana	Panipat TPS (4*110+2*210+2*250)	1367	0	0	0.00
DCRTPP (Yamuna nagar) (2*300)		600	457	480	10.99	458
Faridabad GPS (NTPC)		432	368	319	7.91	329
RGTPP (khedar) (IPP) (2*600)		1200	373	373	8.62	359
Magnum Diesel (IPP)		25	0	0	0.00	0
Jhajjar(CLP) (2*660)		1320	0	0	0.00	0
Thermal (Total)		4944	1198	1172	27.51	1146
Total Hydro		62	27	25	0.59	24
Total Haryana		5006	1225	1197	28.10	1171
Rajasthan		kota TPS (2*110+2*195+3*210)	1240	918	934	23.32
	suratgarh TPS (6*250)	1500	940	761	20.98	874
	Chabra TPS (4*250)	1000	282	194	6.77	282
	Dholpur GPS (3*110)	330	79	78	1.92	80
	Ramgarh GPS (1*37.5 + 1*35.5 +2*37.5 +1*110 +1*50)	271	194	199	7.47	311
	RAPS A (NPC) (1*100+1*200)	300	182	183	4.29	179
	Barsingar (NLC) (2*125)	250	187	186	4.31	180
	Giral LTPS (2*125)	250	77	50	1.34	56
	Rajwst LTPS (IPP) (8*135)	1080	559	494	11.87	494
	VS LIGNITE LTPS (IPP) (1*135)	135	0	0	0.00	0
	Kalisindh Thermal(2*600)	1200	455	481	11.13	464
	Kawai(Adani) (2*660)	1320	857	860	21.11	880
	Thermal (Total)	8876	4730	4420	115	4771
	Total Hydro	550	325	298	7.31	304
	Wind power	3214	84	96	2.42	101
	Biomass	99	21	21	0.51	21
	Solar	730	0	0	0.00	0
	Renewable/Others (Total)	4043	105	117	2.93	122
	Total Rajasthan	13469	5160	4835	124.74	5197
	UP	Anpara TPS (3*210+2*500)	1630	1313	1203	29.20
Obra TPS (2*50+2*94+5*200)		1194	347	452	9.20	383
Panicha TPS (2*110+2*220+2*250)		1140	738	647	16.60	692
Panki TPS (2*105)		210	45	50	1.20	50
Harduaganj TPS (1*60+1*105+2*250)		665	491	379	11.60	483
Tanda TPS (NTPC) (4*110)		440	267	268	6.51	271
Roza TPS (IPP) (4*300)		1200	820	806	19.30	804
Anpara-C (IPP) (2*600)		1200	539	544	13.00	542
Bajaj Energy Pvt.Ltd(IPP) TPS (10*45)		450	365	361	8.00	333
Anpara-D(1*500)		500	0	0	0.00	0
Lalitpur TPS(1*660)		660	0	0	0.00	0
Thermal (Total)		9289	4925	4710	115	4776
Vishnuparyag HPS (IPP)(4*110)		440	0	0	0.00	0
Alakananda(4*82.5)		330	325	325	7.80	325
Other Hydro		527	160	349	3.60	150
Cogeneration	981	50	50	1.20	50	
Total UP	11567	5460	5434	127	5301	
Uttarakhand	Total Hydro	1398	1072	1066	25.36	1057
	Total Uttarakhand	1398	1072	1066	25.36	1057
Delhi	Rajghat TPS (2*67.5)	135	0	0	0.00	0
	Delhi Gas Turbine (6x30 + 3x34)	282	43	51	0.96	40
	Pragati Gas Turbine (2x104+ 1x122)	330	145	143	3.52	147
	Riithala GPS (3*36)	95	0	0	0.00	0
	Bawana GPS (4*216+2*253)	1370	0	0	0.00	0
	Badarpur TPS (NTPC) (3*95+2*210)	705	320	327	6.90	287
	Thermal (Total)	2917	508	521	11.38	474
	Total Delhi	2917	508	521	11.38	474
HP	Baspa HPS (IPP) (3*100)	300	328	298	7.49	312
	Malana HPS (IPP) (2*43)	86	103	103	2.45	102
	Other Hydro	878	568	622	14.36	598
	Total HP	1264	999	1023	24.31	1013
J & K	Baglihar HPS (IPP) (3*150)	450	440	440	10.56	440
	Other Hydro/IPP	560	178	173	3.88	162
	Gas/Diesel/Others	190	0	0	0.00	0
	Total J & K	1200	618	613	14.44	602
Total State Control Area Generation		42521	18545	17890	437.68	18237
J. Net Inter Regional Exchange [Import (+ve)/Export (-ve)]			5096	5161	118.41	4934
Total Regional Availability(Gross)		67758	44449	42055	1011.77	42157

IV. Total Hydro Generation:

Regional Entities Hydro	12234	11829	10856	270.19	11258
State Control Area Hydro	5811	4116	4298	97.53	4064
Total Regional Hydro	18045	15945	15154	367.72	15322

V(A). Inter Regional Exchange [Import (+ve)/Export (-ve)] [Linkwise]

Element	Peak(20:00 Hrs)	Off Peak(03:00 Hrs)	Maximum Interchange (MW)		Energy (MU)		Net Energy MU
	MW	MW	Import	Export	Import	Export	
Vindhychal(HVDC B/B)	50	250	250	0	3.20	0.00	3.20
765 KV Gwalior-Agra (D/C)	2086	1464	2159	0	39.89	0.00	39.89
400 KV Zerda-Kankroli	-133	-144	0	261	0.00	4.67	-4.67
400 KV Zerda-Bhimmal	-61	-47	0	203	0.00	2.38	-2.38
220 KV Auraiya-Malanpur	-20	-92	0	103	0.00	1.23	-1.23
220 KV Badod-Kota/Morak	-6	-9	7	55	0.00	0.76	-0.76
Mundra-Mohinderqarh(HVDC Bipole)	1997	1996	2504	0	42.80	0.00	42.80
400 KV Vindhychal - Rihand	419	502	505	0	11.94	0.00	11.94
765 kV Phagi-Gwalior-2							
Sub Total WR	4332	3920			97.83	9.04	88.79
Pusauli Bypass/HVDC	400	400	400	0	8.99	0.00	8.99
400 KV MZP- GKP (D/C)	72	290	394	0	6.59	0.00	6.59
400 KV Patna-Balia(D/C) X 2	58	163	264	0	3.85	0.00	3.85
400 KV B'Sharif-Balia (D/C)	29	43	159	29	1.04	0.00	1.04
765 KV Pusauli-Balia	23	2	120	0	0.35	0.00	0.35
765 KV Gaya-Fatehpur	39	138	169	0	2.78	0.00	2.78
220 KV Pusauli-Sahupuri	156	132	187	0	3.54	0.00	3.54
132 KV K'nasa-Sahupuri	0	0	0	0	0.00	0.00	0.00
132 KV Son Ngr-Rihand	-42	-42	0	42	0.00	0.84	-0.84
132 KV Garhwa-Rihand	0	0	0	0	0.00	0.00	0.00
765 KV Sasaram - Fatehpur	-146	-11	42	146	0.00	0.66	-0.66
400 KV Barh -GKP (D/C)	175	126	238	0	3.99	0.00	3.99
Sub Total ER	764	1241			31.13	1.50	29.63
Total IR Exch	5096	5161			128.96	10.54	118.41

V(B). Inter Regional Schedule & Actual Exchanges [Import (+ve)/Export (-ve)] [Corridor wise]

ER	ISGS/LT Schedule (MU)		Bilateral Schedule (MU)		Power Exchange Shdl (MU)		Wheeling (MU)	
	Bhutan	Total	Through ER	Through WR	Through ER	Through WR	Through ER	Through WR
22.29	3.97	26.26	20.61	9.11	4.16	-0.24	1.46	-1.46
Total IR Schedule (MU)			Total IR Actual (MU)			Net IR UI (MU)		
Through ER	Through WR Incids Mndra	Total	Through ER	Through WR	Total	Through ER	Through WR	Total
52.49	80.28	132.77	29.63	88.79	118.41	-22.86	8.51	-14.35

V(C). Inter National Exchange with Nepal [Import (+ve)/Export (-ve)] [Linkwise]

Element	Peak(20:00 Hrs)	Off Peak(03:00 Hrs)	Maximum Interchange (MW)		Energy (MU)		Net Energy MU
	MW	MW	Import	Export	Import	Export	
132 KV Tanakpur - Mahendarnagar	-19	-13	0	35	0	1	-0.57

VI. Frequency Profile <----- % of Time Frequency ----->

<49.2	<49.7	<49.8	<49.9	<50.0	49.9-50.05	50.05-50.10	50.10-50.20	>50.20	>50.50
0.00	0.00	0.66	15.79	65.91	71.72	10.20	2.35	0.00	0.00

<----- Frequency (Hz) ----->				Average Frequency Hz	Frequency Variation Index	Std. Dev.	Frequency in 15 Min Block	
Maximum		Minimum					MAX (Hz)	MIN (Hz)
Freq	Time	Freq	Time	49.97	0.06	0.07	50.16	49.91
50.17	6.02	49.76	21.05					

VII. Voltage profile 400 kV

Station	Voltage Level (kV)	Maximum		Minimum		Voltage (in % of Time)			
		Voltage(KV)	Time	Voltage (KV)	Time	<380 kV	<390 kV	>420 kV	>430 kV
Rihand	400	405	04:01	401	07:28	0.0	0.0	0.0	0.0
Gorakhpur	400	423	06:03	402	14:42	0.0	0.0	4.7	0.0
Bareilly	400	414	00:00	414	00:00	0.0	0.0	0.0	0.0
Kanpur	400	419	04:02	407	14:44	0.0	0.0	0.0	0.0
Dadri	400	414	03:31	399	10:53	0.0	0.0	0.0	0.0
Ballabgarh	400	421	04:00	404	10:53	0.0	0.0	0.7	0.0
Bawana	400	418	04:03	402	10:52	0.0	0.0	0.0	0.0
Bassi	400	425	04:01	410	10:52	0.0	0.0	20.6	0.0
Hissar	400	414	04:02	399	10:53	0.0	0.0	0.0	0.0
Moga	400	410	03:50	397	11:22	0.0	0.0	0.0	0.0
Abdullapur	400	414	04:02	382	21:18	0.0	4.9	0.0	0.0
Nalagarh	400	417	04:00	404	14:25	0.0	0.0	0.0	0.0
Kishenpur	400	413	03:47	404	11:07	0.0	0.0	0.0	0.0
Wagoora	400	408	04:02	387	14:16	0.0	9.0	0.0	0.0
Amritsar	400	412	03:54	393	07:28	0.0	0.0	0.0	0.0
Kashipur	400	419	04:00	228	10:57	48.8	48.8	0.0	0.0
Hamirpur	400	402	00:00	402	00:00	0.0	0.0	0.0	0.0
Rishikesh	400	406	00:53	379	12:47	0.1	3.0	0.0	0.0

VIII. Voltage profile 765 kV

Station	Voltage Level (kV)	Maximum		Minimum		Voltage (in % of Time)			
		Voltage(KV)	Time	Voltage (KV)	Time	<728 kV	<742 kV	>800 kV	>820 kV
Fatehpur	765	779	04:01	751	10:56	0.0	0.0	0.0	0.0
Balia	765	757	00:00	757	00:00	0.0	0.0	0.0	0.0
Moga	765	788	04:01	762	10:53	0.0	0.0	0.0	0.0
Agra	765	796	18:03	765	10:56	0.0	0.0	0.0	0.0
Bhiwani	765	796	03:49	768	10:57	0.0	0.0	0.0	0.0
Unnao	765	767	06:02	748	14:42	0.0	0.0	0.0	0.0
Lucknow	765	785	04:03	757	14:42	0.0	0.0	0.0	0.0
Meerut	765	803	04:00	771	10:53	0.0	0.0	3.0	0.0
Jhatikara	765	795	03:56	769	10:52	0.0	0.0	0.0	0.0
Bareilly	765	0	00:00	9999	00:00	0.0	0.0	0.0	0.0
Anta	765	760	00:00	760	00:00	0.0	0.0	0.0	0.0
Phagi	765	789	18:01	762	00:49	0.0	0.0	0.0	0.0

IX. Reservoir Parameters:

Name of Reservoir	Parameters		Present Parameters		Last Year		Last day	
	FRL (m)	MDDL (m)	Level (m)	Energy (MU)	Level (m)	Energy (MU)	Inflow (m ³ /s)	Usage (m ³ /s)
Bhakra	513.59	445.62	507.40	1426.07	506.96	1396.66	2150.55	1472.76
Pong	426.72	384.05	420.90	931.43	409.90	494.27	1320.33	1345.59
Tehri	829.79	740.04	807.75	758.00	807.15	746.00	798.01	553.00
Koteshwar	612.50	598.50	609.74	4.44	611.03	5.09	553.00	561.65
Chamera-I	760.00	748.75	756.25	0.00	0.00	0.00	573.28	356.23
Rihand	268.22	252.98	0.00	0.00	0.00	0.00	0.00	0.00
RPS	352.80	343.81	0.00	0.00	0.00	0.00	0.00	0.00
Jawahar Sagar	298.70	295.78	0.00	0.00	0.00	0.00	0.00	0.00
RSD	527.91	487.91	524.21	10.64	519.30	11.53	688.29	419.85

* NA: Not Available

X(A). Short-Term Open Access Details:

State	Off- Peak Hours (03:00 Hrs)			Peak Hours (20:00 Hrs)			Day Energy (MU)		
	Bilateral (MW)	IEX (MW)	PXIL (MW)	Bilateral (MW)	IEX (MW)	PXIL (MW)	Bilateral (MU)	IEX / PXIL (MU)	Total (MU)
Punjab	1465	205	0	1363	91	0	35.41	3.13	38.54
Delhi	318	40	-2	432	0	-2	9.13	4.11	13.24
Haryana	1631	263	0	1683	236	0	39.36	2.95	42.31
HP	-1214	-426	0	-998	-404	0	-25.10	-10.06	-35.16
J&K	-741	-110	0	-489	15	0	-13.24	-1.46	-14.70
CHD	0	0	0	0	0	0	0.24	0.03	0.27
Rajasthan	-495	678	2	-495	576	2	-11.89	14.57	2.68
UP	1063	0	0	669	0	0	16.42	0.25	16.67
Uttarakhand	-345	-91	0	-255	9	0	-6.98	-1.18	-8.17
Total	1682	558	0	1909	523	0	43.35	12.33	55.68

X(B). Short-Term Open Access Details:

State	Bilateral (MW)		IEX (MW)		PXIL (MW)	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Punjab	1598	1363	205	89	0	0
Delhi	718	105	584	-75	0	-2
Haryana	1683	1631	271	-547	0	0
HP	-913	-1251	-365	-458	0	0
J&K	-489	-741	15	-186	0	0
CHD	30	0	25	0	0	0
Rajasthan	-495	-495	678	298	2	0
UP	1068	505	262	0	0	0
Uttarakhand	-255	-345	32	-91	0	0

XI. System Constraints:

XII. Grid Disturbance / Any Other Significant Event:

XIII. Weather Conditions For 11.08.2015 :

XIV. Synchronisation of new generating units :

XV. Synchronisation of new 220 / 400 / 765 KV lines and energising of bus / /substation :
765kV Phagi-Gwalior-II synchronised first time at 00:58 hrs. on 11/08/15 with line reactor at both ends

XVI. Tripping of lines in pooling stations :

XVII. Complete generation loss in a generating station :