

---

## Energy Conservation and Commercialization Project

*A Program of USAID, Ministry of Power & ICICI*



## DSM Cell Organization and Management Workshops

*Bangalore & Jaipur*

*Activity 11 Milestone B*

---

USAID Contract Number: LAG-I-809-98-00006-00

Implemented by: **NEXANT** INC

23865-809.0020

---

## Table of Contents

<b>Preface</b>	<b>1</b>
<b>Background</b>	<b>2</b>
<b>Executive Summary</b>	<b>4</b>
<b>Workshop Design</b>	<b>7</b>
<b>Program Content Design</b>	<b>11</b>
<b>Selection Criteria</b>	<b>12</b>
<b>Overview</b>	<b>13</b>
<b>Comments</b>	<b>14</b>
<b>Conclusions</b>	<b>22</b>
<b>Opinion</b>	<b>25</b>
<b>Subcontractor's Deliverables</b>	<b>27</b>
<b>Draft Covering Note</b>	<b>29</b>
<b>Synopsis of Workshop Topics &amp; Papers</b>	<b>30</b>
<b>Faculty Members' Profile</b>	<b>32</b>
<b>Targeted Audience: Bangalore Workshop</b>	<b>34</b>
<b>Participants: Bangalore Workshop</b>	<b>37</b>
<b>Others</b>	<b>39</b>
<b>Participants: Jaipur Workshop</b>	<b>40</b>

---



## Preface

The ECO project is being implemented by Nexant Inc. under a USAID contract, LAG-I-00-98-0000. This contract has been issued by the USAID Mission in New Delhi as a part of the IQC (Indefinite Quantity Contract), currently in place through USAID's Global Bureau. The project contract was signed on February 29, 2000, and continues through December 2003.

The ECO project has 13 major activities including 6 on the market component and 7 on the policy component. Activity 11 focuses on 'Electric Utility DSM/Energy Efficiency Capacity Building'. This report is on one of the three deliverables within Milestone B, to conduct two workshops on DSM Cell Organization & Management.

The main participants for this activity were:

- Mr VM Thakor, Nexant ECO Project Staff;
- Dr. Claire Fulenwider, Private Consultant on Energy and Electric utilities; and
- Saha Sprague Limited, ECO Project subcontractor.

These individuals coordinated closely with USAID, the Jaipur DISCOM and other entities within India in developing and conducting these training workshops.

Implemented by:

**NEXANT** INC

### **New Delhi**

ID-II, Parkwood Estate, Rao Tula Ram Marg, New Delhi 110 022  
Tel: 91-11-618 8816, 618 1376  
Fax: 91-11-619 0022  
Email: Nexant@vsnl.com

### **Mumbai**

408, Dalamal Tower, Nariman Point, Mumbai 400 021  
Tel: 91-22-288 4554, 282 5869  
Fax: 91-22-288 4555  
Email: Nexantm@vsnl.net

## Background

The Government of India ('GOI') and the US Agency for International Development ('USAID') signed a joint project agreement on January 28, 2000, refers to the implementation of the Energy Conservation and Commercialization Project ('ECO'). The ECO is a 4-year program that targets the reduction of greenhouse gas ('GHG') emissions per unit of electricity generated and consumed in India.

ECO aims to promote widespread commercialization of energy efficiency technologies and services in India, thereby contributing to the reduction in growth of GHG emissions. However, assistance will be provided for developing a market oriented policy environment for commercialization of energy conservation and enhancing the capabilities of the private and financial sectors for deploying market-based mechanisms for energy efficiency investments. The ECO project supports USAID's Climate Change Strategy and will contribute to USAID/India's Strategy Objective for increased environmental protection in energy, industries and cities.

ECO will facilitate the commercialization of energy services and technologies through a two-pronged strategy:

- Energy Efficiency Market Development and Financing (Markets Component); and
- Energy Efficiency Policy and Institutional Reforms (Policy Component).

The Markets Component will undertake the following major activities:

- Technical and project structuring services for sponsors;
- Development of financial incentives for credit enhancement/risk mitigation;
- Support to energy efficiency services industry;
- Efficient technology promotion;
- Market conditioning and promotion; and
- Non-sugar co-generation market development.

The policy component will cover policy, regulatory and institutional reform issues at the central and state levels including the following major activities:

- Energy efficiency policy and institutional support;
- Energy efficiency standards for labeling for consumer appliances;
- Energy efficiency improvement in Government facilities and private buildings;
- Energy efficiency through regulatory reform and restructuring;
- Electric Utility DSM/energy efficiency capacity building;
- Development of State energy efficiency financing schemes; and
- DSM/energy efficiency within privatized distribution utilities.

Technical assistance ('TA') and training will be provided to various government agencies to assist them in creating a market-oriented policy environment conducive to investment in efficiency. TA and training will be provided to the private and financial sectors to design and implement energy conservation projects. The Ministry of Power (and the subsequent Bureau of Energy Efficiency) will be the partner agency for the ECO project. State-level activities under the Policy Component will be coordinated with the State Regulatory Commission and State Electricity Boards (including its functionally unbundled entities) of the focus-state.

"Electric Utility DSM/Energy Efficiency Capacity Building" focuses on working with an unbundled SEB to develop energy efficiency and DSM capabilities within the utility. Under this activity, Rajasthan was identified as the focus state and a DSM cell was formed by the utility in the Jaipur DISCOM at the state of 2001.

There are 3 deliverables under Milestone B:

- Establish a DSM Cell in at least 1 DISCO of the focus state and assess their staff needs;
- Conduct at least 2 workshops on Cell Organizational and Management; and
- Conduct 2 regional training programs on the role of energy efficiency.

The abovementioned addresses the two workshops on Cell Organizational and Management, which were conducted on 16 & 17 January at Bangalore and 23 & 24 of January at Jaipur, respectively. These workshops were targeted for utilities and regulators to expose them to the concepts of DSM and how it should be structured within a utility.

The main faculty for these workshops consisted of the following individuals and firms:

- Mr VM Thakor, Senior Consultant, Nexant ECO Project staff;
- Dr Claire Fulenwider, Private Consultant, Energy and Utilities; and
- Saha Sprague Limited, ECO Project subcontractor.

This report includes materials presented during the course of these two workshops, as well as observations and comments from various individuals.

## Executive Summary

The primary objective of Activity 11, Task B was to conduct a 2-day workshop to introduce DSM/Energy Efficiency cell staff of Jaipur DISCOM, and staff from other utilities and external influencing bodies, such as regulators, to the concepts and approach to the organization and management functions of and within a DSM cell, that will sustain the cell. These workshops were conducted in Bangalore (targeting Utilities from the southern part of India) and in Jaipur (targeting the Jaipur DISCOM DSM cell, in its early part of inception, and other utilities in the northern part of India.).

### Indian Scenario

Utility demand-side management ('DSM') in the Indian context remains a buzzword, with very little practical implementation within the Indian private and State Electricity Boards ('SEBs'), and the new member entities of reforming SEBs (example Rajasthan). With a few programs conducted in The Ahmedabad Electricity Company Limited ('AECO'), and not much elsewhere, the aggregate DSM spending is still an insignificant amount for ascertaining any impact in the Indian Power Sector.

One of the reasons for the lack of DSM programs in India is the lack of importance given to DSM initiatives within the management structure that currently prevail within utilities in India. There is a distinct lack of acknowledgment that DSM can be an effective and instrumental tool within the total gambit of integrated resource planning within a utility, and therefore there is no DSM function that is entrusted to any particular individual or department within the management structure of utilities. Thus, there is a lack of a general management focus on DSM activities within utilities in India.

Most utilities claim to have departments that are dubbed "R&D" or "Consumer Education", and their activities are limited to 'essay competitions' and 'once in awhile' advertisements suggesting ways in which consumers can curtail their energy consumption. In context of the big supply demand and power quality gap in the supply and distribution of power in India in general, such energy efficiency initiatives are insufficient and not effective enough for quantitative results.

### Objectives

In order to convert utilities from carrying out 'token' DSM initiative to large-scale DSM initiatives that can have a meaningful impact on their system, the ECO program is structured to promote and establish DSM programs as a seminal activity amongst many, with the ultimate aim of contributing to the reduction of GHG emissions.

One of the key tasks relating to this activity relates to carrying out 2-day workshops to introduce DSM/Energy Efficiency cell staff of Jaipur DISCOM, and staff from other utilities and external influencing bodies, such as regulators, to the concepts and approach to the organization and management functions of and within a DSM cell, that will sustain the cell. These workshops were conducted in Bangalore (targeting Utilities from the southern part of India) and in Jaipur (targeting the Jaipur DISCOM DSM cell, in its early part of inception, and other utilities in the northern part of India.). The locations for the workshop were decided by Nexant and USAID based on suitability for the North & South Core Group of States. For the North Group all workshops related to DSM activities would be held at Jaipur where the DSM Cell is located in the Focus State, Rajasthan. For the South Group it is decided to held the workshop at Bangalore.

### Workshop Achievements

The overall objectives achieved during the workshops on 'DSM Cell Organization & Management' are as follows:

- ❑ The dissemination of the need, functioning, structure and management of a DSM Cell for the benefit of Jaipur DISCOM and other utilities, so that a continuous focus on DSM is established within the Utilities' management structure. This has set the stage for building capacity within the DSM Cell Jaipur DISCOM to carry out load research, which is the next imminent task under Activity 11.
- ❑ To encourage the utilities, other than the focus state of Rajasthan, to establish DSM cells in their own respective utilities by demonstrating the need and benefits from DSM activities in general.
- ❑ To encourage regulators to play an active role in encouraging and influencing DSM activities within their respective regions.

### Workshop Design

While the main content of the workshop was based on dissemination of the inner workings of a potential DSM Cell to operate in a continuous way, these two workshops were also partly structured with the idea of increasing the awareness in the utilities for establishing a DSM Cell, in the first instance, for implementing structured DSM programs, and in understanding external influencing factors such as the role of regulators in encouraging DSM in the utilities by their approach to tariff structuring, and the DSM's role therein. This was done in recognition of the fact that many participants were potential influencing agents in setting up of DSM cells in the first instance, and that discussions relating to justification for such cells in the Indian Context, were necessary to keep them engaged and involved.

### Participation

In total, between both Bangalore and Jaipur, representatives from 8 States participated in the two 2-day workshops. Between both Bangalore and Jaipur, 55 participants (27 in the Bangalore workshop, and 28 in the Jaipur workshop) took part in these 2-day workshops. The participation level exceeded the 20 per workshop allocation due to high level of interest from utilities and regulatory authorities. Of the total 55, 11 were regulators, 29 were utility members, 4 were consultants, and 11 represented other interests such as consumers, associations and finance bodies.

Of the *North Core Group*, Uttar Pradesh and West Bengal did not participate, while Rajasthan, Madhya Pradesh, Delhi and Gujarat participated. Of the *South Core Group*, Maharashtra did not participate, while Karnataka, Andhra Pradesh, and Tamil Nadu participated.

### Realities and DSM Definition

Given the inherent inefficiencies in the distribution systems of the utilities in India, viz. high T&D losses prevailing, it was well established from the interactions of the workshops that DSM actions needed to include the potential analysis for EE measures before and after the meter. It was also determined that both rural and urban regions required different strategies, and that the future treatment of tariff subsidies would influence DSM uptake from consumers point of view. Mr. Thakor & Mr. Iyer demonstrated several practical examples of pilot projects, current DSM examples, and future potential DSM activities in the Indian context.

**Conclusion**

The existing members of Jaipur DISCOM DSM Cell (Mr. C. P Agarwal; Mr. Ramji Lal Kejriwal; and Mr. Ajeet Saxena) were given a deeper understanding of their roles and functions internally within the Jaipur DISCOM. The aspects covering the Cell training is covered in more detail in the report prepared by Dr. Claire Fulenwider and Mr. Thakor on Milestone 11b.

Participants from utilities found the workshops very useful from the aspect of merging theory with practical implementation, and generally felt convinced that DSM had an important role to play. (This is evident from the written feedback received at the end of the workshops.) Many participants expressed interest of establishing a DSM cell in their own respective utilities, and appropriate follow up work is required in this area.

Participants from the regulatory commissions acknowledged that DSM is part and parcel of all three aspects of regulation: process, technical and economical regulation. From the interactions of the workshops, it was acknowledged by the regulators that they had an important role to play in influencing and expecting utility driven DSM programs. These workshops have set the stage to do further work with regulators in spreading the concept of establishing DSM cells in other states of India.

## **Workshop Design**

A draft agenda was developed and circulated amongst the training faculty in order to review the suggested topics and to recommend changes to the agenda. The training program was presented twice, in Bangalore and Jaipur respectively. The agenda would be the same, except for possible small changes to reflect local conditions or circumstances, if any. The training program followed technical assistance work on DSM Cell Management and Organization was forwarded to the newly formed DSM Cell at Jaipur DISCOM. Therefore, portions of the training program at Jaipur were specifically directed towards the individuals and activities taking place within their DSM Cell.

It was also agreed to have inaugural session at the start of the training program at Jaipur. The agenda was therefore modified to include several dignitaries, including individuals from USAID, the Rajasthan state government, the Rajasthan Electricity Commission, ICICI Limited and the utility. This event was quite successful, and a lot of focus was given to the formation of the DSM Cell.

A brief agenda for each of the two training programs follows.

**Organization & Management of Demand Side Management (DSM) Cell**

Date: 16-17, JANUARY 2001  
 Venue: Taj Residency, Bangalore

<b>DAY-1</b>		
9.30 AM	Registration	SSL
10.00-10.30	Inaugural Session	USAID/NEXANT
10.30-10.50	Overview of ECO Project.	NEXANT/CoP
<b>10.50-11.00</b>	<b>TEA - BREAK.</b>	
11.00-12.00	DSM Overview	Dr. Claire Fulenwider
12.00-13.00	DSM Cell Organization	Mr. Thakor, Nexant
<b>13.00-14.00</b>	<b>LUNCH.</b>	
14.00-15.00	Functions of DSM Cell & responsibilities	Mr. Iyer, Saha Sprague Ltd
15.00-16.00	Key Factors for DSM Success	Dr. Claire Fulenwider
16.00-17.00	Panel Discussions	

<b>DAY-2</b>		
10.00-10.50 AM	DSM - International Experience / Possible First Year Work Plan	Dr. Claire Fulenwider
<b>10.50-11.00</b>	<b>TEA-BREAK</b>	
11.00-12.00	Budgeting & Financial Structuring of DSM	Mr. Saha, Saha Sprague Ltd
12.00-13.00	Strategies for DSM Activities	Mr. Iyer, Saha Sprague Ltd
<b>13.00-14.00</b>	<b>LUNCH</b>	
14.00-14.45	Case studies – Utility Experience	Mr. Thakor, Nexant
14.45-15.45	Regulators role in Supporting DSM	Mr. B Dixit, Saha Sprague Ltd
<b>15.45-16.00</b>	<b>TEA-BREAK</b>	
16.00-16.30	Market Research & Customer Interface	Mr. Iyer, Saha Sprague Ltd
16.30-17.00	OPEN Discussion with Panel: challenges and Opportunities of DSM	
17.00-17.30	Feed back & Course evaluation.	NEXANT/SSL

## *Organization & Management of Demand Side Management (DSM) Cell*

Date: 23-24, JANUARY 2001

Venue: Vidyut Bhavan, Bhagwandas Road, Conference Hall, Jaipur

<b>DAY-1</b>		
9.30 AM	Registration	SSL
10.00-10.30	Inaugural Session	USAID/NEXANT
10.30-10.50	Overview of ECO Project.	NEXANT/CoP
<b>10.50-11.00</b>	<b>TEA - BREAK.</b>	
11.00-12.00	DSM Overview	Dr. Claire Fulenwider
12.00-13.00	DSM Cell Organization	Mr. Thakor, Nexant
<b>13.00-14.00</b>	<b>LUNCH.</b>	
14.00-15.00	Functions of DSM Cell & responsibilities	Mr. Iyer, Saha Sprague Ltd
15.00-16.00	Key Factors for DSM Success	Dr. Claire Fulenwider
16.00-17.00	Panel Discussions	

<b>DAY-2</b>		
10.00-10.50 AM	DSM - International Experience / Possible First Year Work Plan	
<b>10.50-11.00</b>	<b>TEA-BREAK</b>	
11.00-12.00	Budgeting & Financial Structuring of DSM	
12.00-13.00	Strategies for DSM Activities	
<b>13.00-14.00</b>	<b>LUNCH</b>	
14.00-14.45	Case studies - Utility Experience	
14.45-15.45	Regulators role in Supporting DSM	
<b>15.45-16.00</b>	<b>TEA-BREAK</b>	
16.00-16.30	Market Research & Customer Interface	
16.30-17.00	OPEN Discussion with Panel: challenges and Opportunities of DSM	
17.00-17.30	Feed back & Course evaluation.	NEXANT/SSL

Inaugural Session: January 23, 2001  
Vidyut Bhavan, Jaipur

Presentation		Person
1	Commencement & Welcome Address	Mr. Brian Wood Deputy Chief of Party Nexant
2	Introduction	Dr. Ashok Sarkar Project Manager ECO Project USAID
3	Address By	Mr. Padhmanabhan Sr. Advisor Environment & Energy USAID
4	Address By	Mr. A. Malhotra Vice President ICICI
5	Address By	Mr. Umesh Kumar Chairman & Managing Director JDISCOM
6	Address By	Mr. C. S. Rajan Secretary Energy GOR
7	Address By	Mr. Arun Kumar Chairman RERC
8	Vote of Thanks	Mr. Manoj Saha Director Saha Sprague Limited
High Tea		
9	DSM Workshop	Starts 11:30 AM

## Program Content Design

The main focus was the internal workings of a potential DSM Cell to operate in a continuous process. These workshops were also partly structured to:

- Increase the awareness within the utilities to establish a DSM Cell;
- Implement structured DSM programs; and
- Understand external influencing factors such as the regulators role in encouraging DSM in the utilities through tariff structuring.

This process was implemented in recognition of the fact that several participants were influential in the objective of setting up DSM cells, and that discussions relating to justification for such cells in the Indian context were necessary to keep them engaged and involved.

The new members of the Jaipur DISCOM DSM Cell were uncertain about the purpose of DSM and its role as well as their individual functions within the DSM Cell. Therefore, the scope of these workshops was developed to address these issues, as mentioned below:

- DSM
  - Understanding DSM as part of an integrated resource planning tool for the power sector;
  - DSM process;
  - Cost benefit of DSM measures/DSM phases & work plan;
  - Key factors for DSM success;
  - DSM international experience;
  - DSM cell organization; and
  - Function & responsibilities of a DSM Cell.
- Overview of Budgeting & financial structuring of DSM;
- Overview of Regulators role in supporting DSM;
- Overview of Case studies – Indian Utility Experience in DSM; and
- Overview of Market research and Customer Interface.

## Selection Criteria

The audience for each workshop was targeted at a minimum of 20 participants. The targeted audience were:

- SEB/utility members;
- Electricity Boards (regardless of stages of reform accomplished);
- State Regulators; and
- Other interested parties & Consultants interested in DSM

Participation from the SEBs/utilities was mainly directed at what has been referred to as the Core Group of States. These are ten state utilities/SEB that have been jointly selected by the Ministry of Power, USAID, ICICI Limited and Nexant as being the most likely to benefit from the utility DSM training programs. The expectation is that each of these ten states will nominate three or four individuals who will participate in all of the ECO DSM related training over the course of the ECO project. These individuals can form the nucleus of potential DSM Cells for these ten states, and the training that they will receive will allow them to carry on much of the same work that is being implemented at Jaipur DISCOM through the ECO project technical assistance efforts. The Generating companies and independent power producers were not specifically invited as the relevance of Demand Side Management to these groups was considered to be limited.

The responsibilities for workshop invitations and confirmation of participants were as follows:

### ***Bangalore Workshop (South India Group):***

- Mr B Dixit (SSL – Mumbai);
- Mr Madhu Gopinath (SSL – Mumbai); and
- Mr Rajiv Arora (Nexant – Delhi)

### ***Jaipur Workshop (North India Group):***

- Mr VM Thakor (Nexant – Delhi/Ahmedabad);
- Mr B Dixit (SSL – Mumbai); and
- Mr Rajiv Arora (Nexant – Delhi)

To assure comfortable communication with prospective participants, the Bangalore, Mumbai and Delhi office address and communication details were given. A detailed list of participants is given in the Appendix XX for each workshop.

## Overview

- ❑ Representatives from Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Madhya Pradesh and Gujarat attended the Bangalore workshop. For the Jaipur workshop, representatives from Rajasthan, Delhi and Gujarat were present.
- ❑ In totality representatives from 8 States attended these workshops. In addition, 55 individuals participated (27 at Bangalore and 28 at Jaipur) in the two day workshops.
- ❑ Due to a change in the schedule the Bangalore workshop became the first workshop with Jaipur following. Subsequently, the time for inviting participants to the Bangalore workshop was reduced to less than 2 weeks. Therefore, a maximum effort was made to achieve the best possible participation for the workshop.
- ❑ Saha Sprague Limited received confirmation from approximately 8 members including MSEB, BEST, BSES. However, due to shortage of time, necessary internal sanctions required for attending the seminar could not be obtained resulting in non-attendance of these members.. Ironically, the more successful utilities of India located in Maharashtra seem to have more stringent internal approval procedures for these kinds of events.
- ❑ Some senior members of the Maharashtra based utilities commented that from a sanctioning point of view, the term “workshop” tends to be a hurdle. Better terms that could be used are ‘Forum’; ‘Interactive Session’; ‘Symposium’ etc, which do not carry the connotation of running a classroom format.
- ❑ Furthermore, some senior Mumbai invitees would have attended if they were also given an opportunity for presenting their experiences/case studies. It was suggested that the future workshops should have more flexibility in allowing certain senior participants to have a 10-15 minute slot for their own utilities involvement in the context of the workshop. This will enhance the quality of the learning experience in these workshops.
- ❑ Generally, while there was good attendance from the North and South territories, there was a distinct absence from the West (Utilities from Maharashtra) and East (Utilities from Bengal, Orissa, far-eastern states, Bihar) parts of India. No invitees from Uttar Pradesh, Haryana, and Punjab were present. A combined effort was made by Nexant and Saha Sprague Limited to all these territories with regards to invitations and follow ups.
- ❑ A review needs to be undertaken to encourage more members from the states to attend any workshops in the future, given that there is ample invitation notice in the next workshop.

## Comments

### Dr. Ashok Sarkar, USAID ECO Project Manager (Bangalore Workshop)

Dr. Sarkar explained the USAID program on Energy Conservation and commercialization project. He focussed on the absence of an enabling policy environment, weak energy efficiency standards and absence of energy efficiency labeling as well as absence of working ESCO models and standard for energy auditor's quality & competence & DSM financing problems.

He opined that DSM in Indian context should also concentrate on T&D loss reduction apart from end user efficiencies. Further, he mentioned that US \$ 5 million is available as USAID contribution to leverage other investments from promoters & financial institutions.

The important point mentioned by Dr. Ashok Sarkar was the ECO project results indicators.

- Actually captured KWH & KW savings;
- Decreased CO2 emissions/unit of electricity provided (implying reduced loss); and
- Improved policy, legal and regulatory framework for increasing efficiency in the electric power sector.

### Dr. Claire Fulenwider, Nexant Consultant (Bangalore Workshop)

Following objectives were achieved during the workshop are:

- Reviewed what DSM is all about;
- Nature of Work Involved through a DSM Cell;
- Enough first hand experience exists to make DSM relevant in the Indian context; and
- Generally, a lot of skepticism exists.

Dr. Fulenwider focussed that as engineers, we were all outstanding in identifying problems; the main challenge now is to become part of the solution. Dr. Fulenwider reiterated that tremendous opportunities exist in terms of extension of energy availability; improved efficiency on your system; ultimate reduction of cost for consumers and environmental savings. However, a lot of effort will be required to materialize it.

Challenge would be to establish concrete proposals in each of the utilities, to establish DSM cells. To take this forward, the ECO/USAID program will provide technical assistance.

Ultimately, the ECO program is a resource available for use, but it depends upon the utilities to take the first step. CF wished everyone luck in that journey.

### Mr. Hanumant Rao, Member TNERC (Bangalore Workshop)

Thanked the Faculty on behalf of all the participants.

DSM will have to come and stay with us in the long term. If anyone asks him as a regulator what business he is in, he will reply that he is in the business of DSM.

Process, technical and economical regulation are the three important aspects of DSM

The 2 days workshop has elaborately exposed to each one of us to look at DSM as an opportunity and vision and the routes to reach the objectives keeping all constraints in mind. We need to inform

utilities to consider DSM in terms of practice and percepts: one without the other will a sterile approach. This workshop has presented both practice and percepts.

Finally, utilities must embrace DSM to be very much in their role.

**Mr Murthy, APTRANSCO (Bangalore Workshop)**

Individuals should practicable ideas and solutions to respective utilities and try to implement them. In this respect, Mr Murthy will request management to conduct DSM in a scope. ESCOs can directly acquire project with various co-operative societies.

DSM on the secondary side of distribution transformers with performance contracts will be welcome. There should be an information dissemination system to all SEBs like a magazine.

Mass media requires to be used more effectively to shape consumer behavior with respect to deploying EE measures.

**Mr Chandrashikharan, Chief Engineer of Audit and Quality Control, KPTCL (Bangalore Workshop)**

Mr. Chandrashekharan, in his 34-year career, has been through different stages of evolution in his utility, particularly witnessing a great change in public opinion and reactions.

He indicated that many strategies mentioned in the workshop have been tried out:

- Such as capacitor installations at consumer points (but this was abandoned as consumers started to expect the utility to replace them after some time.
- Voluntary disclosure of load found very little public participation.
- Even government aided solar heater replacement program did not materialized for certain reasons.

The primary concern was 'attitude'. Not only does KPTCL need to change the attitude of its employees, but also needed to shape consumer attitude of KPTCL, from being uncaring to being honest and subservient.

He emphasized that it was also the duty of consumers to be honest if they want good 'honest' power supply, as the attitude is that consumers say that they will only pay now if the get quality power.

Every point raised in the last two days was thought provoking and was an eye opener. He indicated that while he had aged 2 days, he felt 'young' with fresh new ideas infused within him. Enough to prompt him to request his Chairman to make a serious beginning in opening a DSM cell in KPTCL.

He felt, however, the organizers could have also invited generators to this forum also. Mr. Chandrashekharan thanked the faculty on their presentations, which he indicated were excellent. He made special references to each faculty members as follows:

- Dr. Claire Fulenwider: She had good understanding of our Indian scenario, and while she was president of the Heartland Group, she had 'landed in all our hearts'.
- Mr. V. M. Thakor: He particularly enjoyed the case studies and the immense experience behind his knowledge. He proved that theory can be converted to practicable practice.
- Mr. Manoj Saha: He asked 'what state of mind are you in?' and having learnt more about financing possibilities, Mr. C felt that he was in much more positive state of mind.

- ❑ Mr. B. Dixit: He felt that Mr. Dixit highlighted one of the most crucial points of the workshop, and that was that regulators should better understand their role in DSM and their higher responsibility. Mr. C requested Mr. Dixit to personally in touch with him to assist in this endeavor.
- ❑ Mr. R. K. Iyer: Mr. C. felt Mr. Iyers presentation to be full of force, energy and spirit, and made all realize that there is solution for every problem, if we try hard enough. He felt that his initials R.K. could very well stand for “resourceful kinetic”.
- ❑ Dr. Ashok Sarkar: He also thanked Dr. Sarkar in his absence for his excellent presentation.

**Mr Brian Wood (Dv. Chief of Party, Nexant)**

Mr. Wood inaugurated the first Jaipur workshop and training for DSM under the ECO project.

Through DSM, consumers will get more services for every KWH used such as more light, more water pumped from a well etc. He also emphasized that Utilities will be serving their customers effectively in relieving constraints on their power systems. This is more significant as consumers’ appetite for power is growing at a rapid pace. In this respect, he said “DSM is surely Good News!”

He expressed his appreciation for the vision of the partners in Jaipur DISCOM’s CMD Mr. Umesh Kumar, who is supporting the idea with company resources and high enthusiasm. The commitment is not small, as this will be a 3-year program.

The establishment of the DSM cell in Jaipur is one of the seminal activities of the ECO project.

Nexant is the prime contractor for implementing and executing the ECO project. Nexant is part of the Bechtel Group, and was formally known as Bechtel Consulting, with a wide range of activities in the energy sector, including EE & Energy management, Power Quality Engineering and Management, Privatization and Restructuring of power companies, Renewable Technology Development, Oil & Gas consulting services.

Nexant has developed DSM cells and programs around the world. Mr Wood has spent 2 years in setting up a DSM cell in Alexandria, Egypt.

Team consists of American and Indian experts, including Dr. Claire Fulenwider, Mr. Manoj Saha and Mr. V. M. Thakor, who have many years of combined experience.

He looked forward to embarking on a 3-year program with Jaipur DISCOM, and wished the project good success.

**Dr. Ashok Sarkar (USAID) inauguration address**

Thanks to Mr. Umesh Kumar and Mr. Rajan for their involvement and interest.

The DSM component of the ECO project is the major activity under the ECO project.

Apart from the normal objectives of DSM to offset power plant additions and take advantage of cost effective EE measures, the real advantage for India is the mitigation of power strategies. For example, Rajasthan and Delhi are facing power cuts every day. Therefore, DSM will be seen in this ‘other’ perspective.

Use DSM as a mechanism to ease up the impact of reforms, which will have great impact on consumers who are not well off, and therefore, make reforms more acceptable to consumers. In this context, he was glad that regulators were also present, with special reference to Mr. Sharma (Member GERC).

USAID has a history in DSM in India, such as programs for AECO, and for TNEB. Experiences, though successful, were based on different circumstances, and their replication can only be done through new mechanisms more suitable to the area in question. In this regard, the TA from the ECO project will be useful to establish models that could be replicated elsewhere in India.

The presence of Messers Malhotra and Dhumal, ICICI financial counterparts to the ECO projects, should be beneficial to the workshop as they were to assist implementing some of these programs which have to be financially closed with the use of the ECO Loan fund.

Timing is also right, not only because of reforms in and around the country, but also EE potential needs to be harnessed. This is embodied by the new EE Bill that the Government of India ('GoI') is likely to pass through Parliament this year, and this will set the policy environment for DSM activities such as those going to take place in Jaipur DISCOM involving Utilities & Regulators, as well as market players such as private sector ESCOs.

During President Clinton's visit in India, an agreement between the USA Government and the Government of India was signed to specify a target of 8% EE by 2008. Apart from the Government of India, all of us have a contribution to make in this endeavor. The ECO project is one of the mechanism for helping the GoI to meet and achieve the target.

The selection of Jaipur DISCOM was made after interacting with several regulators and SEBs. The fact that the Bank is also involved in Rajasthan in a big way, including concepts of EE, played an important role in the selection process. Also, reforms in the State of Rajasthan was impressive. And finally, the support of RERC Chairman's and the Jaipur DISCOM's CMD sealed the selection of Rajasthan.

Although, most of the training and activity is centered in this State, the training is available to SEBs of all state in India. And for this reason, USAID/Nexant has invited representative from 10 different states (between workshops in Jaipur & Bangalore).

Dr Sarkar was pleased with the presence of representatives from other states taking advantage of these training programs.

Ultimately, the endeavor was to identify and close projects, which will help other states in capturing the benefits of DSM by replicated these projects in their own states.

Expressed interest in interacting with the representatives of other states to see how USAID could help in the EE and implementing DSM in their own states.

**Mr. Padhmanabhan (USAID) inauguration address**

"We have come full circle": In 1995, he was in the same room representing the World Bank, and was participating in a discussion on DSM. "Maybe we were 5 years too early" expressed Mr. Padhmanabhan, but never the less felt it was good program then. He expressed happiness that USAID has 'picked up the ball' by assisting in the creation of the DSM cell in Rajasthan. The recommencement of this activity was apt as the Utility business is changing globally, from an emphasis on supply, to an emphasis on demand. The reason, supply options are very costly, and have an environmental impact. Demand options in many cases are low cost and have little or no environmental impact.

In the process of moving from supply to demand, the intrinsic nature of the Utility business has changed from being remote from the customer to being closer to the customer.

Options for India are more stark and clearer particularly in the context of Reforms, Rajasthan credit facility from the Bank being a case in point. Of the various components of reform, DSM needs to be recognized as a key component.

DSM in North America originated due to several reasons: regulatory pressure to offset capacity with DSM. As a contrast, the drivers for DSM in Rajasthan and India are a little different: need to mitigate shortages and rising tariffs; need for industry to get reliable and quality power; need to divert saving in one sector to another that is willing to pay for it.

Power Quality and efficiency being closely linked, one cannot have EE without power quality, which must be delivered if you want to get end user efficiency. Therefore, one must intervene on both sides of the meter: the Utility side to improve distribution design and reduction of losses as well as the customer side, to reduce the load.

In Rajasthan, we have a restricted load curve, which is basically flat and supply side managed. The opportunities for load management are very different than what it would be in an unrestricted situation. This is a challenge for the DSM cell: to be relevant in the context of a restricted load curve.

The agriculture sector would appear to be the main sector, which would have to be verified by load research. This will pose a major challenge as there exist a vicious cycle in this sector, with inefficiencies on both sides of the meter. The vicious cycle needs to be understood in order to know how to intervene, and how to attract private sector intervention.

Four key components are:

- Capacity building and training (should migrate to other DISCOMS in Rajasthan)
- Setting off a load research function. Not only to place data on the table, but to use it as a tool of liaison between regulators and the utility, so that decisions on tariffs and so on are taken on a scientific basis.
- Development of a pipeline of projects to demonstrate impacts on both sides of the meter.
- Financing of these projects via ICICI assistance

#### Mr. Anil Malhotra (ICICI) inauguration address

The Technology Group of ICICI has been working with USAID for last 16 years, resulting in trend-setting activities in the area of energy and environment.

ICICI is implementing 3-programs for USAID, ECO being one. Under the ECO project, there is a loan fund of US\$5m, which will be used for various activities including DSM projects.

Replication potential, demonstration to all stakeholders that these kind of projects are commercially viable, so that subsequent projects can be financed by other lenders also.

ICICI looks forward towards a demonstration project to fund through the DSM cell.

Mr. Umesh Kumar (Chairman Jaipur Discom) inauguration address

This program is the culmination of the last 6 months' discussions, which lead to the short-listing of Rajasthan as the focus state.

Welcome other states to participate to enable Jaipur DISCOM to learn from each other's experiences.

Program will be for 3-years. Need for DSM is crucial from all angles: meeting unmet demand (1/2 million people waiting for connection), and mitigating capacity constraints.

In the present scenario, distribution companies are 'adding their losses' as the 'more you sell, the more you lose'.

Looking forward to a long association, which will surely produce the desired results.

Mr. C. S. Rajan (Sec of Energy) inauguration address

Expressed appreciation on behalf of Government of Rajasthan ('GoR') for the selection of Rajasthan as the focus state.

Complemented Jaipur DISCOM to take the initiative to carry forward this process.

While he understood the theoretical aspects of DSM, he could not understand how to operationalize this concept.

Not sure if the Utility has in its interest to encourage consumers to consume less (example: tobacco health warning), and felt that other agencies other than utilities are more suited for this task.

DSM must relate to the India Context. The distinguishing features in the Indian context are (a) lower per capita consumption of electricity (b) huge subsidies in electricity tariffs (c) subsidized consumers have become dominant sector

Oversupply, load management vis-à-vis peak clipping and valley filling are not really relevant in the Indian context. Load curves in India are relatively flat. DSM must relate to relevant issues else it will not get much credibility.

What will sustain DSM? Local participation was not impressive in the seminar, and greater effort from the organizers is expected to ensure better attendance for such programs in the future. Incentive structures for the utility and the consumer should be established. The modes through which utilities actually benefit from DSM is required to be highlighted clearly in terms of the cost the utility bears in terms of carrying out DSM: whether these costs are going to be allowed by the regulators, and whether there can be tax benefits on the costs incurred by the utilities.

From the consumers' point of view, incentive structure should account for high initial costs, a difficult task for the consumers to accept (case in point: CFLs). Real case studies of success in these conditions need to be demonstrated. Given current tariff structure, there is no incentive for the agricultural/rural structure to make investments in EE devices. How will this situation be addressed?

Publicity and wider dissemination of the proceeding of this workshop will be welcomed.

**Mr. Arun Kumar (Chairman RERC) inauguration address**

Demand for consumption will lead to generation enhancements, which is very capital/investment intensive. The generation of electricity also has an environmental impact, and the need for generating electricity can be reduced by EE measures. In this regard, an integrated strategy including both demand and supply has great significance.

EE on supply side (generation and transmission) is well recognized. EE on the demand side is generally not well recognized enough. There is a great need to educate consumers in this regard, as well as re-orienting the approach of utilities themselves. USAID assistance in this area will surely be helpful.

This type of DSM activity needs to be done on a large statewide scale, and in this respect, regulatory support will be required and forthcoming in full.

He hoped that the workshop today would go a long way towards mass scale EE.

**Dr. Claire Fulenwider (Jaipur Workshop)**

There is a very serious need and extensive opportunity for DSM in Rajasthan. It will not be easy: we will need extensive technical analysis, creativity and commitment. 'We will all need and want this to happen'.

There is an engineering challenge to work with good and mediocre data, and sometimes we will need to make some 'leaps of faith'.

DSM is similar to agriculture: While it is important to know how to plough the ground, it is important also to know how to grow the garden. That means that we should not only find the problems, but also be part of the solution.

Wished success for the DSM cell.

**Mr. Sharma (Member GERC) Ahmedabad Workshop**

Awareness of the problems is the key issue: it is good that USAID, Nexant, SSL and ICICI have joined hands in helping to solve this problem through these workshops.

DSM is being discussed but not taken up seriously. There needs a strong rapport between the Government, Regulators and the Utility to encourage DSM.

Thanks to the organizers of the seminar, which has given them 'homework' to contribute towards the goals of DSM.

In the context of DSM, great responsibility falls on regulators: competitiveness, efficiency, transparency are all small word with very big meanings. While regulators are affecting change, the real effects on the ground will take some time.

One of the biggest problems today is that no state regulator really knows the magnitude of T&D losses. Studies indicate T&D loss varies between 30-55%. 35% in states like Gujarat and Maharashtra; and more than 50% in states like Orissa and Delhi. Un-metered supply and over pampering of the agricultural sector should be discontinued.

Demand forecasts must be more accurate. We tend to extrapolate last 5 years data and project 5-7% demand growth. However, if we closely study last and current years data, we will notice a decline in

Industrial Consumption by 5% last year, and 3% this year. Therefore, one must be realistic in projecting demand, which after taking into account domestic demand growth, the net growth in demand may only be 1-2%. Integrated planning must take this into account.

In Gujarat, we are self reliant to upto 80% of our requirement. We purchase another 10% from central generators, and balance 10% is procured at around Rs. 7/unit. DSM is a big tool in reduction of the costs of 'the last units' as the economics of the last units is the most important. The savings of the last unit is not 50 paise, but Rs. 7.00! It is necessary to introduce mandatory auditing for HT consumers by registered pre-qualified auditors.

In the commercial and LT sector, it is important to introduce KVAH metering to reduce harmonics and improve power factor. One should establish pilot projects for each sector.

Agricultural load, being 33% to 45% in and around the country, needs to be targeted for efficiency. Gujarat is more critical as the water table is decreasing by 20 feet per year.

## Conclusions

On Agricultural DSM: to improve irrigation pumping efficiencies an attempt can be made in the sugar co-operatives or through private sugar companies, who pay the farmers for their produce. Sugar companies can be financed by institutions and can act as collecting agents from the farmers for the saved energy.

Possibilities for forming Power Co-operatives in comparatively rich areas of agricultural sector and implementing energy efficiency program through the co-operatives.

There is need to involve NGO for interfacing with the farming community and aggrieved consumers, as in many cases, utilities have lost credibility.

Major concern of the regulators has been the enormous T&D loss that is occurring. Regulators are not getting from the utilities the correct figures as 85% of the agricultural consumers are not metered and the utilities try to shift technical and non-technical T&D losses to agricultural sector.

Major areas of DSM should be the areas of distribution wires below 33KV level. With proper understanding of load profile of substations and load shifting exercise with proper planning can be a major cost saver in terms of demand Reduction.

Mr. Deo felt that the tariff revisions should be a dynamic process and change depending on a continuous evaluation of the tariff orders.

According to Mr. Dev, T O D tariff as an example, was estimated to reduce peak period demand by a minimum of 500MVA on a grid of 11500 MVA in MSEB. But a scientific study should be assessed to know whether further time zones could be fixed in the T O D tariff. T O D tariff expansion to other categories and its effect can be studied as a separate exercise to know the impact. The cost of metering is very negligible when considering the peak demand reduction, and improved power reliability and marginal cost of creating the supply side capacity.

All tariffs should be a combination of "fixed charge based on demand "and "variable charge based on energy consumed". According to him, even consumers metered on ordinary energy meter (not a demand measuring type) should also be on such a two-part tariff resulting in reduction in incentive for theft and meter tampering. This fixed charges can be based on connected load (not very satisfactory) meter current capacity etc.

Regulators are a major influence for DSM in T&D loss reduction during tariff revision. MERC disallowed certain percentage of T & D loss and directed MSEB to achieve this reduction within a time frame.

Mr. B.E. Chandrashekar, Chief Engineer (Tech Audit &QC), KPTCL felt that all the methods presented for DSM were experimented at different times & discontinued due to various reasons .

Mr. K. Umashankara Technical Assistant to Director Finance, KPTCL felt that the application of advanced Technology only facilitates those customers who are paying and does not influence the nonpaying customers.

Some participants from EBs felt that the trend of nonpayment of bills is rather increasing than decreasing due to political interference. When any officer at functional level undertakes stern measures and political functionaries interfere, the level of demoralization is immeasurable.

As the discussions proceeded, a sort of consensus was emerged that technology can be used to circumvent some of the Social and political problems that are specific to power distribution.

In the overall structure of Power industry, whether vertically integrated or unbundled, the distribution set up is technically & commercially weak.

Any DSM demonstration has to factor all these to be an acceptable model to be applied anywhere.

Mr. K. S. N. Murthy (S.E, APTRANSCO) elaborated on the Andhra experiment of single phase HV Transmission in the rural sector, which did not materialized as expected due to various non-technical reasons. On the other hand, he mentioned, at the end of the meeting, that he would do his best to start a DSM Cell in his utility. He felt that - A need for scientific and systematic study of DSM possibilities and their implementation needs no stressing.

Critical task is to understand and quantify the energy and demand saved. Unless demand saved by peak reduction is factored by taking into consideration the marginal cost of peaking power, many a DSM measures may not look attractive.

Creating a revenue model to a DSM may be difficult as the advantages of peak demand and general demand reduction, which are great savings in terms of avoided investment in an integrated resource planning exercise, can not be inbuilt into a DSM financial structure, particularly for consumers in the rural sector, where efficiency of power utilization are the lowest.

For industrial consumer, the best driver for DSM would be a rational tariff structure which provides correct signals with features like demand charges, time of the day tariff, PF incentives, bulk discounts for valley filling etc. It is noted that several industrial customers have their own or borrowed capital for a DSM

Mr. D. S. Hanumanth Rao (member TNERC) gave his deep insight into some of the problems adding positively that NGOs, collage students can be used to promote the idea of energy efficiency and energy efficient devices and its uses.

Tariff structure need to be bifurcated into power (demand) charges and energy charges with specific tariff incentives for the reduction of concurrent maximum demand on the system by TOD tariff and PF incentives for better voltage profile and upstream energy loss. This is being addressed by CERC & SERC.

Skepticism was highest regarding the possibilities of DSM in the rural sector.

Another opinion expressed was that energy savings generated by DSM would be forwarded to the rural sector where revenues are not generated. (Comment from SSL: The above point does not seem very logical as DSM basically avoids waste and improves system quality and service of the utility, which naturally goes to increase the revenue stream of the utility. Other wise too, utilities have the switches in their hands to see where the energy is flowing.)

Agricultural DSMs can be attended, where we can have a revenue streams. In the case of sugar cooperatives, payment to sugarcane growers are paid by the sugar cooperatives, in turn can stand as a guarantor and collector to the financial institutions.

Formation of Power cooperatives with support of the government to retail power beyond the distribution transformer can be used further to implement DSM with a clear-cut revenue collection model.

Urban DSM may be more practicable and more immediate.

DSM in the Indian context must mean efficiencies before and after the meter in synchrony.

Load research is the key to knowing what to do and where. One needs to somehow find ways to ensure that lenders to DSM financing are protected equally with IPPs. If lenders to T&D loss reduction & DSM get side lined to IPP lenders, the core problem will persist.

There is a need for incorporating DSM into an integrated resource planning exercise with the same protection to lenders of DSM as that to lenders of IPPs.

Mr. D. P. Gupta, CE, Jaipur DISCOM indicated DSM attempts are like adding a bucket of milk to a vast tank and trying to analyze what is the change in color of the water. This is reflective of the enormity of the problem and the associated frustration.

Another point raised by Mr. Gupta was that such generated savings are transferred to other sectors such as agriculture, where no revenue is generated.

This point can be addressed by the fact that substation and feeder level controls can always see that energy drawn by any sector can be controlled.

Mr. R. K. Sharma, Member GERC was impressed by Mr. V. M. Thakor's presentation on DSM, and in his significant talk he said that he would impress upon the utilities to involve in DSM as an ongoing strategy for better efficiency. He said ways and means would be found out to introduce DSM in utilities through tariff orders.

## Opinion

In addition to the remarks of various individuals as highlighted earlier to, the general response received from the participants by and large vary between the ratings of "Excellent" and "Good". Several mentioned that the program helped them to understand the concept of DSM.

Following are some of the remarks made in the feedback forms by the participants:

- " I am happy to say that I am enlightened"
- " I shall propagate the concept of DSM"
- "It is very encouraging and the work shop is very useful for regular usage in our corporate office"
- "Keep in touch to update the information periodically"
- "Prefer setting up a DSM cell in the corporation"
- "We may pursue the utility to take up some DSM programs and may link up while passing the tariff order"
- " I had no knowledge of DSM, I gained more knowledge about it- I will try to propose some action to be taken regarding DSM in my organization"
- "As a participant from a regulatory commission I would present the views and deliberations of the two days interactive session to my commission and endeavor to intensify the efforts of the AP utility towards DSM through regulatory measures"
- "KPTCL is facing lot of problems- What DSM can do – came with lot of hopes to listen and learn- 'Yes' DSM provided lot of answers for many questions - In KPTCL a DSM cell has to be formed – It will be recommended to the chairman of KPTCL"
- "To usher in the DSM appreciation in the commission. Already a DSM position is created in the organization. Specific result oriented studies will be initiated in unison with consumers and utilities. The commission will act as a catalyst to provide appropriate incentives for those who benefit from DSM"
- "Would do my best to improve the ideas"
- "To go through more cotemporary Knowledge & have more knowledge while planning the distribution system. We will be more careful to ensure that it is energy efficient and otherwise also we will be conscious to save energy in every field."
- "To take overall view and think in the direction of implementation of DSM in Jodhpur DISCOM".
- "We will take up some pilot project to reduce the demand and improve energy efficiency at the consumer end."
- "As a consumer group and Social Action Organization we would like to educate and inform the consumer about the concept. Since most of the population is in rural areas and depend on agriculture, we too would like to increase the energy efficiency of forming equipments."

- "As a first step plan, would implement DSM project at my home and in my office building and then extrapolate the conclusions/results to others. Would like to be trained more on the subject. "
- "To take up with management for establishing a DSM Cell in the organization which is currently passing through the phase of reforms."

## Subcontractor's deliverables: Saha Sprague Limited

In compliance with Task Order 0101-NEX-106, the following activities have been carried out by Saha Sprague Limited:

<u>Activities</u>	<u>Reference</u>
<ul style="list-style-type: none"> <li>❑ Subcontractor reviewed background materials provided, and prepared technical materials, in cooperation with Mr. Thakor (Nexant consultant and ECO project staff), regarding the procedure and requirements for establishing a DSM cell in an electric utility. The materials included examples of staffing requirements, staff functions and responsibilities, reporting requirements within the utility, and other aspects required to setup a DSM cell.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Various interactions between Dr, Claire and Mr. Thakor via EMAIL and Phone. See report from Dr. Claire Fulenwider and Mr. Thakor.</li> </ul>
<ul style="list-style-type: none"> <li>❑ Subcontractor also prepared training materials on this activity in form of presentations, of which soft and hard copies are attached. Nexant staff prior to presentation reviewed these.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Various interactions between Dr, Claire and Mr. Thakor via EMAIL and Phone. See Appendix 9 &amp; 13</li> </ul>
<ul style="list-style-type: none"> <li>❑ Subcontractor interacted with Nexant staff and Dr, Claire Fulenwider (other subcontractor) assigned to this activity in preparing both technical assistance materials and training course materials, agenda and outline.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Various interactions between Dr, Claire and Mr. Thakor via EMAIL and Phone. See Pages of this report.</li> </ul>
<ul style="list-style-type: none"> <li>❑ Subcontractor interacted with Dr. Sarkar (USAID) regarding the DSM activity via emails, and through Mr. Thakor (Nexant) who coordinated with USAID for this task.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Various interactions between Mr. Thakor and Dr. Sarkar (USAID) via EMAIL and Phone.</li> </ul>
<ul style="list-style-type: none"> <li>❑ Subcontractor traveled to Jaipur to work with the Jaipur distribution company, to establish a DSM cell and to assess the needs of this cell.</li> </ul>	<ul style="list-style-type: none"> <li>❑ Trip Report of First Jaipur Visit (9<sup>th</sup> and 10<sup>th</sup> of January, 2001) See Page.</li> </ul>
<ul style="list-style-type: none"> <li>❑ Subcontractor conducted a two-day training workshop on DSM Cell Organization and Management in Jaipur and Bangalore, respectively.</li> </ul>	<ul style="list-style-type: none"> <li>❑ See attached Workshop Report. See pages (attendance list of participants)</li> </ul>
<ul style="list-style-type: none"> <li>❑ Upon completion of the second training program, Subcontractor met with USAID staff to conduct a review meeting on this activity, and other matters.</li> </ul>	<ul style="list-style-type: none"> <li>❑ See attached Review Meeting Report dated 23<sup>rd</sup> February 2001. See Page.</li> </ul>

Subcontractor, in conjunction with other subcontractors on this task, submitted the following reports to USAID:

**Activities**

- ❑ A report on the establishment of the DSM Cell at Jaipur, documenting the work undertaken, providing observations and needs of the DSM Cell. The report includes interactions and discussions with the utility management as well as the staff of the newly formed DSM Cell. The report also contains recommendations and conclusions resulting from the technical assistance work.
- ❑ A report on the training programs, includes hard copies of all handout materials as well as copies of visual aids presented. A report on the training programs contains the roster of participants from each training program session, a summary of discussions and observations from each session, and an executive summary. The report also includes recommendations or conclusions resulting from these sessions.
- ❑ Subcontractor has also provided both hard copy and electronic copy of all reports.

**Reference**

- ❑ See report from Dr. Claire Fulenwider and Mr. Thakor
- ❑ Included in this report in its entirety.
- ❑ See Appendices



Draft Covering Note

## Training Workshop on: Organization & Management of Demand Side Management (DSM) Cell

Dear Sir:

Nexant Inc., a Bechtel Technology and Consulting Company, invites your participation to the *Training Workshop on Organization and Management of DSM Cell* on 23<sup>rd</sup> & 24<sup>th</sup> January 2001 at Jaipur.

### *Background*

The Ministry of Power in their recent communication to the states has given a brief background about the ECO Project, which is aimed at promoting widespread commercialization of end-use energy efficiency technologies and services in India's transitioning Power sector as it undergoes regulatory reforms and restructuring

This communication also states about establishing a core group of identified states, which would receive assistance for capacity building in Demand Side Management (DSM) under the ECO project. This includes assistance in developing the requisite knowledge for initiating, designing and implementing DSM programs through the DSM cell, within the identified states.

It is in this context that this *training workshop, the first in the series*, will address issues relating to forming, organizing and functioning of the Cell in the Power Utilities.

### *Training Workshop*

The course will provide an overview on the skills and organizational resources required to develop and maintain an effective DSM cell. Options for location of the cell in the organizational structure, and ways to build credibility and acceptance for this new unit would also be covered. Organizational examples of effective DSM cells in other utilities will be provided and ample opportunity will exist for interaction to address specific questions and situations facing participants in their own utility. The advantages and disadvantages of several organizational models for DSM cell location; composition and resources will also be addressed.

### *Course Objectives*

The course will enable participants to develop an understanding of DSM and how it functions. It would apprise them of the organizational resources required for the effective functioning of the cell. It would instill the necessary confidence in the participants for initiating & setting up of DSM cell in their respective utilities.

### *Participants*

The programs will benefit decision makers & executives (Superintendent level Engineers) of Utilities who are nominated / being identified for the DSM Cell. Stakeholders such as State Regulatory Commissions, FT's and consumer groups would find the program useful as an important means to achieve energy efficiency improvements and reduction in system losses, through their interface with the DSM Cell.

### *Faculty*

The faculty will include expert consultants from the US and India as per details attached herein.

**(Do we need to write the venue again since it is already mentioned in the opening paragraph of this letter??**

### *Registration*

The course is non residential and is by invitation. The timings are 930 hours to 1700 hours. We invite participation of 2-3 Executives from your organization and do look forward to receiving your confirmation. Confirmations may be sent to:

---

Mr. Rajiv Arora  
1D-II, Parkwood Estate  
Rao Tula Rao Marg  
New Delhi 110 022  
Tel. +91 11 6188816 / 6181376 / 6186855  
Fax +91 11 6190022;  
Email: nexant@vsnl.com

and

Mr. B. S. Dixit  
Saha Sprague Limited (Indian Partner of Nexant)  
266 Dr. Annie Besant Road, 1st Floor,  
Worli, Mumbai - 400 025  
Fax: 91-22-430 1969 Tel: 022 421 0234  
email: balu@sahasprague.com

---

Sincerely,

Charles H. Fafard  
Chief of Party

## Synopsis of Workshop Topics & Papers

### *Dr Claire Fulenwider – DSM Overview*

Effective implementation of DSM will involve challenges in managing change and innovation. If DSM is to add value to Indian utility operations the benefits and values it brings need to be well understood. Dr. Claire will discuss the scope and value of DSM, provide an overview of the DSM process, and then illustrate the organizational requirements for effective DSM cell implementation. She will also present the key challenges that US utilities faced in DSM implementation and how they managed the change process in establishing their DSM initiatives.

### *Mr VM Thakor – DSM Cell Organization*

DSM can provide solutions to several problems anticipated by the power sector in our country. Experience of those developed and developing countries that have adopted and practiced DSM, has been very favorable and encouraging. For its effective operation and implementation it is essential to have a proper set up of the cell. Mr. Thakor will discuss the need, setup, structure and the linkages with in the over all organizational set up for carrying out various activities smoothly and effectively. The details covered in the topic will assist in planning and setting up DSM cell with in the Organization.

### *Mr RK Iyer – Functions of DSM Cell & responsibilities Programs*

With the fragmentation of SEBs into discos, gencos and transcos, more and more emphasis will now be made on distribution and demand efficiency. Mr. Iyer will discuss *different technical measures* that can be adopted at a consumer site, and ways in which some of these technical measures may be adopted in a DSM project involving the Utilities. His paper will give participants an idea of the basic technical measures that are potentially useful for a DSM project in the Indian context, which will be very useful to any new DSM cell under construction. Mr. Iyer will also discuss ways in which a cell could interface with consumers to optimize its market research and measures.

### *Dr Claire Fulenwider – Key factors for DSM success*

The key factors leading to success of DSM initiatives has been identified by a widespread body of evidence. These factors include organizational components, senior management support, financial resources, and organizational acceptance by other divisions of the utility. While the objectives for DSM differed among utilities, different organizational placements for DSM responsibility evolved and were effective. Dr. Claire gave specific examples of how different kinds of organizational support contributed to or detracted from the success of DSM cell activities and provide guidance to enable effectiveness in achieving your objectives.

### *Dr Claire Fulenwider – DSM evolution: The First Year*

DSM will change and evolve over time if the Indian experience proves to be similar to the US experience. Dr. Claire will provide an analytic framework of DSM evolution and illustrate how that evolution alters the DSM cell organization and its management requirements. She will provide brief case study examples of effective DSM activities in each phase and will also suggest a first year "work plan" for DSM cells. This work plan will provide participants with expected milestones and management tasks and will offer an opportunity for discussion of management requirements, staffing, training, budget expectations and regulatory supports needed to make DSM successful in each participant's home situation.

### *Mr MK Saha – Budgeting & Financial structuring of DSM projects*

Any DSM model to work effectively, a robust financing mechanism should be established to enable DSM in the first instance. Mr. Saha will discuss the barriers involved in bringing serious money to

such programs in the Indian context, and demonstrate how these barriers can be overcome. This knowledge will be useful to any DSM cell that is being constructed, and will assist in shortening the learning curve towards establishing a functioning DSM program.

***Mr VM Thakor – Case studies: Utility experience***

Due to different priorities and pressing problems, very few utilities have adopted DSM, although all are advocating and even practicing conservation of energy. One of the important and favorable outcomes of DSM is the interface with the consumers in understanding and solving some of their problems, thereby establishing a healthy relation. Mr. Thakor will highlight and discuss the experience of AEC, which was the first utility to adopt DSM and implemented certain programs, successfully. The case studies will show that it can help assist in solving some of the problems which has long lasting effect.

***Mr BS Dixit – An overview of regulators' role in encouraging DSM***

With advent of regulatory commissions in India, we are now entering an era of transparent accountability of the State power sector. Mr. Dixit will be exploring the ways in which existing regulatory bodies such as the CERC and MERC have used their powers to influence energy efficiency. His paper will provide a general description on the mandate given by the statute to the central and state electricity regulatory commissions. He will cover the tariff order details of CERC as a regulator of grid discipline/ analysis and discuss how such a tariff structure can be a driver for DSM. He will also throw light on the Tariff order of MERC as an example of a state regulator's role in incentivising peak demand reduction and reduction of Technical T&D losses.

***Dr Fulenwider, Messers RK Iyer and Thakor – Market research and Customer interface***

Implementing DSM; one of the key contributing factors towards creating successful DSM programs, is an effective and practicable strategy for carrying out consumer load behavior research and for establishing appropriate intermediaries and mediums to communicate with consumers en masse. Dr. Fulenwider, Mr. Thakor and Mr. R. K. Iyer will discuss these issues in an open forum.

## Faculty Members' Profile

### *Claire Fulenwider, Ph.D*

Dr. Fulenwider holds a Ph. D. from the University of Wisconsin--Madison in political science and public policy and has spent 25 years in the electric and natural gas utility business in the US. For the past 2 years, she has provided independent consulting to electric utilities in the areas of strategic planning, energy services, management and restructuring. In June of this year, Claire presented a workshop on maximizing value from telecommunications assets for the Egyptian Electricity Authority. At Alliant Energy in the central US from 1994-1999, Dr. Fulenwider served as Vice President of Development and Planning where she worked to integrate demand-side management strategies with other energy services to improve the company's financial position. At Alliant and previously at another US utility, Claire established energy service departments that delivered a broad array of DSM and other load shaping programs to customers. Dr. Fulenwider is a frequent speaker at US conferences on these subjects. As an early developer of a demand-side energy research center in her home state, she has both a broad and deep knowledge of the demand-side process and the factors that contribute to strong success of demand-side programs.

### *VM Thakor (Nexant)*

Mr. Thakor is a graduate in Electrical and Mechanical Engineering. He is also a Fellow of Institute of Engineers (India). He has an experience of 33 years with a leading Generating, Transmitting and Distributing Utility in private sector (AEC) known for reliable and quality supply. Having worked as head of Transmission, Distribution, Commercial and Consumer areas, he has acquired wide and rich experience. He was responsible for introduction of Demand Side Management first time in the Utility in the country, and has implemented programs of end-use efficiency improvement successfully through ESCO system, on lease base arrangement with performance guarantee.

On retirement from AEC he was associated with USAID's EMCAT Project in carrying out programs related to Demand Side Management as well as Reforms, Restructure and Privatization of SEBs. Presently he is associated with ECO Project of USAID and is working in the areas of DSM, EE of end users, fixing minimum standards for certain equipments/appliances in Gov. Buildings, Training etc. He has written number of articles on Distribution System, T&D Losses, End-Use Efficiency Improvement and has presented papers in National and Inter National Seminars. He is also associated and working as an expert on various committees for T&D Loss reduction, Distribution System Improvement, Tariff formation and presentation to the SERC.

### *Manoj Saha, Executive Director (SSL)*

Mr. M. K. Saha holds a B. A Degree (Hons) from the Guildhall University of the City of London (Accountancy and Business Finance). As part of his strategy to return to India permanently, in 1995, he established a joint venture company "Saha Sprague Limited" (SSL) with a US company, Commonwealth Sprague Capacitor Inc. in the field of Energy Services specializing in Demand Side Management and Transmission and Distribution Loss Reduction. His experience in establishing workable financial instruments for implementing DSM will be useful to participants in getting an understanding of these working models.

**Saha Sprague Limited** has been part of the AECO DSM program from its inception in 1995, and has diverse experience for carrying out T&D loss reduction strategies for utilities such as BSES, BEST and SEBs. SSL has established different financing models for its DSM projects with the assistance of IREDA and IL&FSL. SSL is also an integrated ESCO company implementing audits and financed projects for large industrial undertakings in the Indian Marketplace.

***RK Iyer, Vice President (SSL)***

Mr. Iyer is a Btech (Electrical) Graduate from REC Surathkal, Mangalore. He is also a senior member of various associations such as Association of Energy Engineers, USA, Energy Services Marketing Society, Environmental Engineers and Managers Institute of AEE; and a member of the Institute of Electrical Chartered Engineers. Currently at the age of 40, he has been with Saha Sprague Limited from the inception of the Company. His vast technical experience will be useful to participants wanting to know about ways in which DSM could be implemented technically.

***MS Balasundaram Dixit, General Manager – Research & Projects (SSL)***

Mr. Dixit is a post graduate in power systems engineering from The Regional Engineering college, Trichy, with around two decades of experience with Bharat Heavy Electrical Ltd, in different areas of power sector and five years with Windia Power Limited in the field of wind power who started his career as an engineer with Karnataka electricity board. Currently working for SSL as GM research & Projects, Mr. Dixit will be useful to participants with respect to the role of regulatory bodies in influencing efficiency.

## Targetted Audience: Bangalore Workshop

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
G.P. Rao	Chairman	Andhra Pradesh Electricity Regulatory Commission
D. Laxminarayana	Member	Andhra Pradesh Electricity Regulatory Commission
A. V. Subbarao	Member	Andhra Pradesh Electricity Regulatory Commission
T. B. Narasimha Rao	Secretary	Andhra Pradesh Electricity Regulatory Commission
Mr. R. P. Patel	Dy.G.M.	BEST Undertaking
Mr. Kanolkar	Asst.G.M	BEST Undertaking
Mr. Jitendra Shah	Dy. Chief Engineer	BEST Undertaking
Mr. M. Sayed	D.E	BEST Undertaking
Mr. R. V. Shahi	Chairman	BSES Ltd,
Mr. S. P. Karkaria	G.M.(Distribution)	BSES Ltd,
Mr. D. Sukhthankar	Dy.G.M	BSES Ltd,
Mr. P. V. Subbarao	Chief Engineer	BSES Ltd,
Mr. S. H. Joshi	Sr.Manager	BSES Ltd.,
Anant Huilgol	Secretary General (Member-KERC)	Citizens Forum (Regd),
Ravi Uppal	Chairman (Member- KERC)	Confederation of Indian Industry
Y. G. Muralidharan	Managing Trustee (Member-KERC)	Consumer Rights, Education & Awareness Trust
G P Rao	Chairman (Member- KERC)	Energy & Infrastructure Committee & Past President
K. N. Jayalingappa	Chairman (Member- KERC)	Energy Committee, Federation of Karnataka Chambers of Commerce & Industry
Prof. V. K. Damodaran	Director	Energy Management Centre
V. Narayana Gowda	Vice President (Member-KERC)	Karnataka Electricity Board
Philipose Matthai	Chairman	Karnataka Electricity Regulatory Commission

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
H. R. Gopal	Member	Karnataka Electricity Regulatory Commission
Nalini M. K. Menon	Member	Karnataka Electricity Regulatory Commission
Maj. Gen. S.G. Ombatkere	(Member-KERC)	Karnataka Electricity Regulatory Commission
S. Muni Gowda	Jt. Director of Agriculture Retd. (Member-KERC)	Karnataka Electricity Regulatory Commission
M. Rangaswamayya	R. Ex-Zilla Parishar Member (Member-KERC)	Karnataka Electricity Regulatory Commission
R. Sridharan	Secretary (Member-KERC)	Karnataka Electricity Regulatory Commission
M. Nagaraj	Consultant (Member-KERC)	Karnataka Electricity Regulatory Commission
N Gokul Ram	Managing Director (Member-KERC)	Karnataka Power Corporation Ltd.,
V P Baligar	Chairman & Managing Director (Member-KERC)	Karnataka Power Transmission Corporation Ltd.,
B. T. Jnaneshwar	Additional Secretary	Karnataka Power Transmission Corporation Ltd.,
Y. K. Viswanath	Superintending Engineer (Elec.), Tech Audit&QC	Karnataka Power Transmission Corporation Ltd.,
J. Crasta	President (Member-KERC)	Karnataka Small Scale Industries
K. C. Naikwadi	President (Member-KERC)	KEB Engineers Association
	The Chairman	Kerala State Electricity Board
	Dy. Chief Engineer (Research & Planning)	Kerala State Electricity Board
	Dy. Chief Engineer (M.I.S.)	Kerala State Electricity Board
Dr. G. Pavithran	General Secretary	KSEB Post-Graduate Engineers Association
Mr. P. Subramanyam	Chairman	Maharashtra Electricity Regulatory Commission

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
Mr. Jayant Deo	Member	Maharashtra Electricity Regulatory Commission
Mr. Venkat Chari	Member	Maharashtra Electricity Regulatory Commission
Mr. Vinay Bansal	Chairman	Maharashtra State Electricity Board
Mr. P. R. Deshpande	Director Technical	Maharashtra State Electricity Board
Mr. V. D. Apte	Suptd. Engineer	Maharashtra State Electricity Board
D. V. Rao	Chief Project Manager	Rural Electrification Corpn Ltd.,
M.N. Shankarikoppa	President (Member-KERC)	State Farmers Co-ordinary Committee
E.C. Arunachalam	Member	Tamil Nadu Electricity Regulatory Commission
D. S. Hanumantha Rao	Member	Tamil Nadu Electricity Regulatory Commission
R. Poornalingam	Chairman	Tamilnadu Electricity Board
C. Andrew Tennyson Abraham	Member (Distribution)	Tamilnadu Electricity Board
P Ramakanth Reddy	CMD	Transmission Corporation of Andhra Pradesh Ltd
M.V.S. Birinchi	Director - Technical	Transmission Corporation of Andhra Pradesh Ltd
D. Prabhakara Rao	Director - Finance	Transmission Corporation of Andhra Pradesh Ltd
V. Ramakrishna Rao	Director Commercial	Transmission Corporation of Andhra Pradesh Ltd
P.M.K. Gandhi	Managing Director (APCPDCL)	Transmission Corporation of Andhra Pradesh Ltd
Kalala Ranganatham	Managing Director (APSPDCL)	Transmission Corporation of Andhra Pradesh Ltd
N. Biksham	Managing Director (APNPDCL)	Transmission Corporation of Andhra Pradesh Ltd
Y. Gopalakrishna Murthy	Managing Director (APEPDCL)	Transmission Corporation of Andhra Pradesh Ltd
J. Parthasarathy	Part Time Director	Transmission Corporation of Andhra Pradesh Ltd

## Participants: Bangalore Workshop

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
R. V. J. Srinivasan	Jt. Director - Tariff	Andhra Pradesh Electricity Regulatory Commission
K. S. N. Murthy	Superintending Engineer	AP Central Power Distribution Company(APTRANSCO)
K. Nagi Reddy	Divsl. Engineer	APSPDCL of APTRANSCO
N. Gurumurthy	Trustee	Consumer Rights, Education & Awareness Trust
M.K. Ramachandra	Chairman (GMCI)	Energy & Infrastructure Committee
M. Udaybhanu	Head Industry & Training	Energy Management Centre
Leena Pische-Thomas	Director	eSSe'n' eLLe International Business Consultants
Sudha Setty	Director	eSSe'n' eLLe International Business Consultants
Amin Petiwala	Manager(Finance)	Gujarat State Energy Generation Ltd.,
Dr.C.V.Divakar	OSD(Tariff)	Karnataka Electricity Regulatory Commission
H.R.Gopal	Member	Karnataka Electricity Regulatory Commission
M.Nagaraj	Director(Technical)	Karnataka Electricity Regulatory Commission
R.Sridharan	Secretary	Karnataka Electricity Regulatory Commission
Achyutha Rao	Manager(P&M)	Karnataka Power Transmission Corporation Ltd.
Chandrasekhara B.E	Chief Engineer (Tech Audit&QC)	Karnataka Power Transmission Corporation Ltd.
D. S Palekar	Special Officer	Karnataka Power Transmission Corporation Ltd.
K. Umashankaran	TA to Dir (F)	Karnataka Power Transmission Corporation Ltd.
N. Vijayabhaskar	Director Distribution	Karnataka Power Transmission Corporation Ltd.
W. M. Shivakumar	Asst. Executive Engineer (Elec.,)	Karnataka Power Transmission Corporation Ltd.
M. H. A.Shaikh	General Manager	Karnataka Renewable Energy Development Ltd
L. Ravi	Gen.Secretary	KEB Engineers Association

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
B. S. Rajasekhar	Executive Engineer(Elec.)	Master Plan Division, KPTCL
D. K. Dewan	Joint Director - Tariff	MPERC
K. S. Anjanappa	Dy. Electrical Inspector	Office of Chief Electrical Inspector GOK
U. V. Krishna Mohan Rao	Energy & Resource Management	Specialist
D. Hanumanth Rao	Member	Tamil Nadu Electricity Regulatory Commission
P. Pandiya Rajan	Asst. Exec. Engineer(TNERC)	Tamil Nadu Electricity Regulatory Commission
S. V. Naidu	Energy & Resource Management	U.V.Krishna Mohan Rao & Associates

## Others

### *Bangalore Workshop*

<u>Name</u>	<u>Organization's Name</u>
Dr. Ashok Sarkar	USAID
Dr. Claire Fulenwider	Nexant Consultant
Mr. Rajiv Arora	Nexant
Mr. V. M. Thakor	Nexant
Mr. Manoj Saha	Saha Sprague Limited
Mr. R. K. Iyer	Saha Sprague Limited
Mr. B. Dixit	Saha Sprague Limited
Mr. D. V. Shah	Saha Sprague Limited
Mr. Purshottam	Saha Sprague Limited
Mr. Madhu Gopinath	Saha Sprague Limited
Mr. Mallikarjuna	Saha Sprague Limited
Administration Staff - two	Saha Sprague Limited

### *Jaipur Workshop*

<u>Name</u>	<u>Organization's Name</u>
Dr. Ashok Sarkar	USAID
Mr. Padhmanabhan	USAID
Mr. Malhotra	ICICI
Mr. Dhumal	ICICI
Dr. Claire Fulenwider	Nexant Consultant
Mr. V. M. Thakor	Nexant
Mr. Manoj Saha	Saha Sprague Limited
Mr. B. Dixit	Saha Sprague Limited
Mr. Vineet Mehta	Saha Sprague Limited

## Participants: Jaipur Workshop

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
Ashok Dayal	Executive	Bhagat Power
Geeti Bhagat Datwani	Vice Chairman	Bhagat Power
Partha Das	Development Officer	CUTS
R P Nagpal	EE	Delhi Vidyut Board
D Devnani	EE	Delhi Vidyut Board
R K Sharma	Member	Gujarat Electricity Regulatory Commission
G K Dave		Gujrat Electricity Board
G D Falar	Exe.(PMV)	J V V N L Ltd.,
S K Rajput	Asst.Engineer	J V V N L Ltd.,
K C Gupta	Ex-Engineer	J V V N L Ltd.,
A k Sharma	Ex.TW (MT-I)	J V V N L Ltd.,
A M Lodha	S.E. (M & P)	J V V N L Ltd.,
R L Kejriwal	Exe. Engineer.	J V V N L Ltd., (Energy Audit)
R.G.Gupta	S.E.	Jaipur DISCOM
Mukesh Chellene	Asst.Engineer	Jaipur DISCOM
Jethani	Asst.Engineer (Reforms)	Jaipur DISCOM
K S Arora	Executive Engg.	Jaipur DISCOM
C P Agarwal	Ex.Engineer.DSM	Jaipur DISCOM
N M Sareen	Ex.Engineer. (Commercial)	Jaipur DISCOM
D P Gupta	CE	Jaipur DISCOM
A C Gupta	DY. CE	Jaipur DISCOM
S C Malhotra	SE (Planning)	Jaipur DISCOM
Ajeet Saxena	AENDSM	Jaipur DISCOM

<u>Name</u>	<u>Designation</u>	<u>Organization's Name</u>
S. Krishnaswamy	Manager	NGO - Consumer Utility & Trust Society
Q C Sharma	Dy. Secretary (RERC)	Rajasthan Electricity Regulatory Commission
D. R. Mathur	Dy. Secretary (RERC)	Rajasthan Electricity Regulatory Commission
B. L. Jain	S.E. (PSR)	RVPNL
A. k. Sharma	Ex.Eng.(PSR)	RVPNL