

**REPORT OF THE
COMBINED COMMITTEE
FOR
TRAINING AND CERTIFICATION
OF
SYSTEM OPERATORS**

March 2010

CONTENTS

	Acronyms	v
	Executive Summary	vii
	Acknowledgement	xii
1.0	Background	1
2.0	Skills required in LDC Executives	6
3.0	Prevailing Practices of Training & Certification of LDC Executives	7
4.0	Recommendations on Training of LDC Executives	9
4.1	Identification of training curriculum / course lay out for system operators including lectures, simulator training / site visits	9
4.2	Identification of institutes / organisations for conducting of training / site visits	11
4.3	Duration and Periodicity of training and Basic Level Training / Advance Training	13
5.0	Recommendations on Certification of System Operators	14
5.1	Criteria and Procedure for Certification of System Operators	14
5.2	Periodicity of Certification	14
5.3	Certification Authority	15
5.4	Whether certification Authority will be same both for RLDC and SLDC?	16
6.0	Recommendations on Designing suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Dispatch Centres	16
6.1	Identification of Institutes / Organisations for conducting these courses	16
6.2	Procedure for selection of candidates and Level of experience / designation of candidates for undergoing these courses	17

6.3	Periodicity and Duration of courses	17
6.4	Identification of multi lateral institutions for funding	17
6.5	Interaction with the selected multi lateral institutions	18
Annex-I	Extracts of the Report of the Committee on Manpower, Certification and Incentives for System Operation and Ring Fencing Load Despatch Centres	19
<i>Annex-II</i>	Action Plan formulated for implementation of the Recommendations of the Pradhan Committee (Relevant extract of the minutes of the meeting held on 7-10-2008)	20
Annex-III	Office Order constituting the Combined Committee	21
Annex-IV	Minutes of the meeting of the Combined Committee	26
Annex-V	Comments received from the members of the Combined Committee	34
Annex-VI	Course Contents of the Modules for Training Curriculum of System Operators	44
Annex-VII	Model memorandum of understanding between Educational Institute and Load Despatch Centre/Company	71
Annex-VIII	Comments of NPTI on the draft report circulated on 11 th December 2009	76

Acronyms

ALDC	Area Load Despatch Centre
CEA	Central Electricity Authority
CPD	Continuing Professional Development
CPRI	Central Power Research Institute
CPSU	Central Public Sector Undertaking
DTS	Despatcher Training Simulator
EMS	Energy Management System
ESCI	Engineering Staff College of India
FOLD	Forum of Load Despatchers
FOR	Forum of Regulators
GO&D	Grid Operation & Distribution
IIM	Indian Institute of Management
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
ISO	Independent System Operator
IT	Information Technology
LDC	Load Despatch Centre
MOP	Ministry of Power
MOU	Memorandum of Understanding
MSETCL	Maharashtra State Electricity Transmission Corporation
NERC	North American Electric Reliability Corporation
NERPC	North Eastern Regional Power Committee
NIT	National Institute of Technology

NLDC	National Load Despatch Centre
NPTI	National Power Training Institute
PJM	PJM Interconnection LLC, USA
POWERGRID	Power Grid Corporation of India Ltd
PSTI	Power System Training Institute
RLDC	Regional Load Despatch Centre
SCADA	Supervisory control and data acquisition
SLDC	State Load Despatch Centre
TSO	Transmission System Operator
WBSETCL	West Bengal State Electric Power Transmission Corporation

EXECUTIVE SUMMARY

Ministry of Power constituted a committee headed by Sh. G.B. Pradhan, Additional Secretary, Ministry of Power vide order no. 6/2/2008-Trans dated 4th February 2008, to examine issues relating to manpower, certification and incentives for the personnel employed in System Operation at various levels and also for ring-fencing the Load Despatch Centres to ensure their functional autonomy. Pradhan Committee in its Report has indicated that there is huge disparity in various LDCs on the aspects of skill up-gradation and opportunities being provided for imparting training in their respective fields. In line with the Recommendation 3 of the Pradhan Committee and Action Plan decided during the meeting taken by Secretary (Power), a combined committee headed by Member (GO&D), CEA was constituted to recommend the system for training and certification of system operators and to design suitable courses at IITs, NITs and IIMs etc. for sponsored candidates from LDCs.

The Terms of Reference of the Combined Committee are given below:

1. Training of System Operators
2. Certification of System Operators
3. Design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Dispatch Centres

The summary of the Recommendations of the Committee are as follows:

1. Recommendations on Training of LDC Executives:

- a) **Course Content:** The training curriculum for LDC executives should include modules on aspects such as System Frequency & Tie Line Control, System Voltage Control, Resource Scheduling, System Security, Protection coordination and insulation coordination, System Restoration, SCADA / EMS, Disturbance Analysis, Power System Reliability, Power System Optimisation, Dispatcher Training Simulator (DTS), Commercial & Economic Aspects, Legal framework, Policies and Regulation, System Operation – International Practices, Electricity Markets, etc. The detailed course contents for the above modules are given at Annex-VI.

The detailed course material would require to be reviewed periodically to take care of changing requirement and keep abreast with the latest developments in the sector. It is recommended that a Committee of Experts may be constituted with members drawn from CEA, NLDC, RLDCs, SLDCs and the Academia to ensure that the course content is relevant and covers all aspects. This committee may also periodically review the course material.

- b) **Institutes for Training System Operators:** To start with, the courses can be conducted in the Institutes under the umbrella of NPTI, which has got requisite infrastructure and other facilities such as Power system simulators, High voltage testing lab, relay testing lab, instrumentation lab. NPTI has facilities available at Delhi, Faridabad, Nagpur, Durgapur and at Bangalore (PSTI), broadly covering all the Regions and they may gear up their infrastructure to provide training to the System Operators. Since a large number of operators would have to be trained in short span of time, gradually, other institutions such as the IITs, IISc,

IIMs, NITs, etc. may also be considered for imparting the training, particularly advance level training on regular basis to the system operators depending on the requirements.

- c) **Accreditation of Institutes imparting the Training:** In order to ensure that desired level of quality is maintained by training institutes imparting basic level training, the Committee recommends that an institute must get accredited from CEA before it starts imparting training to LDC executives. For this purpose, CEA will be required to frame guidelines for accreditation of the institutes imparting training to LDC executives. Till such time CEA comes out with these guidelines, NPTI will continue to impart basic level training. The requirement of accreditation is not applicable to institutes like NITs, IITs, IIMs and IISc which may be conducting advance level and specialised courses for LDC executives.

- d) **Duration and Periodicity of Training:** The suggested duration of the course for basic level training is three months. Every LDC executive will have to undergo basic level training within one year of joining at the entry level. Those executives who are already working in the LDCs for duration of less than 3 years would have to undergo the basic level training program and obtain Certification. Those executives who are already working in the LDCs for a duration of more than 3 years would have the option of undertaking self study and go for Certification. As part of the Continuing Professional Development (CPD), it is desirable that the LDC executives, who have completed basic level training, undergo training of 1-2 weeks duration every year through various refresher courses and advance level training courses conducted by IITs, IISc, NITs, PSTI, ESCI and other such organisations.

2. Recommendations on certification of LDC Executives:

- a) **Criterion and Procedure for Certification of System Operators:** The Committee suggests three level Certification viz. basic level, specialist

level and management level. The Committee recommends that certification authority may conduct the online examination for all the three levels of Certification on periodic basis (half yearly / quarterly) basis and fix the criteria for award of grade on the basis of performance.

- b) **Periodicity of Certification:** All personnel working in the LDCs would have to undergo at least the Basic Level Certification by 2011. Each LDC executive at the entry level will have to obtain basic level certificate within 1½ years of induction. Subsequently, this certificate will have to be renewed every 3 years.
- c) **Certification Authority:** The Committee feels that for an initial period of 3 years, NPTI may be designated as the Certification Authority for NLDC, RLDCs, SLDCs and ALDCs for maintaining uniformity in the pattern of examination. This position may be reviewed thereafter in view of the recommendation of the Pradhan Committee that training and certification agencies should be different.

3. **Recommendations on Designing Suitable Courses at IITs, NITs, IIMs for sponsored candidates:**

- a) **Identification of Institutes / Organizations:** The Committee recommends that in line with the charter of Forum of Load Despatchers (FOLD), Secretariat of FOLD can pursue with premier institutes like NITs, IITs, IISc and IIMs to regularly conduct short-term courses specially designed for LDC executives. Secretariat of FOLD can also hold discussion with NITs, IITs and IISc to explore feasibility of starting a post graduate course on system operation or offering relevant electives in their regular post graduate course on power system.
- b) **Procedure for Selection of Candidates:** The Committee feels that all entry level and middle level executives should get opportunity to attend

specialised short-term courses to be conducted by IITs, IISC and NITs. However, for post-graduate courses, only LDC executives who have completed at least 3 years of service and have obtained desired certification may be sponsored.

- c) **Periodicity and Duration of Courses:** Short term specialised courses may be conducted at least twice a year, perhaps once in summer and once in winter. Post-graduate course are generally of 24 months duration and it may not be possible to alter this duration especially for LDC executives.
- d) **Identification of Multilateral Institutes for Funding:** The Committee recommends that collaboration with National / International Institutes for developing and resolving the operational as well as commercial issues be explored. Possibility of obtaining funds from multilateral institutions like ADB and World Bank etc may be explored for structured training programmes and for creation of specialised infrastructure in the training institutes, if so required.
- e) **Interaction with selected multilateral institutions:** NPTI or other accredited training institutes in consultation with FOLD and CEA may approach multilateral institutions for funding through Ministry of Power, Government of India.

ACKNOWLEDGEMENT

As Chairman of the Committee, I am thankful to all the members of the Committee for actively participating in the discussion and giving their valuable suggestions. Load Despatch Centres are the nerve centres of the electric supply systems and therefore training and certification of the executives working in Load Despatch Centres is of utmost importance. I am hopeful that this report will not only kick-start this process, but will also help to guide the process in right direction to meet the future needs of fast expanding electric supply systems in India.

I am particularly thankful to Shri S.K. Soonee, Executive Director (SO), Power Grid Corporation of India Ltd and his officers for contribution in preparation of this report. Last but not the least; I acknowledge immense contribution of my officers who have worked in Grid Management Division during various phases of preparation of this report.



(S.M. Dhiman)

Member (GO&D), CEA

&

Chairman of the Committee

March 19, 2010

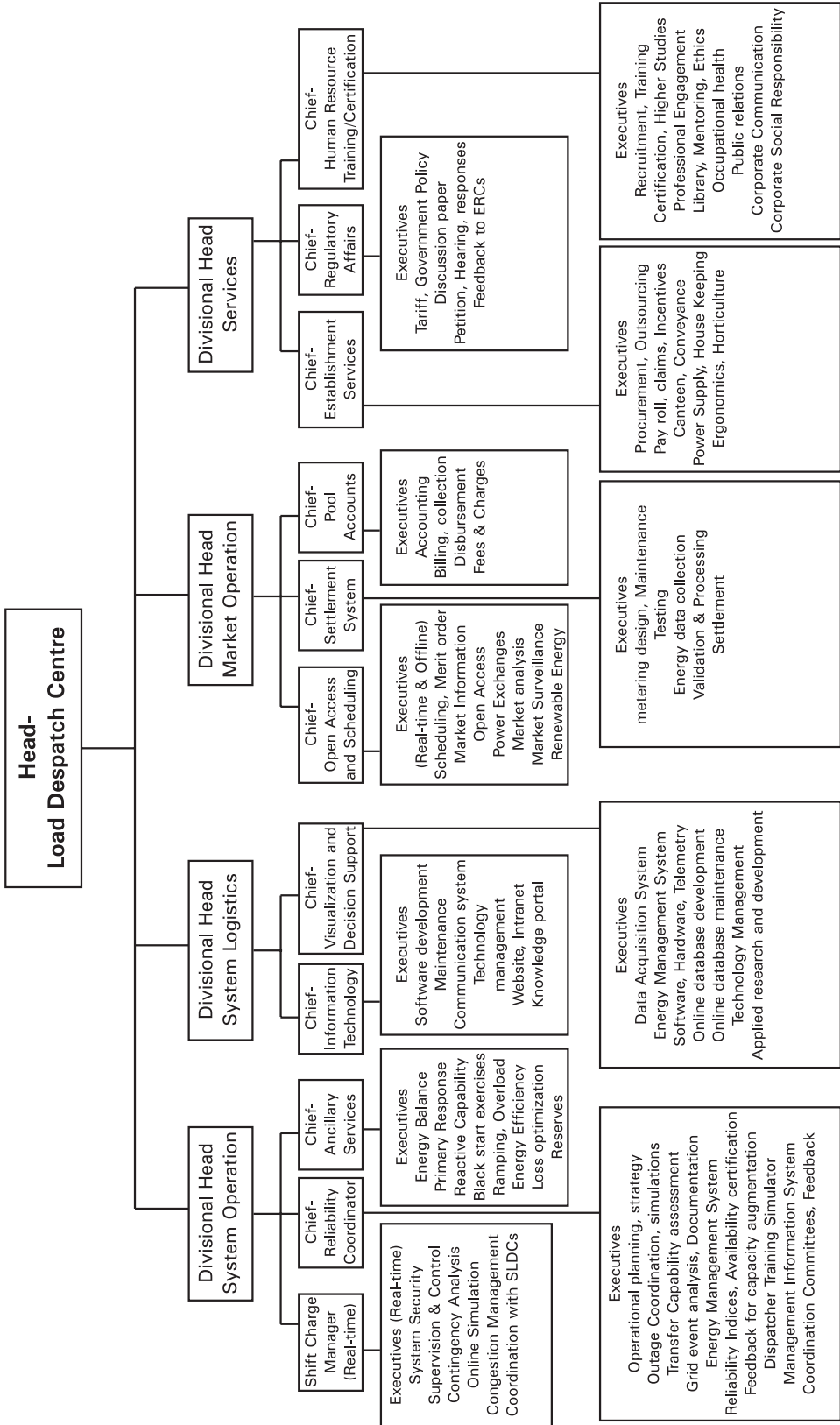
New Delhi

REPORT OF THE COMBINED COMMITTEE

1.0 Background

- 1.1 During the interactive session organized by the Ministry of Power (MOP) with the Forum of Regulators (FOR) on the 5th November 2007, the importance of the role of the system operators working in the Load Despatch Centers (LDCs) was highlighted and the need for capacity building by imparting training & certification was emphasized. Subsequently, Ministry of Power constituted a committee headed by Sh. G.B. Pradhan, Additional Secretary, Ministry of Power vide order no. 6/2/2008-Trans dated 4th February 2008, to examine issues relating to manpower, certification and incentives for the personnel employed in System Operation at various levels and also for ring-fencing the Load Despatch Centres to ensure their functional autonomy. The Committee examined various aspects of functioning of LDCs in India and viewed that the functions discharged by LDCs are highly specialised and technical. Pradhan Committee submitted the Report to the Government on the 18th August 2008 and gave recommendations for strengthening and ring fencing of LDCs in India.
- 1.2 Pradhan Committee in its Report has indicated that there is huge disparity in various LDCs on the aspects of skill upgradation and opportunities being provided for imparting training in their respective fields. The Committee observed that in the rapidly changing scenario a new look at the operator's competencies is required and emphasized the need to develop a system to ensure that quality services are delivered by LDCs. The Committee suggested the need to develop an elaborate process on the lines of the procedure being followed for selection, training and regular assessment of personnel associated with aviation industry viz. aircraft pilots, aircraft maintenance engineers and air traffic management etc. Apart from the induction level courses, the Committee felt that refresher courses, specialized training for skill upgradation of system operators / load Despatchers in the LDCs is also essential.

1.3 A typical organizational structure of a Load Despatch Centre as envisaged by Pradhan Committee is given below.



ORGANIZATION CHART FOR A TYPICAL LOAD DESPATCH CENTRE

1.4 Subsequently, a meeting chaired by Secretary, Ministry of Power, was held on the 7th October 2008 to decide an action plan for implementation of the recommendations of the Committee. The meeting was attended by Chairperson, CEA, the Energy / Power Secretaries from the states, State Electricity Regulatory and senior officers from CPSUs, CPRI, NPTI and State Power Utilities. Various issues related to implementation of the report of the Pradhan Committee were discussed during the meeting. It was decided to constitute three different task forces to oversee the implementation of different recommendations of the Committee. In terms of MOP O.M. No.6/2/2008-Trans. dated 13th October 2008, SI.No.1&2 of Clause 6.3d of Recommendation No. 3, Committees were to be constituted by CEA for the Training and Certification of System Operators. Further, in terms of SI.No.1 of Clause 6.3 (g) of Recommendation No. 3 (a), a committee was to be constituted by CEA to design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres. The extracts of Recommendation 3 of the Pradhan Committee and Action Plan formulated during the meeting held on 7-10-2008 for its implementation is given in Annex-I and Annex-II respectively.

1.5 In line with the Recommendation 3 of the Pradhan Committee and Action Plan decided during the meeting taken by Secretary (Power), a combined committee headed by Member (GO&D), CEA was constituted to recommend the system for training and certification of system operators and to design suitable courses at IITs, NITs and IIMs etc. for sponsored candidates from LDCs. The Office Order constituting the combined Committee is given at Annex-III. The Terms of Reference of the Combined Committee are given below:

(i) Training of System Operators

a) Identification of training curriculum/course layout for System Operators including lectures/simulator training/site visits.

- b) Identification of Institutes / Organisations for conducting of training/ site visits.
- c) Duration of training.
- d) Basic level training/Advanced training.
- e) Periodicity of training

(ii) Certification of System Operators

- a) Criteria for Certification of System Operators.
- b) Certification procedure.
- c) Periodicity of Certification.
- d) Certification Authority.
- e) Online certification procedure.
- f) Whether Certification Authority will be the same both for RLDC and SLDC.

(iii) Design suitable course at IITs,NITs,IIMs etc. for sponsored candidates from Load Despatch Centres

- a) Identification of Institutes/Organisations for conducting these courses.
- b) Level of experience/designation for candidates for undergoing these courses.

- c) Procedure for selection of candidates.
- d) Duration of courses.
- e) Periodicity of courses.
- f) Identification of multilateral institutions for funding.
- g) Interaction with the selected multilateral institutions.

1.6 The meeting of the Combined Committee was held on 30th January, 2009 wherein it was decided that

- All Members will send their comments on the course content as per the training proposal of NPTI circulated by Director (GM), CEA to all other Members through E-Mail by 10th February, 2009.
- After receipt of the comments, a smaller working group will meet in NPTI to finalize the course module. This would be finalized by middle of February, 2009.

The minutes of the Meeting are given at Annex-IV.

The comments / observations / suggestions were received from North Eastern Regional Power Committee (NERPC) / Maharashtra State Electricity Transmission Corporation (MSETCL) & West Bengal State Electric Power Transmission Corporation (WBSETCL) which are given at Annex-V.

1.7 First draft of the report was circulated to all the members of the committee in August 2009. The draft of the report was revised primarily based on the comments and suggestions of the members and the second draft was again circulated to all the members on 11th December 2009, with the request to

give suggestions, if any by 18th December 2009. Only NPTI has given certain suggestions, which are enclosed as Annex-VIII. Some of the suggestions of the NPTI regarding faculty development and infrastructure support have been incorporated in para 4.2.3 of the report.

2.0 Skills required in LDC Executives

2.1 The system operator is required to possess the capability to clearly visualise the present state of power system, assimilate and analyse, draw conclusions and take action which are in conformity with existing grid code, standards and market rules. The job of system operator also involves dissemination of information and interaction with stake holders / utilities. It is therefore, necessary to provide adequate training and evolve a system of certification of operators manning LDCs both for shift staff as well as support personnel in other areas.

2.2 Pradhan Committee had earlier conducted a survey of all LDCs in India to assess the profile of the personnel working in the LDCs. The current strength of executives working in the LDCs in the entire country at all levels is around 1200. The Report projects a total requirement of 2350 to 2750 for all LDCs. Manpower requirement on average of 60-70 persons in an LDC has been assessed by the Committee. The break-up of the posts in Top, Middle and Lower management level in a LDC may be as under.

Management Level	%
Top	2
Middle	12
Lower	86
Total	100

- 2.3 The majority of officials at executive level will be from engineering background. According to Pradhan Committee Report, the present skill and domain of knowledge of work force comprise 76% electrical, 10% electronics, 6% mechanical, 1.5% computer science and 1.8% instrumentation and 4.7% others.
- 2.4 The manpower requirements of the LDCs may also vary depending upon the size of the power system under the jurisdiction of LDCs. For example, larger States such as Uttar Pradesh and Maharashtra may also require Area Load Despatch Centers (ALDCs) to assist the SLDCs and the number of persons required for the Load Despatch function will be comparatively higher.
- 2.5 As follow up action to the recommendations of the Pradhan Committee, Ministry of Power had in-ter-alia constituted a Task Force headed by Chairperson, CEA to examine the aspects related to Manpower, Selection, Recruitment Procedure etc. of SLDCs. This Task Force has submitted its final report in October 2009 to the Ministry of Power. The Procedure for Certification of System Operators has to be in conformity to the Recruitment Procedure recommended by the Task Force.

3.0 Prevailing Practices of Training & Certification of LDC Executives

- 3.1 The Load Despatch Centres cover the four broad functional areas viz. system operation, market operation, system logistics and services. The LDCs are to function round the clock with suitably skilled manpower for system operation, market operation, research & analysis, regulatory affairs, logistics (system data acquisition, energy management, communication, IT system) and other establishment services to carry out the assigned functions. With the view to elicit information regarding the prevailing practices with regard to training being imparted and system of certification to system operators, inputs were provided by Members of the Combined Committee. West Bengal State Electricity Transmission Corporation (WBSETCL), Maharashtra State

Electricity Transmission Corporation (MSETCL) and North Eastern Regional Power Committee provided the inputs / suggestions to the Committee. WBSETCL and MSETCL conveyed that there is no system of organised training for system operators / load Despatchers and there is no participation in courses at IITs, NITs and IIMs on regular basis. There is no system prevailing in these organisations for certification of system operators. The engineers / system operators are, however, imparted relevant training in the programs organised by the various organisations from time to time like Power System Training Institute (PSTI), Bangalore, Engineering Staff College of India (ESCI), Hyderabad etc.

- 3.2 Pradhan Committee in its Report has observed that the North American Electric Reliability Corporation (NERC) has a system operator certification programme to provide the framework for examination for obtaining the initial certification in one of the four NERC Credentials viz. Transmission Operators, Balancing and Interchange Operators, Balancing, Interchange and Transmission Operators and Reliability Operators. According to NERC practice for award of certification, a written examination is conducted for testing the operators on their knowledge of NERC operating policies as well as principles of operation of interconnected power system. The certificates are revalidated every three years and it is a mandatory requirement to obtain certification by personnel manning control centres in North America.
- 3.3 A Working Group of the Combined Committee comprising representatives of NPTI, CEA and POWERGRID deliberated on the inputs / suggestions given by the Members of the Committee regarding various aspects of training of system operators, certification of system operators, suitable courses at IITs, IIMs and NITs for sponsored candidates from Load Depatch Centres. The Combined Committee also studied the system prevailing in other countries by literature survey and other material available on the subject for consideration by the Combined Committee.

4.0 Recommendations on Training of LDC Executives

The recommendations of this Committee on various items as per Terms of reference are as under.

4.1 Identification of training curriculum / course lay out for system operators including lectures, simulator training / site visits

4.1.1 The following modules for the training curriculum are recommended for LDC executives to carry out the functions assigned to them in various Divisions of LDCs.

- Orientation / Overview
- Review of Electrical Engineering Fundamentals
- Generation
- Transmission
- Distribution
- Power System Protection
- Grid Operation and Management
 - System Frequency & Tie Line Control
 - System Voltage Control
 - Resource Scheduling

- System Security, Protection coordination and insulation coordination
 - System Restoration
 - SCADA / EMS
 - Disturbance Analysis
 - Power System Reliability
 - Power System Optimisation
 - Dispatcher Training Simulator (DTS)
 - Commercial & Economic Aspects
 - Legal framework, Policies and Regulation
 - System Operation – International Practices
-
- Electricity Markets
 - Data processing, analysis and presentation
 - IT – Tools
 - Management Module
 - Practical Experience

4.1.2 The combined committee has prepared detailed training curriculum based on the above mentioned modules, which is given at Annex- VI. The course material may be designed in such a way that all the major areas mentioned in the training curriculum are covered. The Indian Power Sector is passing through a phase of high growth and there are changes in the policies, rules and regulations which have a bearing on the System Operation. The detailed course material would require periodic review to take care of changing requirement and keep abreast with the latest developments in the sector. It is recommended that a Committee of Experts may be constituted with members drawn from CEA, NLDC, RLDCs, SLDCs and the Academia to ensure that the course content is relevant and covers all aspects. This committee may also periodically review the course material.

4.1.3 Regulations on open access, power trading, terms and conditions of tariff have all been introduced during the last four to five years. Power Exchanges have been operationalized and the rules governing them have also been framed during last two years. Review of the principle of transmission pricing is under process by the Central Electricity Regulatory Commission. In view of the above, the Committee feels it to be appropriate to leave it to the training institutes to ensure inclusion of all the latest regulations relevant to system operators in their training courses from time to time.

4.2 Identification of institutes / organisations for conducting of training / site visits

4.2.1 The Committee feels that to start with, the courses can be conducted in the Institutes under the umbrella of NPTI, which has got requisite infrastructure and other facilities such as Power system simulators, High voltage testing lab, relay testing lab, instrumentation lab, required for such courses. NPTI has facilities available at Delhi, Faridabad, Nagpur, Durgapur and at Bangalore (PSTI), broadly covering all the Regions and

they may gear up their infrastructure to provide training to the System Operators.

- 4.2.2 It has already been mentioned that presently about 1200 personnel are involved in the System Operation function and the projected requirement is around 2750. Since a large number of operators would have to be trained in short span of time, gradually, other institutions such as the IITs, IIMs, NITs, etc. may also be considered for imparting the training, particularly advance level training on regular basis to the system operators depending on the requirements.
- 4.2.3 In order to ensure that desired level of quality is maintained by training institutes imparting basic level training, the Committee recommends that an institute must get accredited from CEA before it starts imparting training to LDC executives. This will be in line with the function of promoting measures to advance skills of the persons engaged in electricity industry, which has been entrusted to CEA under Section 73 (g) of the Electricity Act, 2003. For this purpose, CEA will be required to frame guidelines for accreditation of the institutes imparting training to LDC executives. However, till CEA comes out with these guidelines, NPTI will continue to impart basic level training. NPTI may immediately initiate action for faculty development and creation of additional infrastructure if any, for conducting training courses as well as to undertake responsibility of certification authority discussed in the later part of the report. In order to have closer interaction with LDCs and for better understanding of their training needs, NPTI may get in touch with secretariat of the FOLD. The Committee wishes to clarify that the requirement of accreditation is not applicable to institutes like NITs, IITs, IIMs and IISc which may be conducting advance level and specialised courses for LDC executives.
- 4.2.4 The Recommendation 6.3(g) of the Pradhan Committee says- *“g) Active collaboration of LDCs with educational institutes for research and*

development related to Indian power system and electricity market operation.”

In the meeting taken by Secretary, Ministry of Power on the 7th October 2008 regarding the implementation of the Recommendations of the Pradhan Committee, an action plan was drawn up for implementation of Recommendation 6.3(g) where it has been recorded that a Memorandum of Understanding between the LDCs and Educational Institutions would be signed. In line with the above Recommendations, a Draft MOU with the Educational Institutions has been prepared and is enclosed at Annex – VII.

4.3 Duration and Periodicity of training and Basic Level Training / Advance Training

4.3.1 The suggested duration of the course for basic level training is three months. Every LDC executive will have to undergo basic level training within one year of joining at the entry level. Those executives who are already working in the LDCs for a duration of less than 3 years would have to undergo the basic level training program and go for Certification. Those executives who are already working in the LDCs for a duration of more than 3 years would have the option of undertaking self study and go for Certification. An intensive short duration training program of 1 – 2 weeks duration could also be arranged for executives who have a working experience of more than 3 years in the LDCs.

4.3.2 As part of the Continuing Professional Development (CPD), it is desirable that the LDC executives, who have completed basic level training, undergo training of 1-2 weeks duration every year through various refresher courses and advance level training courses conducted by IITs, IISc, NITs, PSTI, ESCI and other such organisations. Also, there is a need to rope in premier Institutes in the field of Management such as the IIMs, since Management

Level Certification is also being envisaged.

5.0 Recommendations on Certification of System Operators

5.1 Criteria and Procedure for Certification of System Operators

5.1.1 The Committee recommends three level Certification viz. basic level, specialist level and management level. This aspect has also been referred to by the MOP Task Force on “Capital Expenditure and Issues Related to Emoluments for Personnel in Load Despatch Center” (report submitted to MOP in June 2009), which has recommended linking of incentive at various levels to the Certification. For becoming a Divisional head, a specialist level certification in addition to a basic level certification is recommended. For becoming the head of LDC, a management level certification in addition to basic level and specialist level certifications is recommended. For personnel at other levels, basic level certification is recommended as the essential qualification.

5.1.2 The Committee recommends that the designated certification authority may conduct the online examination for all the three levels of Certification on periodic basis (half yearly / quarterly) basis and fix the criteria for award of grade on the basis of performance. There may be total of five grades from A to E and grade C may be kept as the minimum benchmark for award of certification. The examination papers may be set after taking input from experts in various fields and then consolidating and moderating the same. Experts in the various fields should be selected in such a manner that they represent a good mix of the industry and academia.

5.2 Periodicity of Certification

5.2.1 All personnel working in the LDCs would have to undergo at least the Basic Level Certification by the end of 2011. Each LDC executive at the

entry level will have to obtain basic level certificate within 1½ years of induction. Subsequently, this certificate will have to be renewed every 3 years.

- 5.2.2 During these three years, in order to maintain the certification status as 'active', LDC executive would have to work in the respective area. Moreover, he should also have attended refresher courses for at least 5 days in a year as part of Continuing Professional Development (CPD) during this period. At the end of each financial year falling within these three years, head of the LDC will certify 'active status' of certification or otherwise for all the LDC personnel. At the end of three years, the LDC executive will have to appear in the examination for re-certification.
- 5.2.3 Once the initial period (first phase) of 2-3 years is passed, say after 2011-12, LDC executives with 10 years experience, particularly those who are likely to be considered for the post of Divisional Heads, may appear for Specialist Level certification examination. Similarly, a LDC executive who has obtained Specialist Level Certification and has completed 15 years of service may appear in the Management Level certification examination. The detailed modalities in this respect would be worked out subsequently.

5.3 Certification Authority

- 5.3.1 Pradhan Committee has recommended that to maintain credibility, the training and certification agencies need to be different. It has further recommended that to begin with, the NPTI may be entrusted with the responsibility of training and certification of system operators. This Committee also feels that since this is a new area, NPTI may be designated as Certification Authority for an initial period of 3 years. After this period, a review may be done to see if any other agency, which is not conducting training for system operators can be designated as certification authority.

5.3.2 Each Load Despatch Centre would be required to furnish the appropriate Electricity Regulatory Commissions with an Annual Compliance Report of certification for each of the System Operators working in their LDC

5.4 Whether Certification Authority will be the same both for RLDC and SLDC?

The functions entrusted to ALDCs, SLDCs, RLDCs and NLDC are broadly similar in nature, though the quantum of power / transmission system being handled may vary from State to State and Region to Region. The Committee feels that NPTI may be designated as the Certification Authority for NLDC, RLDCs, SLDCs and ALDCs for maintaining uniformity in the pattern of examination.

6.0 Recommendations on Designing suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres

6.1 Identification of Institutes / Organisations for conducting these courses

As already mentioned, in addition to NPTI premier institutes like NITs, IITs and IIMs should also be roped in to provide training to LDC executives, particularly the advanced level training. The Committee recommends that in line with the charter of Forum of Load Despatchers (FOLD), Secretariat of FOLD can pursue with these premier institutes to regularly conduct short-term courses specially designed for LDC executives. Secretariat of FOLD can also hold discussions with IITs, IISC and NITs to examine feasibility of starting a post graduate course in system operation in one of these institutes. Alternatively, since many institutes are already offering post graduate course in power systems, these institutes may be persuaded to offer couple of subjects more relevant to system operation as electives.

6.2 Procedure for selection of candidates and Level of experience / designation of candidates for undergoing these courses

The Committee feels that all entry level and middle level executives should get opportunity to attend specialised short-term courses to be conducted by IITs, IISC and NITs. However, for post-graduate courses, only LDC executives who have completed at least 3 years of service and have obtained desired certification may be sponsored. Since sponsoring organisation will be incurring expenditure in the form of course fee as well as salary during this period, the sponsored candidate may be required to sign a bond to serve the organisation for a specified period. The discretion to nominate a LDC executive for post-graduate course may rest with head of the LDC, who among other things, shall take into account performance appraisal of the candidate.

6.3 Periodicity and Duration of courses

Short term specialised courses may be conducted at least twice a year, perhaps once in summer and once in winter. Post-graduate course are generally of 24 months duration and it may not be possible to alter this duration especially for LDC executives. Of these 24 months, 12 months are assigned for dissertation work and possibility of completing dissertation work after joining the duty may be examined, provided the candidate is appropriately loaded and should be allowed to interact with his supervisor.

6.4 Identification of multi lateral institutions for funding

- 6.4.1 There appears to be growing awareness in the power sector about training needs of the system operators. The Committee expects that this will translate into provision of adequate funds for training in the 'fees and charges' for LDCs to be approved by appropriate Commissions. However, periodical training in the reputed institutes and exchange visits with the

system operators abroad is desirable, which may require additional funding. A collaboration with International Energy Institute like Siemens PTI, Florence School of Regulation (European University Institute), Areva, GE, independent system operators (ISOs/TSOs i.e. National Grid, UK,) and PJM of USA etc.) could be developed by the Institutes imparting training to the System Operators for understanding of latest technology in Power Sector and the role of LDCs in regulated environment. Possibility of obtaining funds from multilateral institutions like ADB and World Bank etc may be explored for structured training programmes and for creation of specialised infrastructure in the training institutes, if so required.

6.4.2 The Training Institutes designated to impart training to the System Operators should be encouraged to interact with international agencies imparting similar Certification facilities in the field of System Operation in order to adopt the best industry practices and further enrich the Course Content and improvise the whole Certification Process further

6.4.3 The Committee recommends that collaboration with National / International Institutes for developing and resolving the operational as well as commercial issues be explored.

6.4.4 The Academia may be encouraged to explore the possibility of research work in the fields relevant to system operation. A possibility of identifying power system operational problems and their required solutions through continual research can be explored.

6.5 Interaction with the selected multi lateral institutions

NPTI or other accredited training institutes in consultation with FOLD and CEA may approach multilateral institutions for funding through Ministry of Power, Government of India.

Extracts of the Report of the Committee on Manpower, Certification and Incentives for System Operation and Ring Fencing Load Despatch Centres

“6.3 Recommendation 3

The Committee recommends

- a) Introduction of a system of certification of System Operators by an independent Central body, similar to the system followed in case of Air Traffic Controllers.
- b) Establishment of a Central Institute for training of System Operators. Initially the National Power Training Institute (NPTI) may be entrusted with the responsibility of training and certification.
- c) Within the next one year, all the course material, systems and procedures required for administering a “basic level” of training and certification should be developed.
- d) All LDCs must ensure that all the personnel of LDCs undergo this ‘basic level’ training and certification and only certified personnel staff the LDCs within two years from the release of this report. The appropriate Electricity Regulatory Commissions would be furnished with an Annual Compliance Report of this requirement. Subsequently advanced level training and certification programme must be introduced.
- e) Fresh recruitment at regular intervals for lowering the average age of the work force in the LDCs.
- f) Introduction of suitably designed courses in the Indian Institutes of Technology and National Institutes of Technology for ensuring availability of skilled manpower.
- g) Active collaboration of LDCs with educational institutes for research and development related to Indian power system and electricity market operation.”

**Action Plan formulated for implementation of the
Recommendations of the Pradhan Committee**

(Relevant extract of the minutes of the meeting held on 7-10-2008)

QUOTE

43. Summing up the discussions Secretary (Power) thanked the delegates for participating in the meeting. Secretary (Power) said that as all the State Regulators, State Governments and Utilities had endorsed and supported the recommendations, the implementation needed to be put on fast track. Secretary (Power) constituted three task forces for effective monitoring and implementation of the recommendations of the Committee.
44. The first Task Force for Implementation of the Report would be chaired by Member (Power Systems), CEA and co-chaired by joint Secretary (O & M) Ministry of Power. ED (NLDC), Power grid, Chief Engineer (Grid Management), CEA and representatives from the State Governments of Uttar Pradesh, Bihar, Madhya Pradesh, Assam and Tamil Nadu would be the members. Director (OM), Ministry of Power would be the Member Secretary of the Task Force. The States were requested to appoint an officer in-charge, preferably the Secretary (Energy / Power) for implementation of the recommendation of the Committee.
45. The second Task Force for examining the Financial Aspects and Emoluments Issues would be chaired by CMD. Power Finance Corporation and Director (Finance), Power Grid, Principal secretary (Power), Haryana, Principal Secretary, Govt. of Karnataka, MD Transco Gujarat would be members and Secretary CERC would be Member secretary of the Task force.
46. The third Task Force on Manpower Selection and Recruitment would have chairperson, CEA as Chairman of the Task Force, Representative from Rajasthan Electricity Regulatory Commission, Secretary Energy, Government of Delhi as Members and Joint Secretary (Administration), Ministry of Power will be the Member Secretary.
47. The other Committees as suggested by the Committee need to be constituted by respective organization / authorities immediately. The committees would complete the action assigned to them within the suggested time frame.

UNQUOTE

**Central Electricity Authority
Grid Management Division
Sewa Bhawan, R.K.Puram, New Delhi-110 066**

No. 8/X/ISOp./GM-2008

dated 24.12.08

Office Order

A Committee was constituted by the Ministry of Power vide Order No.6/2/2008-Trans. dated 4th February 2008 to examine issues relating to Manpower, Certification and Incentives for the personnel employed in System Operation at various levels and also for Ring - Fencing the Load Despatch Centres to ensure their functional autonomy and give recommendations. The Committee submitted the Report in August 2008.

A meeting was held under the Chairmanship of Secretary (Power) on 7th October, 2008 at Vigyan Bhawan regarding implementation of the Report of this Committee. An Action Plan was prepared and circulated by MoP vide O.M. No.6/2/2008-Trans.dated 13th October 2008.

In terms of this O.M. of MoP, Sl.No.1&2 of Clause 6.3d of Recommendation No. 3, Committees are to be constituted by CEA for the Training and Certification of System Operators. Further, in terms of Sl.No.1 of Clause 6.3 g of Recommendation No. 3, a committee is to be constituted by CEA to design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres. It has been decided to constitute a combined committee with the following members :

- i) Member(GO&D),CEA - Chairman
- ii) Director General, NPTI
- iii) Chief Engineer(Grid Management), CEA.
- iv) Executive Director(SO), POWERGRID.
- v) General Manager, NRLDC, New Delhi.
- vi) General Manager, WRLDC, Mumbai.
- vii) General Manager, SRLDC, Bangalore.
- viii) General Manager, ERLDC, Kolkata.**
- ix) General Manager, NERLDC, Shillong.**
- x) Member Secretary, NRPC, **New Delhi.**
- xi) Member Secretary, **WRPC, Mumbai.**
- xii) Member Secretary, **SRPC, Bangalore.**
- xiii) Member Secretary, **ERPC, Kolkata.**
- xiv) Member Secretary, **NERPC, Shillong.**
- xv) Chief Engineer, SLDC, UP Power Corporation Limited, Lucknow.
- xvi) Chief Engineer, SLDC, MSETCL, Thane, Navi Mumbai.

xvii) Chief Engineer (Grid Operation), SLDC, APTRANSCO, Hyderabad.

xviii) Chief Engineer, SLDC, WBSETCL, Howrah, West Bengal.

xix) Chief General Manager, LDC, Assam Electricity Generating Corporation Ltd., **Guwahati- Assam.**

xx) Director(HRD), CEA

xxi) Director(Grid Management), CEA - Convener

The terms of reference of the Committee will be as follows:

(i) Training of System Operators

- a) Identification of training curriculum/course layout for System Operators including lectures/simulator training/site visits.
- b) Identification of Institutes/Organisations for conducting of training/site visits.
- c) Duration of training.
- d) Basic level training/Advanced training.
- e) Periodicity of training

(ii) Certification of System Operators

- a) Criteria for Certification of System Operators.

- b) Certification procedure.
- c) Periodicity of Certification.
- d) Certification Authority.
- e) Online certification procedure.
- f) Whether Certification Authority will be the same both for RLDC and SLDC.

(iii) Design suitable course at IITs,NITs,IIMs etc. for sponsored candidates from Load Despatch Centres

- a) Identification of Institutes/Organisations for conducting these courses.
- b) Level of experience/designation for candidates for undergoing these courses.
- c) Procedure for selection of candidates.
- d) Duration of courses.
- e) Periodicity of courses.
- f) Identification of multilateral institutions for funding.
- g) Interaction with the selected multilateral institutions.

The Committee would submit its report by 31.5.2009.

Sd/-
(Pankaj Batra)
Director

To,

All Members of the Committee.

Copy for kind information to:

1. Chairman, UP Power Corporation Ltd., Lucknow.
2. Managing Director, MSETCL, Mumbai.
3. Chairman & Managing Director, APTRANSCO, Hyderabad.
4. Chairman, WBSETCL, Kolkata.
5. Managing Director, AEGCL, Guwahati.

Copy also forwarded for kind information to:

1. Member (PS), CEA.
2. Chief Engineer (HRD), CEA.
3. Director (OM), MoP.
4. PPS to Chairperson, CEA.
5. PS to Member (GO&D), CEA

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
ग्रिड प्रवन्धन प्रभाग
Grid Management Division
सेवा भवन, आर के पुरम, नई दिल्ली- 110066
Sewa Bhawan, R.K. Purem, New Delhi – 110066

No. 8 / X / ISOp / O&M - 09 / 243

Dtd : 6.2.09

Subject : Minutes of the first meeting of the combined committee for Training and Certification of System Operators and to Design Suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres.

Enclosed please find the Minutes of the first meeting of the combined committee for training and Certification of System Operators and to design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres held on 30.01.09 at the Conference Room of CEA, 2nd Floor, Sewa Bhawan, R.K. Purem, New Delhi for kind information and necessary action.

Sd/-
(Pankaj Batra)
Director and
Convener of Committee

To,
All Members of the Committee
Copy for kind information to :

1. CMD, Powergrid, Gurgaon
2. Chairman, UP Power Corporation Ltd, Lucknow

3. Managing Director, MSETCL, Mumbai
4. Chairman & Managing Director, APTRANSCO, Hyderabad
5. Chairman, WBSETCL, Kolkata.
6. Managing Director, AEGCL, Guwahati.

Copy also forwarded for kind information to

1. Member (PS), CEA.
2. Chief Engineer (HRD), CEA.
3. Director (OM), MoP
4. PPS to Chairperson, CEA
5. PS to Member (GO&D), CEA

Members of the Committee

- i) Member (GO&D), CEA - Chairman
- ii) Director General, NPTI
- iii) Chief Engineer (Grid Management), CEA.
- iv) Executive Director (SO), Powergrid.
- v) General Manager, NRLDC, New Delhi
- vi) General Manager, WRLDC, Mumbai
- vii) General Manager, SRLDC, Bangalore.
- viii) General Manager, ERLDC, Kolkata
- ix) General Manager NERLDC, Shillong
- x) Member Secretary, NRPC, New Delhi
- xi) Member Secretary, WRPC, Mumbai
- xii) Member Secretary, SRPC, Bangalore
- xiii) Member Secretary, ERPC, Kolkata
- xiv) Member Secretary, NERPC Shillong
- xv) Chief Engineer, SLDC, UP Power Corporation Limited, Lucknow
- xvi) Chief Engineer, SLDC, MSETCL, Thane, Navi Mumbai
- xvii) Chief Engineer (Grid Operation), SLDC, APTRANSCO, Hyderabad
- xviii) Chief Engineer, SLDC, WBSETCL, Howrah, West Bengal
- xix) Chief General Manager, LDC, Assam Electricity Generating Corporation Ltd., Guwahati - Assam
- xx) Director (HRD), CEA
- xxi) Director (Grid Management), CEA - Convener

केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
ग्रिड प्रबंधन प्रभाग
Grid Management Division
सेवा भवन, आर के पुरम, नई दिल्ली- 110066
Sewa Bhawan, R.K. Purem, New Delhi – 110066

Subject : Minutes of the first meeting of the combined committee for Training and Certification of System Operators and to Design Suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres.

The First meeting of the combined committee for Training and Certification of System Operators and to design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres was held on 30.1.09 at the the Conference Room of CEA, 2nd Floor, Sewa Bhawan, R.K. Puram, New Delhi at 14.30 hrs. Member (GO&D), CEA chaired the meeting. The list of participants is given in Annex-I.

Member (GO&D) welcomed all the members. He stated that the Load Despatch Centres play an important role in coordinated operation of the generating facilities. The system operators have to ensure operation of the system with security and reliability. This requires in-depth understanding and development of necessary skills of technical aspects of system operation, market mechanisms and the regulatory framework. Giving the background, he stated that a Committee was formed by the Govt. of India to examine issues relating to manpower, certification and incentives for the system operators and ring-fencing the Load Despatch Centres to ensure their functional autonomy and give recommendation. The report of the Committee was submitted in August 2008. The report envisaged a strength of about 60-70 executives per Load Despatch Centre which would lead to a total strength of 2000-3000 in the country. The committee would recommend contents of the training course to impart state-of-the-art training in system operation. Two levels of training are envisaged, basic level and advanced level after a gap of,

say, 6-7 years of experience. Other courses could also be organized like management and communication skills, yoga to manage stress, etc. He also stated that field experience is necessary for all system operations. He stated that field experience is necessary for all system operators. He stated that, this Committee was formed in comply with Recommendation 3 of the Report of the Committee. Director (GM), CEA, who is also the convener of this committee had done some study in regard to training and certification of system operators in the international arena and prepared a presentation. He requested Director (GM) to give the presentation.

Director (GM) then gave the presentation covering points relating to training and certification of system operators, information of which he had obtained through the internet. He stated that the European transmission system operators did not have any structured training programme for system operators on their website and also there was no information with regard to certification of system operators in such countries. However, North America had a structured programme for system operators, which was available in the website of North American Electricity Reliability Corporation (NERC). According to the website, NERC accredited various institutions/organizations for imparting various training courses pertaining to system operation. Organization like Siemens PTI and System Operations Success Intl, (SOS) were two of the accredited organizations. The broad headings of the courses were also mentioned in the respective websites and these were shown in respect of the above two organizations in the presentation. The details of each of the broad headings were also available in the website and could be accessed. NERC was also the Certifying Authority. NERC prescribed that a one-time examination was to be taken for each system operator which would be valid for three years. Re-certification had to be obtained every three years through undergoing courses of the accredited organizations, amounting to a certain number of continuing education (CE) hours rather than taking the exam every three years.

He stated that NPTI had furnished the basic course outline and outline of specialized short term programmes for system operators. The basic course

duration came to 52 working days which works out to 312 hrs. (since each day is taken as 6 hrs as stated by NPTI). In the training certified by NERC, the training by a particular organization (Siemens PTI) was 71.5 hrs. He suggested that CEA could be the Certifying Authority in India and NPTI could initially be the organization imparting training to system operators. Subsequently, seeing to the demand of training system operators, more institutes/organizations could be accredited by CEA. He also displayed the outline and detailed course content provided by NPTI. There was a suggestion that this could act as a base paper for finalizing the course module and hence should be circulated to everyone. Copies of the Course content provided by NPTI were then circulated to all the members. As per the feed back received from the State Load Despatch Centers, who were members, they stated that they did not have any structured programme specifically for system operators. Only NERLDC had recently organized a program for system operators from the reactive energy charges accumulated in the reactive pool account. He stated that the presentation was to start the thought process for training and certification of system operators and deliberations could be carried out.

Executive Director (System Operation), Powergrid stated that some information on the international practices for ensuring competence of system operators was already mentioned under paras 4.3 and 4.4 of the Report of the Committee on manpower, certification and incentives for system operation and for ring-fencing, the load Despatch centres. He stated that course module and course material for training of system operators had to be finalized quickly. He suggested that a sub-group could be formed for finalizing the course module by the middle of February. The detailed course material could then be formulated by NPTI. Since the preparation of course material required a lot of time and effort, NPTI stated that they could not do it on their own and may have to outsource the same, ED (SO), Powergrid stated that later on, a number of institutes should come up and each state should have a training institute.

Director General, NPTI stated that they had already circulated the basic course outline and outline of specialized short term programmes to Ministry of Power and CEA. It could be seen therefrom, that the course envisages lecture sessions

and laboratory sessions. There could be suitable courses in IIT & IIMs etc. He requested to Co-Opt. someone from Delhi IIT for preparation of the material. On a question whether the course would only be for shift engineers or also for back office staff like commercial/ communication circles, it was clarified that the training course and certification would be for every one manning the load Despatch centre, whether for on-line or off-line functions. DG, NPTI stated that we should have various levels of training like a green belt/black belt etc. in Judo.

Chief Engineer (Grid Management) stated that all the terms of reference of the committee need to be deliberated, He stated that Identifications of other institutes for training of system operators along with the examination authority and certification authority are also to be discussed as long term measure.

Member Secretary, NRPC stated that 360 degrees skills are required for training of system operators, rather than only technical skills. Therefore we should also include IIMs for carrying out the training

Officers from SLDCs also informed about the type of training being conducted in their respective Load Despatch Centre.

At the conclusion, the following decisions were taken:

1. All members will send their comments on the course content as per the training proposal of NPTI circulated by Director (GM) to all other members through e-mail by 10.2.09
2. After receipt of the comments, a smaller working group will meet in NPTI to finalise the course module. This would be finalized by the middle of February 2009.

List of Participants

Power Grid

1. Shri S. K. Soonee Executive (Director SO)
2. Shri S.C. Saxena Manager, NLDC, New Delhi

Regional Load Despatch Centres

3. Shri V. K. Agarwal GM, NRLDC, New Delhi
4. Dr. L. Hari GM, ERLDC, Kolkata
5. Shri T.S. Singh DGM, NERLDC, Shillong
6. Shri N. Nallarasana Chief Manager, SRLDC, Bangalore

Regional Power Committee

7. Shri P. Patel Member Secretary, WRPC, Mumbai
8. Shri A. K. Aggarwal Member Secretary, NERPC, New Delhi
9. Shri Manjit Singh Member Secretary, NERPC, Shillong
10. Shri Ajay Kumar Jain SE, NERPC, Shillong

State Load Despatch Centres

11. Shri K.S.N. Murthy Chief Engineer (GO), APSLDC, Hyderabad
12. Shri P.B. Hote Chief Engineer, SLDC, Mumbai
13. Shri R.P. Singh SE, UPPTCL, Lucknow
14. Shri H. Hazarika DGM, LD&C, AEGCL, Guwahati

National Power Training Institute

15. Dr. N.S. Saxena Director General, NPTI, Faridabad
16. Shri A. V. Chaoji Principal Director, NPTI, Faridabad

Central Electricity Authority

17. Shri S.M. Dhiman Member (GO&D), CEA, New Delhi
18. Shri T. Chatterjee Chief Engineer (GM), CEA
19. Shri Major Singh Director, GM, CEA
20. Shri B.K. Jain Director, GM, CEA
21. Shri Pankaj Batra Director, GM, CEA
22. Shri Chandra Prakash Dy. Director (GM), CEA

**Central Electricity Authority North Eastern
Regional Power Committee
Meghalaya State Housing Finance
Co-Operative Society Ltd. Building
Nongrim Hills, Shillong – 793003.**

Ph : 0364-2520034, Fax: 0364-2520030, email: msnerpc@dataone.in,
website: www.nerpc.nic.in

Subject: First meeting of the combined committee for Training and Certification of System Operators and to design suitable course at IITs, NITs, IIMs etc. for sponsored candidates from Load Despatch Centres held on 30.1.2009.

This refers to discussions that had taken place in above mentioned meeting held in CEA office New Delhi. During the discussions it was concluded that the proposed course content details prepared by NPTI which were circulated in the meeting would be seen by the members and suggestions/comments sent to GM division for taking further action to finalise the course module by the Combined Committee. In the above context, our views are furnished as follows:-

- (i) The course program outline in terms of number of sessions has higher allocation of time for elementary electrical engineering part. As the course participants are expected to be holding degree in electrical engineering and handling load despatch related works/activities, a brief refresher process which covers practical aspects and application part should suffice.
- (ii) Provision of relatively higher allocation of time shall require to concentrate upon in-depth exposure in the real-time functioning under regulatory environment both technically and commercially, wherein grid operation encounters several constraints.

- (iii) The detailed coverage through lecture sessions may be provided by the experts of world-class in the field on topics of the like - congestion management and role of power exchange/power trading agencies thereof, effective and financially viable grid operations/management, commercial skills etc.
- (iv) Hands-on training in real case-studies on simulators should cover most part of time in comprehensive Lab sessions.

(Manjit Singh)
Member Secretary

Chief Engineer, (GM Division), Central Electricity Authority, R.K.Puram, Sewa Bhawan,
New Delhi

No. NERPC/OP/2009

Date 10th February, 2009

Copy: 1. Member (GO&D), CEA, R.K. Puram, New Delhi 2. Managing
Director, AEGCL, Guwahati

Views of Maharashtra SLDC Training needs

In order to execute the functions stated in the Electricity Act 2003 and to meet its objectives, the training needs on the following aspects have been identified:

- a) Economic Despatch & Control, Energy accounting, Contract and Regulation issues, Energy Trading, Power Exchange, Market mechanism for firm and non firm power, Transmission network congestion management.
- b) Merit order operation, Wheeling of Power, Open access, Independent system operator, Transmission system operator, Free governor operation for frequency control, Excitation Control.
- c) Power system dynamics, Power system stability, Power system studies, Long term and short term estimation of Energy requirement and peak Demand.
- d) SCADA systems, Energy Management system, Communication Network management, automation, Microwave and satellite systems in power system communication.
- e) Protection practices of Generator, Transformer, Transmission lines, bus-bar, Sub-station, Special Protection schemes for grid security, System security and Reliability assessment, Reliability standards, Standards for connectivity to the grid, Grid standards for operation and maintenance of transmission lines.

The functions and responsibilities as stated above needs qualified, skilled and trained staff at LD Centres. There are limited institutes in India, which are carrying out the Training Courses on the above aspects. Though all the training need aspects are not covered, Training Courses in NPTI Bangalore and ESCI

Hyderabad shall cover partially the training needs. Engineers from SLDC are being deputed regularly for attending the training courses conducted by these Institutes, however, the training needs are not completely fulfilled.

Academy and Power Industry Interaction and their Proposed Roles :-

In view of the proposed “Manpower, Certification and Incentives for System Operation and Ring fencing of Load Despatch Centres” the Premier Technological Institutions in India like IITs, NITs as well as Management Institutions like IIM can play a major role for academy and industry interaction as well as development of various Certified Courses like Post Graduate Diplomas / Degree.

1. Role of Premier Technological Institutions (like IITs, BITS,VIT & NITs) :-

Premier Technological Institutions in India like IITs,BITS,VIT & NITs can design a course for System Operation and Control , covering all the aspect of real time power system operation including Economic Despatch, Contingency Analysis , Power System Stability & Studies including Dispatcher Training Simulator SCADA , EMS & Expert System for use of domain knowledge intelligence of power system operation. IIT Mumbai has also developed a module on Power System Operation and Control.

2. Role of Premier Management Institutions (like IIMs, MDI,JBIMS,NMIMS) :-

Premier Management Institutes like IIMs,JBIMS, NMIMS MDI, and other well known management institutes can be entrusted to develop a program for deregulated electrical power market . A certificate course covering Open Access ,Market operation, Energy Trading , and role of Power Exchanges, Regulatory and Legal frame work for implementing EA-2003.

3. Improving the Quality of Existing Employees :-

To cover these roles IITs, NITs, IIMs can develop such courses leading to MBA / M.Tech or various certificate courses for existing employees thus improving the quality of the personnel to the required state. A liberal study leave along with full payment towards academic & hostel be also given to attract the employees to pursue the course with elevated posting .

4. Dedicated Courses for attracting New /Fresh Talents :-

National Power Training Institute at Nagpur , Gaziabad , University of Petroleum and Energy Studies (UPES) at Deharadun ,Gurgaon & Rajmundry are presently conducting a dual degree B.Tech(Power System) with MBA (Power Management) . Students pursuing such courses be awarded full scholarship along with preferential absorption in the organisations (NLDC, and its constituent members, PGCIL ,NTPC, Gencos, Transcos & Discoms) at Executive level and creating a pool of talented power system engineer.

5. Interaction with International Institutes.:-

A collaboration with International Energy Institute UK,s, Independent System Operators (ISOs/ TSOs , i.e. National Grid UK , USA ,PJM etc) be developed for latest technology in power sector and the role of SLDC in regulated environment.

6. Development & Setting up of National Level Research Institute & Energy Institute :-

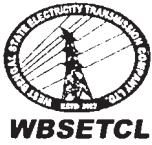
A research institute and a collaboration with National / International Institutes for developing and resolving the operational as well as commercial issues be explored. The academies be encouraged to explore the possibility and

encouraging the employees for research work. A possibility of power system operational problems and their required solution through continual research can be explored.

A separate energy Institute be set up at New Delhi which comprised of 50 % members of academic institutes and 50 % members of Power utilities for further research and system operation with a collaboration with International institutes.

7. Attracting New /Fresh Talents :-

Fresher graduates from institutions like IITs, BITS,NITs, IIMs , NPTI can be absorbed at a level of Executive Engineer (Trainee) with partial / full scholarship to attract the talent to pursue the recent technology and fresh blood for power sector oriented jobs and responsibilities.



**West Bengal State Electricity Transmission
Company Limited**

(A Govt. of W.B. Enterprise)

Office of the Chief Engineer

State Load Despatch Centre (W.B.),
PO: Danesh Sk. Lane, Howrah – 711 109.

Meno No : SLDC/HOW/116/2007-08/381

Dated : 07/03/2009

To
The
Director (GM),
Central Electricity Authority,

Sub: Course module for Load Despatchers' Certification Programme

Ref: Your e-mail dated 04/03/2009.

Dear Sir,

We have carefully gone through the Course Module prepared for System Operator Training & Certification Programme. In our view, though it has covered almost all the relevant areas still we believe that incorporation of few more topics will be beneficial.

With implementation of different aspects of Electricity acts and regulations the work of Load Despatch Centers has gained various dimensions. Hence in our view the workforce of Load Despatch Centers may broadly be divided in five categories and the course modules may be distributed to those categories according to the need.

We are providing herewith the suggested category wise details in annexure - I and the proposed new modules in annexure – II.

Thanking you,

Yours faithfully

Sd/-

D. Ganguly

Chief Engineer, SLDC, WB

Categorization of SLDC workforce:

Category – I

Target group:	All operating personnel.
Minimum educational qualification: (BSc)	Diploma or equivalent / Graduate
Minimum year of experience:	Nil
Other conditions	—
Modules to be covered:	Module – 1, 6, 19, 21.

Category – II

Target group:	Control Engineers or equivalent
Minimum educational qualification:	BE or equivalent.
Minimum year of experience:	Nil
Other conditions:	—
Modules to be covered:	Module – 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 15, 16, 19, 19A*, 21.

Category – III

Target group:	Shift Charge Engineer or equivalent
Minimum educational qualification:	BE or equivalent.
Minimum year of experience:	5 years in relevant field
Other conditions:	Already undergone training of
Modules to be covered:	Module – 8, 12, 13, 14, 17*, 18, 19A*, 20, 21.

Category – IV

Target group:	Management group
Minimum educational qualification:	BE or equivalent.
Minimum year of experience:	adequate experience in relevant field.

Other conditions: _____

Modules to be covered: **Module – 8, 12, 13, 14, 16, 17*, 18, 20, 21.**

Further to perform statistical and Financial activities in SLDC there may be Statistical wing and Financial wing. So it is proposed to treat them in a separate category and they must be trained.

Category – IA

Target group: Manager (Finance & Accounts) and Statistical officer or equivalent.

Minimum educational qualification: Graduate(B.Com)or equivalent / Graduate(BSc) or equivalent.

Minimum year of experience: Nil

Other conditions _____

Modules to be covered: **Module – 1, 7, 17, 19, 21, 22***

* We have added few relevant topics in module 17 and added a new module 19A, 22 to meet the demand of the day.

Modifications and addition of new modules.

Module 17 (in addition to point 17.1 to 17.7)

17.8. Various Regulation introduced by respective State Regulatory Commission.

17.9. Comparative study between various State and Central Regulations.

Module 19A (proposed new module)

19A.1 Basics of Network architecture (LAN, WAN, Routers, Switches etc.)

configuration and maintenance of the same.

19A.2 Knowledge of Database (preferably Oracle).

19A.3 Maintenance of website.

19A.4 Updation and loading of various data in website.

Module 22 (proposed new module)

22.1 Various Accounts related tools and software.

22.2 Different statistical tools and software

Course Contents of the Modules for Training Curriculum of System Operators

The course contents for each of the module are given below.

1. Module – 1: Orientation / Overview

This module aims at giving an Overview of Power System Operation and provides a firm foundation for further building up of the understanding and would comprise of the following:

1.1 General

- a) Electricity supply chain, components of the power system
- b) Evolution of the Indian power systems – a brief historical background
- c) Regional grids in India, development of state, regional and national grids
- d) Load Despatch functions, Load Despatch Centres in India
- e) Institutional framework
- f) Distribution of energy sources in the Country
- g) Sources of Power – Hydro, Thermal, Nuclear, Gas, Renewable
- h) Typical load profile, variation in loads, diurnal, seasonal

- i) Major load centers
- j) Overview of Regional/State grids

1.2 Grid Operation

- a) Control Areas; Regional and state power systems
- b) Interconnections, characteristics, merits & demerits
- c) Inter-Regional Links, capacities
- d) Peculiarities of Indian Grids
- e) Planning philosophy
- f) Generators – Characteristics, Limitations
- k) Characteristics of power system equipments – Transmission lines, transformers, shunt/series capacitors and reactors, FACTS, FSC, SVC, HVDC
- g) Frequency Control
- h) Voltage Control
- i) Protection Systems, UFR, df/dt , SPS, Islanding
- j) Transmission capacities and transfer capability
- k) Flowgates

1.3 Logistics:

- a) Control Centers – typical work areas, functions
- b) SCADA
- c) Communication Systems Used the Control Center
- d) IT Systems

1.4 Market Operation

- a) Settlement System – ABT, UI
- b) Metering
- c) Open Access, Long Term, Short Term, Products
- d) Power Exchange Operation

1.5 Legal & Regulatory Framework

2. Module – 2: Review of Electrical Engineering Fundamentals

The objective of this module is to provide a quick review of the theoretical background. This module contains:

- a) Active and reactive power
- b) $P - f$, $Q - V$ relationship

- c) Effect of conductor resistance – voltage drop, energy loss
- d) Inductive/Capacitive reactance of the line, effect on voltage
- e) Sine wave & RMS Values
- f) Power angle
- g) Load impedance & effect on current flow through transmission lines
- h) Effect of line voltage on energy losses
- i) Flow of reactive power – positive and negative VARs
- j) Generation – fundamentals, types, characteristics
- k) Power (Watts) and Energy (Watt Hours)
- l) Wye and Delta connections, current and voltage relationships
- m) Transformers

3. Module – 3: Generation

The objective of this module is to give exposure on the generation technology and the operational characteristics of the generators.

- a) Overview of Generators
 - Components

- Basic Operating principles
- Rotational Speed
- Characteristics, Droop

b) Types of generating units

- Steam
- Nuclear
- Hydro
- Combustion Turbines
- Combined Cycle Plants

c) Operational characteristics

- Coal-fired Generation
- Hydro Generation- Run-of-the river, Reservoir based etc.
- Pumped Storage Hydro Generation
- Combined Cycle Generation
- Nuclear Generation

d) Renewable / Non-conventional Energy Sources

4. Module – 4: Transmission

The focus of this module is on the transmission system operation.

- a) Operating voltages
- b) Types of transmission towers.
- c) Conductor material, conductor layout and conductor spacing on the towers
- d) Insulators types-porcelain, glass, polymer, anti – fog
- e) Features and limitations of transmission cables.
- f) HVDC transmission
- g) FACTS, Series Compensation
- h) The effect of transmission line conductor resistance and inductance.
- i) Line voltage drop and power angle, effect of line loading on voltage drop and power angle, effect of load power factor on voltage drop and power angle.
- j) The need to generate and provide MVAR, Sources and sinks of reactive power
- k) Charging current required due to the line shunt capacitance, production of reactive power by line shunt capacitance, Ferranti effect
- l) Line reactive compensation equipment, including: reactors, capacitors,

- m) Synchronous condensers and static VAR compensators.
- n) Substations, layout, equipment, different bus arrangements, circuit
- o) Breakers & types
- p) Transformers, physical construction, cooling arrangements,
- q) Autotransformers, Instrument transformers

5. Module 5 – Distribution

5.1 Introduction

- a) System layouts
- b) Distribution Transformers
- c) Cables and conductors

5.2 Power Quality issues

- a) Voltage flicker
- b) Interruptions
- c) Voltage Swell/ Sag
- d) Voltage unbalance
- e) Reactive support

5.3 Distribution System Planning and Reliability

5.4 Distributed Generation

6. Module – 6: Power System Protection

6.1 Introduction

- a) Aspects of power system protection
- b) Zones of Protection
- c) Classification of protection relays based on Operation Quantity, Design, Application

6.2 Elements of Protection System

- a) Instrument transformers – Characteristics & influence
- b) Circuit Breakers – types, construction and operation of circuit breakers, criticality of Breaker operation for protection system, earthing, DC source
- c) Power system faults – Review of symmetrical components and power system faults, Types of faults, Calculation of fault currents

6.3 Over current relays

- (a) Principle of operation,
- (b) Current and time based co-ordination

- (c) Different time gradations like definite time inverse time very inverse time etc. and its applications
- d) Directional relays

6.4 Impedance protection

- a) Impedance protection and fault loops
- b) Impedance relay characteristics
- c) Reactance
- d) Impedance
- e) Admittance (MHO)
- f) Quadrilateral
- g) Special characteristics
- h) Faults affecting impedance relay performance
- i) Fault resistance
- j) Load encroachment
- k) Remote in feed
- l) Mutual induction

6.5 Differential Protection

- a) High impedance differential
- b) Biased differential
- c) Low impedance differential

6.6 Generator Protection

6.7 Transmission line protection

- a) Unit protection
- b) Pilot wire
- c) Phase comparison
- d) Distance Protection
- e) Various aspects of Carrier aided protection
- f) Single-phase auto-reclosing
- g) Protection of series compensated line

6.8 Transformer and reactor protection

6.9 System Protection Schemes - Need for SPS, types

6.10 HVDC protection

6.11 Other Protections

- a) Protection for abnormal frequency and voltages
- b) Different type of Bus configuration
- c) Bus bar protection Zones
- d) Need for LBB protection and LBB protection Logics

6.12 New technologies

- a) Phasor measurements-techniques and its application
- b) Wide area protection and control

7. Module-7: Grid Operation and Management

7.1 System Frequency & Tie Line Control:

- a. Deviation of frequency from nominal, permissible limits of excursion
- b. Governors, response to frequency changes, droop & typical settings
- c. Types of generators participating in frequency control, provisions in IEGC
- d. Sudden tripping large units or entire stations
- e. Load response
- f. Frequency response characteristics, calculation

- g. Automatic Generation Control
- h. Area Control Error

7.2 System Voltage Control

The objective of this module is to provide the principle of voltage control on the transmission network.

- a. Need for both Watts and VARs, Positive and negative VARs
- b. Equipment absorbing VARs / generating VARs
- c. Voltage difference and flow of VARs, direction of flow
- d. Compensation, Synchronous condensers, Static VAR compensators, series compensation
- e. Role of generator excitation, AVR, response to changing VAR Requirement in the system, leading / lagging pf operation
- f. VAR requirement vis-à-vis line loadings
- g. SIL, VAR generation above and below SIL of a line
- h. Need for local generation of VARs
- i. P-V curves, knee of the curve, normal operating region
- j. Voltage limits as per norms (IEGC)

- k. Voltage collapse, specific case studies / examples, need for advance
- l. action
- m. Tap changing of transformers
- n. Possible corrective actions that can be taken in cases of emergency.

7.3 Day-ahead Resource Scheduling:

- a. Load forecasting
- b. Resources available
- c. Preparation of daily schedules
- d. Shortages
- e. Base load stations
- f. Peaking stations
- g. Must – run stations
- h. Generation location & effect on losses
- i. Open Access-Bilateral contracts and Power Exchange transactions
- j. Economic despatch based on cost comparison, Security constrained Despatch

- k. Hydro stations, water releases
- l. Pumped storage plants
- m. Unscheduled Interchange
- n. Demand Side Management, Load regulation

7.4 System Security

- a. Definition
- b. Operating limits
- c. Power angle, limits
- d. Alarms
- e. Steady state, dynamic and transient stability
- f. Define boundaries of normal operation
- g. States of power system operation
- h. Credible contingencies
- i. Secure operation of the power system
- j. Impact of tripping a large generator

- k. Loop flows, parallel flows
- l. Loadability of a transmission line – thermal ratings, transmission
- m. Capacity, transfer capability, line lengths
- n. TTC, RM, ATC
- o. Effect of line loadings on reactive requirements
- p. Maximum permissible voltage drop following credible contingencies
- q. Loss of synchronism
- r. Effect of compensation
- s. Voltage collapse
- t. Typical transformer ratings, overload magnitude, duration, loss of life
- u. Use of SCADA/EMS tools to provide alerts to the operator
- v. Insulation Coordination, Protection Coordination
- w. Defense plans, SPS, UFR, UVLS
- x. Methods for improving power system stability, corrective actions
- y. Case studies of past major/minor disturbances

7.5 System Restoration

- a. Identifying the critical parameters immediately after a disturbance / incidence
- b. First steps to be taken, preventing spread of the disturbances
- c. Black start procedures
- d. Start up power for thermal stations
- e. Hydro stations, gas stations
- f. Frequency control, Load generation balance during restoration
- g. Charging of lines
- h. Controlling voltage
- i. Emergency loads, traction
- j. SCADA requirements for monitoring separated areas (islands)
- k. Importance of communication
- l. Case studies

7.6 SCADA / EMS and Communications

- a. Overview, architecture, main components

b. SCADA

- Hardware – Overview
- System Software – Displays, Database, Disturbance data collection modules/HDR retrieval & playback, HIM, Trends, Alarms,
- Health check, trouble shooting

c. Energy Management System

- Load forecasting – similar day forecast, weather based load forecast, historical data
- Network study – Network modelling; special devices like HVDC, FSC, pumped storage; network reduction & equivalence
- State Estimation – techniques, detection & identification of bad measurement, network observability
- Optimal power flow – Cost optimization, loss optimization, control optimization
- Voltage & VAR scheduling
- Unit commitment
- Contingency Analysis

d. Communication Systems

- Overview- VSAT, Microwave, Optical Fibre etc.
- Hardware
- Protocols
- Configuration
- Communication network

7.7 Disturbance analysis

a. Grid Disturbances and Incidences

b. Classification of grid disturbances

- General approach for investigation of grid incidents
- Relay Numbering and interpretation of relay flag indications
- Using inputs from SCADA-SOE and substation Event Logger, Disturbance Recorder, Fault Locater
- Preparation of disturbance reports
- Case studies

7.8 Power System Reliability

- a. Adequacy- Long-term Planning, Procurement
- b. Security
- c. States of power system- Normal, Alert, Emergency, Restorative
- d. Planning criteria
- e. Connectivity Standards, Grid Standards, Grid Code
- f. Power system equipment capacity & limits
- g. Transmission Capacity & Transfer capability
- h. Total Transfer Capability, Reliability Margin, Available Transfer Capability, First Contingency Total Transfer Capability
- i. ATC in planning and operating time frames
- j. Requirement of Reliability Coordinators at organizational level

7.9 Operational Planning and Power System Optimisation

- a. Long term and short term load forecasting
- b. Generation and transmission maintenance scheduling
- c. Load curves

- d. Long range & short range hydro thermal scheduling
- e. Objective functions
- f. Equality and inequality constraints
- g. UI Mechanism, Arbitrage
- h. Losses

7.10 Dispatcher Training Simulator (DTS)

- a. Elements of the DTS
 - Initiating a snapshot
 - Snapshot timeline
- b. Inputs and processing – training scenarios, time considerations
- c. Tools and Controls available
 - Reactive control tools
 - Active power flow control tools
 - Network elements
 - Status toggle
- d. Outputs

- e. Alarm processing
- f. Message handling
- g. Trends
- h. Exporting results to standard formats such as IEEE, PTI, DPF, etc.
- i. Event scheduler
 - Construction of events,
 - User interface
- j. Case Studies
 - Power flow function
 - Real time network scenario
 - Relay simulation
 - Islanding
 - Restoration

7.11 Commercial & Economic Aspects

- a. Introduction to Power System Economics
- b. Electricity Markets

- Pool Operation
 - Coordinated Multilateral Trading Model
 - Power Exchanges
 - Capacity & Energy Markets
 - Balancing mechanism
 - Ancillary Services Market
- c. Settlement System – ABT & UI
- d. Modalities for access to transmission
- Long term
 - Medium term
 - Short Term
- e. Metering and Settlement
- Measurement principles
 - Meter placement
 - Meter data collection, validation and processing
 - Preparation of energy accounts and billing

- Regional Energy Account
- Unscheduled Interchange Account
- Reactive Energy Account
- Congestion Rent

7.12 Legal Framework, Policies & Regulations

- a. Electricity Act 2003
- b. Organizational set up in Power sector in India
- c. National Electricity Policy
- d. Tariff Policy
- e. Grid Connectivity Standards
- f. Grid Standards Regulations
- g. Metering Regulations
- h. ERC Regulations and Comparative study of Regulations of Central and State ERCs
 - Indian Electricity Grid Code (IEGC)
 - Open Access Regulations

- Terms and Conditions of Tariff
- Unscheduled Interchange Regulations
- Congestion Charge Regulations
- Other regulations

i. Activities of Forum of Regulators

7.13 System Operation – International Practices

- a. PJM, USA
- b. NGC, UK
- c. Nord Pool
- d. ETSO
- e. NEMMCO, Australia

8 Module -8: Electricity Markets

8.1 Fundamentals of electricity markets

- a) Restructuring, Corporatisation, Privatisation
- b) Competitive markets – Pricing mechanisms
- c) Regulated markets

8.2 Impact of transmission and system operation on electricity markets

8.3 Wholesale market design

- a) Bilateral contracts
- b) Organised trading

8.4 Market abuse and its mitigation

- a) Market power and its evaluation
- b) Implications of market abuse
- c) Detection and avoidance of market abuse

9. Module-9: Data processing, analysis and interpretation

10. Module-10: Information Technology Tools

- a. MS Word
- b. MS Excel
- c. MS Power Point
- d. MS Access
- e. MS Outlook, Email
- f. Use of Internet

- g. Use of Intranet

11. Module – 11: Management Module

- a. Management Process
- b. Managerial Skills & performance
- c. Goals, Policy, Objectives
- d. Human Resource Management
- e. Inter-personal relations
- f. Emotional Intelligence
- g. ERP, Six Sigma
- h. Motivation
- i. Leadership skills
- j. Knowledge management
- k. Ethics at work
- l. Communicating Effectively-spoken and written
- m. Stress Management

12. Module – 12: Practical Exposure

a. Site Visits to

- Thermal Generating Station
- Gas/Combined Cycle Based Generating Station
- Hydro Generating Station
- 400 kV / 220 kV Substation
- Load Despatch Center (Regional / State)

**MEMORANDUM OF UNDERSTANDING
BETWEEN
<Name of educational institute>
AND
<Name of Load Despatch Centre/Company>**

This Memorandum of Understanding is made and entered into on this _____ day of _____ between _____ (*Name of the Institute*) _____ having its registered office at _____ (*address of the institute*), (hereinafter called as “_____” which expression shall unless repugnant to the context herein include its successors and permitted assigns) and _____ (*Name of the LDC organization*) _____ having its registered office at _____ (hereinafter called as “COMPANY” which expression shall unless repugnant to the context herein include its successors and permitted assigns).

1. OBJECTIVES OF THE MOU

The objective of this Memorandum of Understanding is:

- a. to promote interaction between _____ and COMPANY in mutually beneficial areas.
- b. to provide a formal basis for initiating interaction between _____ and COMPANY.

2. PROPOSED MODES OF COLLABORATION

The Institute and the COMPANY propose to collaborate in the following areas

- a. Identification of energy related issues and development of topics and possible agendas for exchanging information;
- b. Providing expert opinion, knowledge support in areas such as power system operation, power market operation, grid disturbance analysis, protection coordination, integration of renewable sources of energy in the grid, deployment of new technology and related areas;
- c. Organizing interactive sessions, panel discussions, invited talks, educational tours/visits in areas of mutual interest;
- d. Consultancy in areas of mutual interest;
- e. Capacity building of COMPANY personnel through tailor made programmes conducted by _____(*Name of the institute*) in areas of interest to COMPANY.
- f. Participation in seminars, visits, and exchanges;
- g. Sponsoring R&D projects, which may be carried out wholly at _____(*Name of the institute*) or at premises of COMPANY or partly at (*Name of the institute*) _____and partly at COMPANY;
- h. Sponsoring student projects / fellowships in _____ degree programs at the institute;
- i. Sponsoring eligible employees of COMPANY for higher studies, specialized courses (Degree/Diploma/Certificate or any other suitable courses). The eligibility criteria for selection will be as per mutual agreement;.

- j. Any other appropriate area of collaboration agreed upon between _____(*Name of the institute*) and COMPANY;

The parties may identify specific project(s) in any of the above areas and if required a separate agreement may be entered into between the two parties containing the details of collaborative programmes, roles and responsibilities of INSTITUTE and COMPANY, and sharing of expenditure and facilities etc.'

3. CONFIDENTIALITY

- a. During and for a period of three years from the date of disclosure, each party agrees to consider as confidential all information disclosed by the other party in written or tangible form or, if orally disclosed confirmed in writing within thirty days of disclosure and identified as confidential by the disclosing party.
- b. The obligations above shall not extend to any confidential information for which the receiving party can prove that this information:
- is in the public domain at the time of disclosure or comes within the public domain without fault of the receiving party.
 - is already known or become known to the receiving party
 - is received from a third party having no obligations of confidentiality to the disclosing party,
 - is independently developed by the receiving party; or
 - is required to be disclosed by law or court order.

4. NON-EXCLUSIVITY

The relationship of the parties under this MOU shall be nonexclusive and both parties, including their affiliates, subsidiaries and divisions, are free to pursue other agreements or collaborations of any kind. However, when entering into a particular research agreement, the participants may agree to limit each party's right to collaborate with others on that subject.

5. TERM

This MOU, unless extended by mutual written agreement of the parties, shall be valid for a period of 3 years from the date of execution of the MOU. This MOU may be amended by mutual written agreement of the parties at any time.

6. TERMINATION

This MOU may be terminated by mutual agreement between the parties. However, either party shall have the right to unilaterally terminate this MOU upon 60 days prior written notice to the other party. However, no such early termination of this MOU, whether mutual or unilateral, shall affect the obligations of the participants under any Agreement, Confidentiality clause as referenced in clause 6 above, or any other agreement entered into pursuant to this MOU, which obligations shall survive any such termination.

7. RELATIONSHIP

Nothing in this MOU shall be construed to make either party a partner, an agent or legal representative of the other for any purpose. This MOU shall not create a legally binding agreement between the Parties.

8. ASSIGNMENT

It is understood by the Parties herein this MOU is based on the professional competence and expertise of each party and hence neither Party shall transfer or assign this Agreement, or rights or obligations arising hereunder, either wholly or in part, to any third party.

9. COSTS

The costs shall be borne between the parties as per the mutual agreement.

10. SIGNED IN DUPLICATE

This MOU is executed in duplicate with each copy being an official version of the Understanding.

IN WITNESS WHEREOF , the parties, hereto acting through their duly authorized representative, have caused this Memorandum of Understanding to be executed, effective as of the day and year first above written.

On behalf of

Name of the Institute

By :

Name :

Title :

Date :

Witness :

1.

2.

on behalf of

COMPANY

By :

Name :

Designation :

Date :

Witness :

1.

2.

Comments of NPTI on the Draft Report circulated on 11th December 2009

No.NPTI/HQ/DG-8/2009/5113

Date : 17-12-2009

To

Shri Ajay Talegaonkar
Director (Grid Management Division)
Central Electricity Authority
Sewa Bhawan, R.K.Puram
New Delhi – 110066.

Subject: Comments on Draft Report on Training and Certification of System Operators

Sir,

I am directed to refer to your e-mail dated 11.12.2009 on the above subject and to furnish following comments on the Draft Report on System Operator Training and Certification for your kind perusal :

1. Considering the number of system operators requiring the basic training and the infrastructural facilities available with NPTI, especially the latest Despatcher training simulator, there may not be any need to identify any other Institute except the Regional institutes of NPTI to start with. This will avoid duplication of infrastructure and later under utilization. Hence the clause under Para 1. c) that an institute must get accredited from CEA before it starts imparting training to LDC executives may be excluded. As contemplated for NITs, IITs, IIMs and IISc requirement of accreditation need not be made applicable to NPTI also. As NPTI will remain as certifying authority and already in the field of training Power System engineers for decades NPTI Institutes should not be put on par with any other new Institute to be set up for this purpose by any other organization.

2. Instead of venturing for new Institutes the Institutes of NPTI can be supported with necessary funds to supplement and modernize their laboratories for more hands on training.
3. The Faculty of NPTI may also be deputed regularly for advanced level training at IITs, IIMs etc. and other Institutes of International repute in this field.
4. A system may be evolved to have more interaction by NPTI faculty with Load Despatch Stations and all other players. This will ensure proper updating of the training program as well the effectiveness of the certification. An earlier proposal to include NPTI in Regional Power Committees may be reconsidered.
5. NPTI may also be supported to have a collaboration with IIT/IISC/IIM to conduct research in the field of Power Sector operation.

This issues with the approval of competent authority.

Yours faithfully,

Sd/-
(A.V.CHAOJI)
Principal Director