भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
सेवा भवन आर के पुरम नई दिल्ली-110066
Sewa Bhawan, R. K. Puram, New Delhi-110066

[ISO: 9001-2008]

No.200/5/2012/SP&PA/ 310-362 **Date/दिनांक:** ~~13~~ 15-03-2012

To

(As per List attached)

Subject: Minutes of Joint Meeting of all the regional Standing Committees on Power System Planning for firming up the 'Unified Real Time Dynamic State Measurement (URTDSM)' scheme as part of Smart Transmission Grid development.

विषय: विद्युत प्रणाली के आयोजन की सभी क्षेत्रीय स्थायी समितियों की संयुक्त बैठक – स्मार्ट पारेषण ग्रिड विकास हेतु 'यूनिफाईड रियल टाईम डाईनमिक स्टेट मैजरमेन्ट' की योजना रिपोर्ट पर चर्चा

A Joint Meeting of all the five Regional Standing Committees on Power System Planning was held **on March 5, 2012 (Monday) at 10.30 am at Conference Room, Fifth Floor, Power Grid Corp. of India Ltd., Plot No:2, "Saudamini", Sector-29, Gurgaon, Haryana-122001**.

Minutes of the meeting are enclosed. It is also available at CEA's website (www.cea.nic.in).

भवदीय /Yours faithfully,

15/3/2012

(प्रदीप जिंदल)/ (Pardeep Jindal)
निदेशक(प्र यो एवं प मू प्रभाग)/ Director (SP&PA)
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Address List

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5. Director (Operations), NPCIL, 12th Floor,Vikram Sarabhai Bhawan, Anushakti Nagar, **Mumbai – 400 094**. FAX : 022- 25991258	

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11. Chief Engineer (Operation) Ministry of Power, UT Secretariat,Sector-9 D **Chandigarh - 161 009** (Fax-0172-2637880)	12. Director(Technical) THDC Ltd. Pragatipuram, Bypass Road, Rishikesh, **Uttarakhand- 249201** (Fx-0135-2431519)

Western Region

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Southern Region

1.The Member Secretary, Southern Regional Power Committee, 29, Race Course Cross Road, **Bangalore 560 009.** FAX: 080-22259343	2. The Director (Grid Operation), Transmission Corp. of Andhra Pradesh Ltd., Vidyut Soudha, **Hyderabad – 500 082**. FAX : 040-66665137/ 66665133
3.The Director (Transmission), Karnataka State Power Transmission Corp.Ltd., Cauvery Bhawan, **Bangalore 560 009.** FAX : 080 -22228367	4. The Member (Transmission), Kerala State Electricity Board, Vidyuthi Bhawanam, Pattom, P.B. No. 1028, **Thiruvananthapuram - 695 004.** FAX : 0471-2444738

5. Member (Distribution), Tamil Nadu electricity Board (TNEB), 6th Floor, Eastern Wing, 800 Anna Salai, **Chennai - 600002.** FAX : 044-28516362	6. The Superintending Engineer –I, First Floor, Electricity Department, Gingy Salai, **Puducherry – 605 001.** FAX : 0413-2334277/2331556
7.The Director (Power), Corporate Office, Block – I, Neyveli Lignite Corp. Ltd., **Neyveli** , **Tamil Nadu – 607 801.** FAX: 04142-252650/ 252570	

Eastern Region

1. Member Secretary, Eastern Regional Power Committee, 14, Golf Club Road, Tollygange, **Kolkata-700033**.	2.Director (System), Damodar Valley Corporation DVC Towers, VIP Road, **Kolkata-700054.**
3. Member (Transmission), Bihar State Electricity Board Vidyut Bhavan, Baily Road, **Patna-800021.**	4. Director (Transmission), Orissa Power Transmission Corporation Jan path, **Bhubaneshwar-751022.**
5. Director (System Operation), West Bengal State Electricity Transmission Company Ltd., Vidyut Bhavan, 5th Floor, Block-D, Bidhannagar, Sector-**II Kolkata-700091.**	6.Member (Transmission), Jharkhand State Electricity Board, In front of Main Secretariat, Doranda, **Ranchi-834002.**
7. Principal Chief Engineer cum Secretary, Power Department Government of Sikkim, **Sikkim**	

North Eastern Region

1. The Member Secretary, North Eastern Regional Power Committee, Meghalaya State Housing Finance Cooperative Society Ltd. Building, Nongrim Hills Shillong **(Meghalaya) 793003** Fax: 0364 – 22520030	2. The Chairman and Managing Director, North Eastern Electric Power Corporation Ltd Brookland Compound, Lower New Colony, **Shillong (Meghalaya) – 793003**. Fax: 0364 – 2226417

3. The Managing Director, Assam Electricity Grid Corporation Limited, Bijulee Bhawan; Paltan Bazar, Guwahati **(Assam) – 781001** Fax: 0361 – 2739513 & 0361 – 2739989	4. The Chairman-cum-Managing Director, Meghalaya Energy Corporation Limited, Lum Jingshai, Short Round Road, Shillong **(Meghalaya) – 793001**. Fax: 0364 – 2590355
5. The Chief Engineer (Power), Electricity Department, Keisampat, **Imphal (Manipur)** Fax: 0385 – 2220702	6.The Chief Engineer, Department of Power, Nagaland, **Kohima** Fax: 0832 – 2222354
7. Engineer-in-Chief Power & Electricity Department, Govt. of Mizoram, Tuikhuahtlang, **Aizawl (Mizoram)** Fax:0389-2320862	8. The Chief Engineer (Power), Vidyut Bhawan, Department of Power, Zero Point Tinali, Itanagar **(Arunachal Pradesh) – 791111.** Fax: 0360 – 2217302
9. The Chairman-cum-Managing Director, Tripura State Electricity Corporation Limited, Bidyut Bhavan, Banamalipur, **Agartala, Tripura**. Fax: 0381 – 2319427	

Copy to:

1.The Chairman & Managing Director Power Grid Corp. of India Ltd., "Saudamini", Plot No. 2, Sector-29, **Gurgaon-122001** Fax 0124-2571760/2571932	2. Executive Director (Smart Grid) Power Grid Corp. of India Ltd., "Saudamini", Plot No. 2, Sector-29, **Gurgaon-122001** Fax 0124-2571760/2571932
4. SA to Chairperson, Central Electricity Authority, Sewa Bhawan, R. K. Puram, **New Delhi-110066**.	3.The Member (PS), Central Electricity Authority, Sewa Bhawan, R. K. Puram, **New Delhi-110066**.
5. Prof S.A Soman, Department of Electrical Engineering, Indian Institute of Technology Bombay, **Powai, Mumbai-400076**	

Minutes of Joint Meeting of all the five Regional Standing Committees on Power System Planning was held on March 5, 2012 (Monday) at 10.30 am at Conference Room, Fifth Floor, Power Grid Corp. of India Ltd., Plot No:2, "Saudamini", Sector-29, Gurgaon, Haryana-122001

1.0 List of participants is given at Annex-I.

2.0 Chairperson CEA in his address emphasized the need of modern tools for reliable, secure and economical system operation on real time basis to give confidence to the system planner as well as operators to bring efficiency in system operation. He highlighted that dimension of Indian power system is growing manifolds and their complexity is increasing in all fronts viz. generation, transmission and distribution. Maintaining grid safety, security and reliability is a great challenge in the new regime of open electricity market. He informed that for sustainability, non-conventional energy resources must be developed and needs to be integrated with the grid in one hand, while variability & intermittency in their output is a new challenge in system operation on the other. He mentioned that India would soon be having 1000 MW single generating units, 4000 MW single power plants, high capacity 765 kV and 800kV HVDC transmission system feeding large cities and various critical loads. Any incident - natural calamity etc., even on single element of this capacity, has the potential to cause a major grid disturbance. Highest order of real time measurements, monitoring and control system is a must to avoid or to reduce the impact of such incidences. To address these issues, he emphasized that introduction of intelligence in transmission through Smart Grid applications is inevitable. Application of synchrophasor technology using Phasor Measurement Unit (PMU), integrated with Phasor Data Concentrators (PDC) and fibre optic communication links has emerged to address above critical developments in the grid. In this context proposed "Unified Real Time Dynamic State Measurement" (URTDSM) scheme would help in identifying and developing modules for more inclusive and intelligent measurements, monitoring, analysis, control and communication capabilities with aim to improve reliability and efficiency of available resources. He requested all the members of the regional standing committees to join hands together for implementation of this much needed scheme quickly.

3.0 CMD POWERGRID shared his experience of implementation of Unified Load Dispatch and Communication (ULDC) scheme throughout the country. He also informed about the upcoming large number of EHV network specially 765 kV substations and transmission lines. He informed that by 2014, all the five(5) regions of the country will be synchronized together. Within coming five year plan about 30,000 MW of Renewable Energy mainly in the form of Wind and Solar generation will be added to the existing 23,000MW of Renewable Energy generations in the country. He stressed the requirement of better visibility of system and fast update of operating scenario for safe, secure and reliable operation on real time basis as well as for system planning. To keep ourselves abreast with the latest technology, he urged that early implementation of this "Unified Real Time Dynamic State Measurement" (URTDSM) project is a

necessity. He emphasized that looking at the large number of PMUs deployment in the country, it is necessary that about 10 to 15% of PMUs shall be manufactured and supplied from India, towards indigenization of this technology to cater to future requirement. He also emphasized that a PMU test certification laboratory may be setup in India to certify the PMUs of various manufacturers to be deployed in the grid. He stressed upon the research work required in collaboration with premier academic institutions for analytics development based on the PMUs data for improved situational awareness, decision support tools and control actions in Indian context to be taken up in parallel.

4.0 Member (PS), CEA informed that country has good institutional mechanism for handling power system related issues and the market mechanism is evolving. Technical aspects of grid safety and security in real time, however, still need to be strengthened. He informed that synchrophasor technology using PMU and PDC through fiber optic communication channel having low latency would be very effective in reliable, secure and economical grid operation. He also informed about how PMU has helped in reliable evacuation of Karcham-Wangtoo hydro generation during the monsoon season of 2011. Large quantum of renewable capacity is going to be integrated with the system in coming years. To take care of uncertain characteristics of renewable generation, he emphasized the need of adoption of latest technology like synchrophasor measurement for informed decision making in real time. This shall also facilitate to estimate the transmission capability in a more realistic way which shall bring efficiency in operation as well as economy in cost of power supply. He informed that cost of the proposed "Unified Real Time Dynamic State Measurement (URTDSM)" is meager in comparison to the cost of one EHV transmission line. He informed that in future all the substations and generating stations, including those of IPPs shall be provided with PMU along with fiber optic communication link by the respective developer.

5.0 CEO POSOCO made a presentation on the need of synchrophasor measurements for system monitoring and control. He shared the experience of PMU pilot project in Northern Region. He described how the Indian power sector has been benefited by taking preventive actions based on synchrophasor measurements in advance avoiding large scale disturbances and operating the system in a more reliable manner. PMU pilot Project in Northern Region has helped a lot understanding the new technology and in system operation in real time, protection co-ordination, disturbance analysis and network model validation. He informed that wide band communication is the basic necessity for PMU installation. He presented the case of better transmission system utilization with reliability for evacuation of Karcham-Wangtoo hydro generation along with Baspa and Jhakri Hydro generation during the monsoon season in 2011. PMU also helped in detection of oscillations on 765kV Tehri-Meerut line (Charged at 400 kV). Based on PMU data PSS tuning was done to avoid such oscillations. During foggy winter nights, large number of auto-reclosure operation took place and its detection in real time by system operator helped a lot in effective real time monitoring and control of the grid. He informed that PMU technology is a kind of meta tool that will create new tools in future. Expertise needs to be developed for handling large volume of data generated by PMUs through capacity building exercise.

6.0 Prof S. A. Soman from IIT Bombay presented the need and benefits of synchrophasor technology for system monitoring and control that has been made possible due to technological development in the field of GPS, communication and computation. He emphasized that this technology has capability of measuring & monitoring the system in real time, which would be helpful in better visualization of the system and utilization of existing transmission assets with reliability, security and economy. He emphasized that in the Indian context PMUs need to be installed in such a way that voltage phasor of each substation and current phasor at both ends of each transmission line can be monitored to take care of redundancy in outage of PMU, associated communication link etc. for wide area measurement and control. He highlighted the possible utilization of PMU data through following analytical software; supervised zone-3 blocking, dynamic (linear) state estimator, CVT/CT validation, angular stability, emergency control like frequency control, voltage instability, network parameter validation, transient stability model validation etc.

7.0 POWERGRID presented the "Unified Real Time Dynamic State Measurement (URTDSM)" project details. The approach adopted for deployment of PMU and PDC at State and Central sector stations and transmission lines in a unified manner was presented as under:

Approach on PMU Placement:

i. All 400 kV stations in State and ISTS grids

ii. All generating stations at 220 kV and above

iii. HVDC terminals and inter-regional and inter-national tie lines

iv. Both ends of all the transmission lines at 400kV and above: State and ISTS sector

7.1 POWERGRID informed that PDCs would collect data from PMUs and other PDCs and time aligns these data. Approach on PDC placement –

i. One number of Nodal PDC is proposed for more than 40 PMUs in a State

ii. Data from all Nodal PDC are to be sent to Master PDC proposed at each SLDC

iii. Data from all Master PDC will be sent to Super PDC proposed at each RLDC

iv. Data from all Super PDC are to be sent to PDC proposed at NLDC

It was informed that by 2014-15 altogether about 581 sub-stations (272 ISTS and 309 State sector) and about 3199 transmission lines (1792 ISTS and 1407 State Sector) at 400 kV and above level including 220 kV generating stations are expected to be in place. It was informed that considering the PMUs with three(3) analog input channels total number of PMUs required would be around 1669.

7.2 Further, it was highlighted that as the installation of PMU requires Fiber Optic communication channel, the installation of PMUs and PDCs is proposed in two stages;

Stage-I: Installation of PMUs at the locations where Fiber Optic communication is available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in State, remote consoles at RPCs, CEA, CTU and other locations.

Stage-II: Installation of PMUs at balance locations along with communications links. The stage wise deployment of PMUs and PDCs was given as under.

Table 1: Proposed Stage- I

Region	Sub-stations		No of Transmission line		PMU		Nodal PDC	MPDC	SPDC	Main & B/U NLDC
	ISTS	STU	ISTS	STU	ISTS	STU				
NR	74	42	394	224	206	120	6	9	1	
WR	49	18	456	135	234	71	11	4	1	
ER	51	31	395	149	202	79	4	5	1	
SR	57	16	338	90	178	47	6	4	1	
NER	9	5	69	24	36	13	0	3	1	
Total	240	111	1652	622	856	330	27	25	5	
	351		***2274***		***1186***		***57***			***2***

Table 2 : Proposed Stage- II

Region	Sub-stations		No of Line		PMU	
	ISTS	STU	ISTS	STU	ISTS	STU
NR	9	55	40	211	21	111
WR	11	58	64	280	33	145
ER	-	13	-	50	-	26
SR	3	55	10	199	5	105
NER	9	17	26	45	14	23
Total	32	198	140	785	73	410
	230		***925***		***483***	

It was informed that to effectively utilize the synchrophasor technology, capacity building through training is required. For this purpose training of engineers from

State utilities, RPCs, CEA, CTU, POSOCO are proposed as part of this URTDSM project.

Broad estimated cost of this URTDSM scheme is about Rs. 355 Crore for both Stage-I and Stage-II.

7.3 In addition development of analytical software and hardware as informed by IIT Bombay are to be taken up in parallel. List of analytics proposed to be developed in association with premier academic institution like by IITs and other agencies are as under:

- Vulnerability analysis of distance relays.
- PMU based state estimator.
  - Enable system operator to understand if the system is in secure, alert or emergency state from both steady state and dynamic perspective.
  - Along with steady state contingency analysis tools, one can also use dynamic security assessment tools.
  - Enable monitoring of system unbalances.
  - Enable monitoring of power swing and supervisory control of backup protection scheme i.e., adaptive protection.
- CVT/CT validation
- PMU based supervised zone-3 tripping/blocking
- Assessment of angular, voltage and frequency stability and control through PSS, FACTS devices and HVDC controls.
- Development of improved restoration schemes
  - Synchrophasor check is available at control center itself.
- Network parameter validation, dynamic(transient stability) model validation

7.4 Towards indigenization of this technology, about 10 to 15 % of PMUs shall be manufactured and supplied from India. Further, a PMU test and certification laboratory is also proposed to be setup in India to certify the PMUs of various manufacturers to be deployed in the grid.

8.0 Participants of the regional Standing Committees on Power System Planning deliberated on the proposed “Unified Real Time Dynamic State Measurement (URTDSM)” scheme for implementation by POWERGRID.

Gist of the deliberations are as under:

8.1 RVPNL said that PMU placement should be accompanied with fiber optic communication link so that real time measurement benefit can be derived. Therefore, emphasis shall be given for placement of PMUs at those locations where fiber optic communication links are available. Wherever fiber links are not available the actions need to be taken to install the fiber optic link along with PMU in a time bound manner.

It was clarified that realizing the need for fiber optic communication to facilitate data transfer from PMU on real time basis the entire URTDSM project has been planned for implementation in a 2 stages. Stage-1 involves placement of PMU at those locations which are either already connected through FO or likely to be

connected by 2014-15 at the control centers along with installation of PDCs. In the next stage the PMUs shall be placed at those locations where fiber optic link are to be installed simultaneously.

8.2 On the issue of inclusion of already on-going PMU deployment plan in different regions under WAMS project with this URTDSM project, it was agreed that while finalizing the scheme necessary care will be taken to integrate the existing PMUs of the on-going project.

8.3 Members inquired about the methodology of investment. It was clarified that the cost of the project shall be added in the National transmission pool account and to be shared by all the Designated ISTS Customers(DICs) as per the POC mechanism under the CERC regulation.

8.4 NTPC enquired about provision of RTUs under ULDC scheme, whether they will continue or it will be replaced by the PMUs. It was clarified that, initially, the URTDSM project will not affect the provision of RTUs under ULDC scheme and upgradation of ULDC scheme would continue as planned. Later on, when PMU based measurements get matured, installation of RTUs can be reviewed.

8.5 BBMB enquired about necessity of current measurement of transmission line as the state of the system can be determined with Voltage magnitude and angle only. It was clarified that along with voltage and phasor measurement, measurement of current is also very important for validation of CT, CVT and distance protection and also for network parameters of the system.

8.6 Maharashtra SLDC enquired about using numerical relays as PMUs as most of the numerical relays have such capability. It was clarified that technically there is not any issue in using such relays provided that a phasor measurement unit alongwith GPS clock is available in the numeric relay.

8.7 Rajasthan raised the issue of error in PMU measurement due to limited inaccuracy in CT / CVT. On this issue it was clarified that PMU on its own does not introduce any error and sensors have certain errors. To filter out this errors State Estimation would be carried out.

8.8 Gujarat SLDC enquired about current measurement of ICTs. It was clarified that presently it has not been included; however, in subsequent stages this aspect may be deliberated. Gujarat also suggested that hierarchy of data transfer for central sector PMUs may be through SLDC PDC. It was clarified that going through SLDC PDCs would increase latency of information from ISTS network reacing at RLDC/NLDC and hence may not be desirable..

8.9 Delhi enquired about availability of fast protection and control mechanism that can act within say 40 ms. It was clarified that PMU based protection and control mechanisms are not going to replace the primary protection, it will only be used to enhance the backup protection based the global information and suitable for the system as a whole.

9.0 It was agreed that the scheme would be implemented in the following manner:

i) The URTDSM scheme will cover placement of PMU at sub-stations and both ends of transmission lines at 400kV and above level including generating stations at 220 kV level under State and Central Sector coming up by 2014-15 time frame.

ii) The proposed URTDSM scheme will be implemented in two stages. In the stage-I PMUs will be placed at those locations where fiber optic communication link is either available or would be made available under microwave frequency vacating program and regional strengthening program by 2014-15 along with installation of PDCs at all SLDCs, RLDCs, NLDC, NTAMC, strategic locations in state, remote consoles at RPCs, CEA, CTU and other locations. Nodal PDC shall be provided for collection of data from 40 PMUs in a cluster.

In stage-II, PMUs would be installed at balance locations along with communications links. Summary of the stage wise deployment of PMUs and PDCs is given in Table1 and Table-2 above.

iii) For effective utilization of synchrophasor technology national and international level training programs will be arranged for engineers from State utilities, RPCs, CEA, CTU and POSOCO under the URTDSM scheme.

10.0 After deliberations, members of regional Standing Committees on Power System Planning agreed that “Unified Real Time Dynamic State Measurement (URTDSM)” scheme to be taken up for implementation. It was also agreed that scheme is to be implemented by POWERGRID as system strengthening and cost shall be added in the National transmission pool account and to be shared by all the Designated ISTS Customers(DICs) as per the POC mechanism under the CERC regulation.

11.0 It was agreed that POWERGRID shall file a petition with CERC for getting regulatory approval for this project. It was also requested that all the constituents/States would support POWERGRID in CERC.

12.0 As the Analytics are to be developed in parallel with implementation of the URTDSM scheme, it was agreed that these would be developed in association with premier academic institutions (like by IITs) and in consultation with POSOCO, CEA and RPCs and some of the STUs. It was also agreed that cost of development of the Analytics would be added in the National transmission pool account.

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Annex-I

List of participants:

S.No	Organization	Name (S/Shri)	Designation
	Central Electricity Authority		
1	CEA	Ravinder	Member (PS)
2	CEA	K.K Arya	CE(I/c)
3	CEA	Pardeep Jindal	Director
4	CEA	B K Sharma	Director
5	CEA	AK Yadav	Dy. Director
6	CEA	Manoj Chaturvedi	Dy. Director
7	CEA	Nageswara Rao M	Engr.
	Regional Power Commitees		
8	NRPC	P K Pahwa	Member Secretary
9	WRPC	S D Taksande	Member Secretary
10	WRPC	Satyanarayana	SE
11	SRPC	S R Bhat	Member Secretary (I/c)
12	SRPC	Satbir Singh	SE
13	ERPC	A K Bandopadhyay	Member Secratary (I/c)
14	ERPC	B Sarkhel	Superitending Engineer
15	ERPC	J Bandyopadhyay	SE
16	NERPC	P D Siwal	Member Secretary (I/c)
17	NERPC	AK Mishra	SE
	Central Transmission Utility		
18	POWERGRID	R. N. Nayak	CMD
19	POWERGRID	I. S. Jha	Dir (Projects)
20	POWERGRID	Y. K. Sehgal	Exe. Director (Smart Grid)
21	POWERGRID	Pankaj Kumar	Exe. Director (SEF,CE,ERP&IT)
22	POWERGRID	BS Pandey	Exe. Director (Engg.)
23	POWERGRID	NS Sodha	Exe. Director (LD&C)
24	POWERGRID	R K Sarkar	GM (Engg.)
25	POWERGRID	A S Kuswaha	AGM (LD&C)
26	POWERGRID	Subir Sen	AGM (Smart Grid)
27	POWERGRID	Dilip Rozekar	DGM (SEF)
28	POWERGRID	Manoj Gupta	DGM (SEF)
29	POWERGRID	H Aggarwal	CM
30	POWERGRID	M K Tiwari	CM
31	POWERGRID	RK Gupta	CM
32	POWERGRID	Sunita Chouhan	CM
33	POWERGRID	Vineta Agarwal	CM
34	POWERGRID	Rajesh Kumar	CM
35	POWERGRID	M.S Rao	Manager
36	POWERGRID	Kashish Bhambhani	Manager
37	POWERGRID	Anil Kr. Meena	Dy. Mgr
38	POWERGRID	Pradeep Varun	Engr.
39	POWERGRID	Sandeep Kumawat	Engr.
40	POWERGRID	Ankit Rastogi	Officer
41	POWERGRID	Debajyoti Majumdar	ET
42	POWERGRID	G Sreenivasan	Resident Engineer
	POSOCO		
43	POSOCO	S. K. Soonee	CEO
44	NLDC	VK Agrawal	GM
45	NLDC	SR Narasimhan	DGM

46	NLDC	N Mishra	Engr.
47	NLDC	Pradeep Reddy	Engr.
48	NRLDC	PK Aggarwal	DGM
49	NRLDC	Rajeev Porwal	CM
50	WRLDC	P Pentayya	GM
51	WRLDC	Abhimanyu Gartia	DGM
52	SRLDC	P Bhaskar Rao	AGM
53	SRLDC	T Srinivas	CM
54	ERLDC	UK Verma	GM
55	ERLDC	SK Chandrakar	Mgr. (SLDC)
56	NERLDC	TS Singh	AGM
	Central PSUs & Multi State Agencies		
57	BBMB	Naveen Gupta	Dy. Director
58	DVC	BK Yadav	SE
59	IIT - Bombay	S A Soman	Professor
60	NHPC	DP Bhargava	Director (I&B)
61	NHPC	Nain Singh	ED (Des.I & M)
62	NPCIL	Devendra singh	Shift Charge Engr.
63	NPCIL	Sandeep Gupta	Sr. Maint Engr.
64	NTPC	Abhijeet Sen	AGM
65	NTPC	S S Mishra	DGM
66	THDC	Sarosh Majid Siddiq	Sr. Mgr. (Comml)
	State Transmission Utilities / SLDCs		
67	AEGCL (Assam)	N C Das	CGM
68	AEGCL (Assam)	GK Bhugan	Manager
69	AP TRANSCO (Andhra Pr.)	M Balasubramanyam	Divisional Engineer
70	AP TRANSCO (Andhra Pr.)	M Jaganmohan Rao	Asst. Div. Enginer
71	AP TRANSCO (Andhra Pr.)	S Harish	Superitending Engineer
72	DTL (Delhi)	Roop Kumar	GM (SLDC)
73	DTL (Delhi)	AK Ghyant	Mgr. (SLDC)
74	Me ECL (Meghalaya)	F E Kharshing	EE (SLDC)
75	Elect. Deptt., DNH	HM Patel	EE
76	HPPTCL(Himacghal Pr.)	K Kapoor	DGM
77	HPPTCL(Himachal Pr.)	S K Chauhan	DGM
78	HVPNL (Haryana)	RK Arora	Director (Tech.)
79	HVPNL (Haryana)	Sunil Seth	SE
80	KPTCL (Karnataka)	Suresh Kumar	Exe. Engineer (SCADA)
81	KPTCL(Karnataka)	Gajanana Sharma	Superitending Engineer
82	KSEB (Kerala)	MA Rawther	Member (T&GO)
83	KSEB (Kerala)	VG Manoharan	Chief Engr. (P&C)
84	Manipur Elect. Deptt	B Lalneisang Saiate	Ex. Engr.
85	MPPTCL (Madhya Pr.)	SK Tiwari	EE
86	MSETCL (Maharashtra)	H M Sahara	SE
87	MSLDC (Maharashtra)	VD Pande	EE
88	PSTCL (Punab)	Rajbir Singh Walia	Sr. Exe. Engr.
89	RVPNL (Rajasthan)	Y K Raizada	Director
90	RVPNL (Rajasthan)	l N Mimawat	SE
91	SLDC (Chhattisgarh)	KS Manothiya	CE
92	SLDC GETCO (Gujarat)	BB Mehta	ACE
93	SLDC GETCO (Gujarat)	PB Sathar	DE
94	SLDC MPPTCL (Madhya Pr.)	AP Bhainve	CE
95	TSECL (Tripura)	Subhas Chakraborty	DGM
96	UPPTCL (Uttar Pr.)	VP Tewari	SE
97	WB SETCL(West Bengal)	Subrata Nag	Director (operations)

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