FORUM OF REGULATORS (FOR)

REPORT

ON

INSTITUTIONALISING ENERGY EFFICIENCY

&

DEMAND SIDE MANAGEMENT IN UTILITY SECTOR IN INDIA

JUNE - 2010

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ABBREVIATIONS

ABPS Infra	ABPS Infrastructure Advisory Private Limited
AEC	Ahmedabad Electric Company
AP	Agriculture Pump
APC	Auxiliary Power Consumption
APFC	Automatic Power Factor Correction
ARR	Annual Revenue Requirement
ASE	Alliance to Save Energy
BEE	Bureau of Energy Efficiency
BESCOM	Bangalore Electricity Supply Company
BEST	Brihan Mumbai Electric Supply & Transport Undertaking
BPL	Below Poverty Line
CDM	Clean Development Mechanism
CEC	California Energy Commission
CMS	Central Monitoring System
CPUC	California Public Utility Commission
CREDA	Chhattisgarh State Renewable Development Agency
CSEB	Chhattisgarh State Electricity Board
CSERC	Chhattisgarh State Electricity Regulatory Commission
CSPDCL	Chhattisgarh State Power Distribution Company Limited
CSPGCL	Chhattisgarh State Power Generation Company Limited
CSPTCL	Chhattisgarh State Power Transmission Company Limited
CTU	Central Transmission Utility
DPS	Department of Public Service, Government of Vermont
DGVCL	Dakshin Gujarat Vij Company Ltd
DHBVNL	Dakshin Haryana Bijli Vitran Nigam Limited
DISCOM	Distribution Company
DSM	Demand Side Management
DSM EA	DSM Executive Agency
EA 2003	Electricity Act 2003
EC Act	Energy Conservation Act 2001
EE	Executive Engineer
EEU	Energy Efficiency Utility

EE&DSM	Energy Efficiency and Demand Side Management
EM&V	Evaluation Measurement and Verification
ERC	Electricity Regulatory Commission
ESCO	Energy Service Company
FOR	Forum of Regulators
GEB	Gujarat Electricity Board
GEDA	Gujarat Energy Development Agency
GERC	Gujarat Electricity Regulatory Commission
GESECL	Gujarat State Electricity Corp. Ltd
GETCO	Gujarat Energy Transmission Corp. Ltd.
GUVNL	Gujarat Urja Vikas Nigam Ltd
HERC	Haryana Electricity Regulatory Commission
HPGCL	Haryana Power Generation Company Limited
HPMV	High Pressure Mercury Vapour
HSEB	Haryana State Electricity Board
HVDS	High Voltage Distribution System
HVPNL	Haryana Vidyut Prasaran Nigam Limited
IEPR	Integrated Energy Policy Report
IIEC	International Institute of Energy Conservation
LBNL	Lawrence Berkeley National Laboratory
LED	Light Emitting Diode
LM	Load Management
MD	Managing Director
MEDA	Maharashtra Energy Development Agency
MERC	Maharashtra Electricity Regulatory Commission
MGVCL	Madhya Gujarat Vij Company Ltd
MNRE	Ministry of New and Renewable Energy
MOU	Memorandum of Understanding
MPECS	Mula-Pravara Electric Co-operative Society
MPSV	Medium Pressure Sodium Vapour
MSEDCL	Maharashtra State Electricity Distribution Co. Ltd
MSETCL	Maharashtra State Electricity Transmission Co. Ltd
MSPGCL	Maharashtra State Power Generating Co. Ltd
MYT	Multi Year Tariff

NAPCC	National Action Plan for Climate Change
NEP	National Electricity Policy
NPC	National Productivity Council
OA	Open Access
PF	Power Factor
PGVCL	Paschim Gujarat Vij Company Ltd
PSB	Public Service Board
REC	Rural Electrification Corporation
REL	Reliance Energy Limited
SDA	State Designated Agency
SE	Superintending Engineer
SECF	State Energy Conservation Fund
SERC	State Electricity Regulatory Commission
SWHS	Solar Water Heating System
TOD	Time-of-Day
TPC	Tata Power Company
UGVCL	Uttar Gujarat Vij Company Ltd.
UHBVNL	Uttar Haryana Bijli Vitran Nigam Limited
USAEP	United States Asia-Environmental Partnership

1 EXECUTIVE SUMMARY

The Forum of Regulators (FOR) has been entrusted with the responsibility to evolve common and coordinated approach to various issues faced by the various Electricity Regulatory Commissions in the country. The FOR constituted a Working Group on "DSM and Energy Efficiency" to deal with the issues related to implementation of Energy Efficiency and Demand Side Management (EE&DSM) measures in the electricity distribution sector in the country. The FOR in its Report on DSM and Energy Efficiency recommended BEE to undertake several tasks on priority. In this regard, BEE appointed ABPS Infrastructure Advisory for providing consultancy support to BEE/FOR on a retainer basis. As a part of this assignment, BEE and FOR have identified following seven activities as 'priority' activities for ABPS Infra.

- Activity A: Report on Institutionalising DSM Process
- Activity B: Organisation of Workshop
- Activity C: Development of DSM Regulations
- Activity D: Manual on Cost Benefit Analysis of DSM programmes based on principles of DSM Regulation
- Activity E: Manual on development of standard process for design, development and implementation of DSM programmes
- Activity F: Report on tariff restructuring and impact assessment
- Activity G: Manual on Monitoring and Verification protocol for DSM programmes

This Report which deals with the Activity on Institutionalisation of DSM process is the first of the seven deliverables.

1.1 Institutionalising EE&DSM in utility sector in India

Demand Side Management (DSM) is described as the planning, implementation and monitoring of utility's activities designed to encourage customers to amend their electricity consumption patterns, both with respect to timing and level of electricity demand so as to help the customers to use electricity more efficiently. Various

factors such as increasing economic activity and population growth are resulting in additional pressure on ever increasing power demand when the country is already facing power shortage. In such a scenario, DSM can complement supply-side strategies to help meet electric service demands by assisting utilities avoid or delay costly capacity additions by slowing demand growth. To promote DSM, the Government is continuously introducing various policies and programmes targeting different sectors such as appliances, buildings, industries, etc. Despite these policies, the potential remains largely unrealized due to various technical, financial, economic, and institutional barriers.

Of these barriers, institutional barrier is probably the most important as without proper institutional mechanism it is not possible to undertake large scale DSM implementation. Further, institutional barriers take long period to overcome. Therefore, institutionalisation of EE & DSM has been identified as priority area by Forum of Regulators and Bureau of Energy Efficiency. In this Report, we have identified institutional barriers, regulatory framework causing these barriers and potential options for removal of these barriers.

The objective of the study is to assess institutional set up envisaged under regulatory and policy framework for DSM activities and the existing institutional structures at the State level for implementation of EE&DSM initiatives. On the basis of this assessment, we have identified the gaps in institutional structure for large scale deployment of DSM in the country and have suggested the options to fill the gaps in institutional structure.

1.2 Approach and Methodology

A multipronged approach involving preliminary research, discussions with stakeholders and an in-depth research and analysis was adopted for designing an appropriate institutional mechanism for the large scale deployment of EE&DSM in the country. The approach adopted involved developing understanding of a model DSM framework and comparing it with the existing framework to identify deficiencies in the latter. The need for additional institutional requirement to

overcome these deficiencies has been studied and accordingly options have been identified.

Preliminary research was undertaken through combination of literature review and analysis of regulatory & policy framework. The literature review was aimed at assessment of current status of EE&DSM in identified States. For this purpose, ABPS Infra identified four States in consultation with the BEE/FOR. Under regulatory and policy review, relevant provisions in the Energy Conservation Act 2001 (EC Act), EA 2003, National Electricity Policy (NEP), Tariff Policy, Integrated Energy Policy Report (IEPR), and National Action Plan for Climate Change (NAPCC) with regard to EE&DSM were reviewed. The objective of the review was to identify the roles and responsibilities assigned to various institutions and to identify the institutional gaps with regard to DSM implementation in India.

In the next phase, we carried out primary research by visiting various stakeholders in identified States in the country. ABPS Infra visited senior officials within the key stakeholders such as the Regulatory Commissions, distribution utilities and the State Designated Agencies. To ensure structured, consistent and coherent data collection from the various stakeholders, the discussions were directed using pre-developed questionnaires for each stakeholder. The data and information collected during preliminary review as well as 'one on one' discussions with different stakeholders in the identified States was analysed to identify existing DSM framework adopted in India for DSM implementation. Further, based on the review of international literature we developed model DSM framework which encompasses all activities that may have to be carried out for the deployment of DSM programmes in the State. The framework was then compared with the existing DSM framework and gaps in the institutional structures were identified. Various options to address these institutional gaps were identified and evaluated.

1.3 Analysis of DSM Institutional framework

In the current scenario, implementation of DSM measures has always been ad-hoc and holistic view has been rarely taken in the country on design, development and implementation of DSM measures. This is one of the reasons that DSM has not been able to gain the required momentum in India. Now, given the issues related to global warming and climate change, there is a renewed thrust on DSM in the country. Need for implementation mechanism for large scale sustainable deployment of DSM programmes is being felt. It has been appreciated that there may not be capacity within several existing institutions to undertake specialised tasks required for DSM implementation.

On the basis of the preliminary review, a model DSM framework has been developed and activities/functions that need to be undertaken in a model DSM framework have been identified. Some of these activities or functions are technical potential assessment, goal setting, load and market research, preparation and approval of DSM plan and projects, implementation, monitoring and reporting, EM&V, etc. The DSM processes currently being undertaken in India have been mapped onto the model framework to identify the functional gaps. While doing so, institutions currently responsible for the functionalities have also been mapped on the model DSM framework. We have also tried to identify the functions and institutions under the Model DSM framework which are being undertaken currently. Subsequently, we have identified activities/functions that are not being undertaken by any of the existing institutions. The following figure (Figure 1-1) maps activities under the model DSM framework with existing activities and institutions responsible for performing those activities. Consequently, the activities that are not being undertaken by any of the existing institutions have been identified.

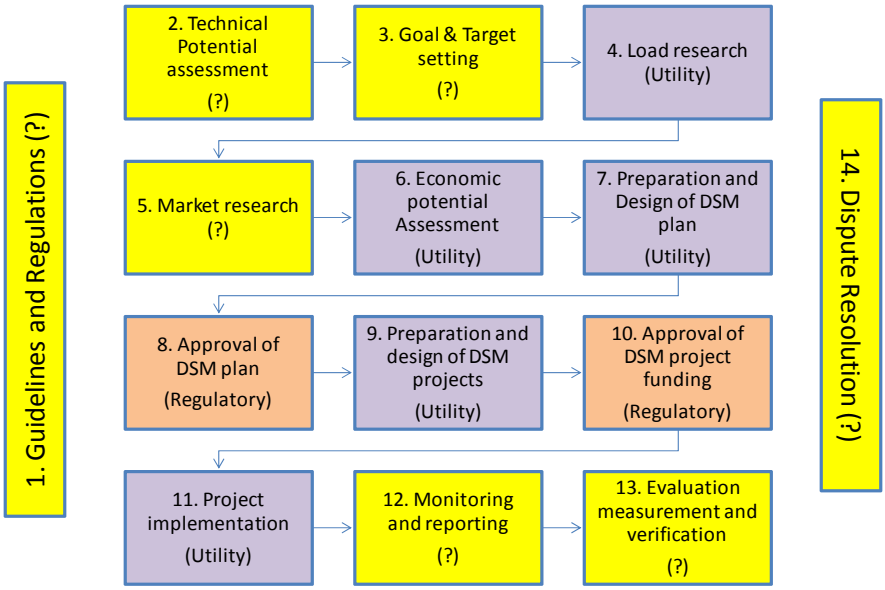

Figure 1-1 Comparison of Model DSM framework with actual DSM framework

This comparison of model and existing DSM framework indicates the deficiencies in regulatory & policy framework as well as in institutional framework.

It is evident that one of the reasons for non-deployment of larger scale DSM programmes is the deficiencies in the existing regulatory and policy framework. These deficiencies include absence of requirement for distribution utilities to take up DSM measures; absence of clear mandate to the SERCs to ensure development and implementation of DSM programmes; absence of Regulations/guidelines for design, development and implementation of DSM activities. In the absence of an overall target/goal, DSM programmes are undertaken on piecemeal basis.

Further, comparison of the model DSM framework and existing DSM process highlights that in the existing DSM framework, some activities are not being undertaken by any institution. These activities are technical potential assessment; goal and target setting; market research; development of guidelines for preparation and design of DSM plan/projects, monitoring and reporting; EM&V, etc. It is necessary to identify institutions to undertake these activities.

Another reason for non-deployment of larger scale DSM programmes is lack of capacity within institutions such as distribution utilities and SERCs. It will be necessary to identify 'capacity building' requirements against their anticipated roles under model DSM framework. However, for that purpose, it is necessary to finalise the institutional framework for DSM implementation. ABPS Infra suggests that the exercise to identify 'Capacity Building and Training Needs Analysis' may be undertaken by BEE/FOR as soon as clarity emerges on likely DSM institutional framework.

1.4 Proposed institutional framework

Currently, the key players in design and implementation of DSM measures are distribution utilities and SERCs. Though, the State Designated Agencies carry out energy efficiency related activities, the SDAs are rarely involved in DSM related activities.

As a part of this assignment, we have clearly identified the list of activities in the model DSM framework which are not being undertaken by any institution. We propose to call this set of functions as 'DSM Executive Functions' and the entity on which these functions may be entrusted as 'DSM Executive Agency'. Several options are available to house this 'DSM Executive Agency' (DSM EA). We have identified following four major options for the same:

a. Separate entity incorporated under the appropriate statute
b. Part of State Electricity Regulatory Commission
c. Part of the State Designated Agency
d. Part of the Distribution Utility

These options have been briefly discussed in the following paragraphs.

- **Option 1: Separate Entity incorporated under Appropriate Statue:** Given that some of the activities identified above are not being undertaken by any institution currently, it may be possible to create separate entity with specific responsibility to execute some or all of those activities. Such an entity will be a

new independent entity without any past baggage. As a result, the entity will able to focus on the activities envisaged for it. Ownership of such an entity could be in private or public domain. However, given the nature of activities it is expected to perform i.e. technical potential assessment, monitoring and verification, it is desirable that such an entity is a public sector entity. The entity, if structured properly, may be able to draw private sector talent to execute the tasks. However, it may be difficult to create new entity only for this activity as role of this new institution will be extremely limited. Further, the ownership and funding of such an entity could be an issue. Individuals working in this entity will have limited career opportunities because of limited scope of work of this entity. The activities envisaged under this entity are the ones that are not being undertaken by any of the existing institutions in any of the States. Given the unclear and undefined territory of activities for a separate new entity, capacity building may emerge as one of the major issues.

- **Option 2: Part of State Electricity Regulatory Commission:** The second option that has been explored with respect to creation of DSM EA is locating this functionality within SERC. In other words, the DSM Cell within SERC may act as 'DSM EA'. In this case, since some of the DSM activities are already being carried out by the SERC, it will have better control over the complete DSM process. Single entity will be responsible for potential assessment, target setting, EM&V, dispute resolution etc. If SERC is given overall control over the DSM process, it will provide certainty to utility about the cost recovery.

  This option appears to be attractive but it is likely to create conflicts. Firstly, inherent conflict would be between some of the DSM functions which are executive in nature and quasi-judicial nature of the SERCs. Since, SERC is a quasi-judicial body; it is desirable that it does not take up executive functions such as DSM potential assessment, monitoring and verification, etc. Further, given the capacity constraint within SERCs, ability of SERC to undertake such wide variety of activities may be an issue.

- **Option 3: Part of State Designated Agency:** The third option that has been explored is, creating DSM EA as a part of State Designated Agency. As discussed earlier, although both utilities and SDAs undertake EE&DSM activities, their activities are rarely coordinated. Currently, there is no institutional mechanism for them to cooperate on DSM related activities. If this institutional gap could be bridged, a stronger institutional structure for EE&DSM will emerge. This option is better suited in comparison to the previous two options for following reasons:
    a. SDA is an entity already identified under statute i.e. EC Act.
    b. Additional responsibility envisaged under 'DSM EA' is complementary to existing role of SDA.
    c. Capacity of SDAs, though limited, already exists and it is more than the institutions proposed under other two options.
    d. Will lead to creation of single point responsibility for EE/DSM related issues at the State level.
    e. Unlike the previous option, in this case the executive function will be effectively separate from the 'Adjudication' function.

  One of the major concerns with this option is the ability of the SDAs to undertake additional responsibility. This issue is closely linked to the issue of constitution of the State Designated Agency. In this regard, ABPS Infra reviewed the report prepared by the National Productivity Council on 'Performance of State Designated Agencies'. As per the report, the SDAs can be divided in to three categories; Renewable Energy Organisation (59%), Electrical Inspector-Cum-Advisor (18%) and Power Distribution Companies (23%). If SDA is a distribution company, its role as SDA and that of a distribution company are likely to conflict. In that case, it may be necessary to change the SDA in that particular state before entrusting any further responsibility related to DSM.

  Further, wherever SDA is an Electrical Inspector cum Advisor, there is significant lack of capacity. The legal structures of the SDAs also differ from one state to another. The institutional capacity issue and the fact that it may not be

possible to implement the proposed structure uniformly across country are two of the major challenges in considering this option.

Option 4: Part of Distribution Utility: The last option that has been explored is creating DSM EA as a part of Distribution Utility. The onus of executing various activities under DSM programme essentially lies with the Distribution Utilities. Some of the activities as identified above are being undertaken by them in some of the States. In addition, some of the activities such as technical potential assessment, market research and monitoring and reporting can well be undertaken by Distribution Utilities. One of the issues that need to be addressed in this option is to bring accountability of the Distribution Utilities to undertake these activities. This can be done through appropriate regulatory mechanism such as DSM Regulations.

Further, the Distribution Utilities can not undertake some of the activities identified under the model framework, such as preparation of guidelines and regulations, goal and target setting, evaluation, monitoring and verification, coordination with Bureau of Energy Efficiency and dispute resolution.

The four options explained above have been further analysed in Figure 1-2 given below:

Parameters	DSM EA: Separate Entity	DSM EA: SERC	DSM EA: SDA	DSM EA: Utility
Specify Guidelines and Regulations	Lacks authority	Best suited	May not have sufficient authority	Lacks authority
Technical Potential Assessment	Depending on resources may develop high competency, though unlikely	Lacks manpower, resources and experience	Although have resources and experience, lacks capability	Best suited
Preparation of Market Research				
Goal setting & Target Setting	Lacks authority	Best suited	Lacks authority	Lacks authority

Evaluation, Measurement & Verification	Independent entity and hence a good option	Not independent, Lacks manpower and capacity	Independent entity with experience, lacks capacity	Not independent agency, not suited
Dispute Resolution	Lacks authority	Best suited	Lacks authority	Lacks authority
Number of dedicated manpower for carrying out above mentioned work	Given limited career opportunities, will not be able to draw good talent	Low	Dedicated officials already working in EE/EC	Some of the States have established DSM Cells, others are following
Knowledge about EE/EC & DSM	Low	Medium	High	Medium/requires capacity building

Figure 1-2 Competency/Authority of the entities proposed under the four options

It can be seen from the Figure above that none of the proposed options for DSM EA is fulfilling the entire requirement on its own. Considering the suitability of Distribution Utilities to undertake various activities under DSM, it appears that it is better equipped to take over most of the executive functions of the DSM EA. However, it will not be able to perform the tasks such as preparation of guidelines, target setting and dispute resolutions. Hence, to ensure that all the tasks identified in the gap analysis are performed by the agency most suitable to execute those tasks, it is proposed to divide tasks between Distribution Utilities and SERC. The tasks of DSM EA may be divided in the following manner

- SERCs may take up the following functions:
  - Preparation of Guidelines & Regulations;
  - Goal and Target Setting;
  - Evaluation, Monitoring and Verification
  - Coordination with Bureau of Energy Efficiency
  - Dispute Resolution;
- Distribution Utility may carryout following activities:
  - Technical Potential Assessment
  - Market Research;

– Monitoring & Reporting

Utility may carry out abovementioned all activities themselves or may consider deployment of an agency for the same. However, it is suggested that utility can give preference to Energy Efficiency Services Limited (EESL) for carrying out these activities. EESL is a joint venture company formed by the State-owned power utilities NTPC, Power Finance Corporation, Rural Electrification Corporation and Power Grid Corporation of India to promote energy efficiency projects in the country. Similarly, keeping in view the lack of capability within SERCs, it is suggested that it can carry out some of the activities such as EM&V through engagement of consultant/third party. However, it is necessary to ensure that agency made responsible for EM&V should be separate from the agencies deployed for carrying out other activities.

The proposed DSM framework with institutions responsible to undertake each activity in the framework is presented in Figure 1-3 below. The activities suggested here may not always flow in the same sequential order. It is an iterative process and the activities are revisited as and when required.

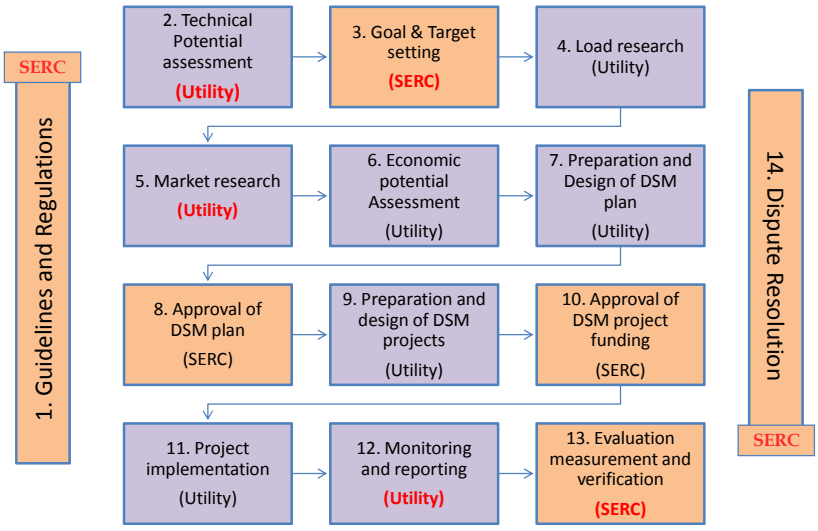

Figure 1-3 Proposed DSM framework

2 BACKGROUND

2.1 Background of the Study

The Forum of Regulators (FOR) created under Section 166(2) of the Electricity Act 2003 (EA 2003) consists of Chairpersons of all State Electricity Regulatory Commissions (SERC) as members with Chairperson of the Central Electricity Regulatory Commission (CERC) as Chairman of the Forum. The FOR has been entrusted with the responsibility to evolve common and coordinated approach to the various issues faced by various Electricity Regulatory Commissions in the country. In order to develop such common and coordinated approach, the FOR has established working groups of members to look into such issues.

In June 2008, the FOR constituted a Working Group on "DSM and Energy Efficiency" to deal with the issues related to implementation of Energy Efficiency and Demand Side Management (EE&DSM) measures in the electricity distribution sector in the country. The FOR invited Director General of Bureau of Energy Efficiency (BEE) as a Permanent Invitee of the Working Group. Further, Bureau was requested to provide secretarial and domain sector expertise to the Working Group. The Working Group met on two occasions in Delhi and Chandigarh and submitted its Report to FOR which was accepted by FOR in September 2008. ABPS Infrastructure Advisory Private Limited (ABPS Infra) provided necessary assistance to the Working Group in preparation of its recommendations. Some of the important recommendations are given below:

1. SERCs should direct all the distribution utilities under their jurisdictions to constitute DSM Cells within their organizations
2. SERCs should also identify some of their staff for handling the DSM aspects
3. SERCs may direct all distribution utilities to submit DSM Plans along with petitions for Annual Revenue Requirement (ARR) for the next tariff period
4. FOR should organize week long training courses in the area of DSM for capacity building of the personnel of the SERCs and the staff of DSM Cells of

the utilities, in which the representatives of the State Governments may also be invited

5. Cost of approved DSM programmes should be allowed as pass-through in ARR. Pre-identified sources of fund such as penal interest on late payment of bills and/or load management charges could be earmarked for financing DSM programmes
6. SERCs could also consider appropriate tariff interventions to support DSM. These could be Time of Day (TOD) tariffs, power factor incentives and penalty/reactive power charges, load management charges, rebate incentives for energy efficient buildings/appliances and differential pricing for agriculture consumers
7. SERCs could also consider giving a slightly higher return on equity for the investments made towards DSM measures
8. Distribution utilities may be encouraged to create their own energy service companies as unregulated activity

In the same Report, FOR recommended BEE to undertake several tasks on priority. Some of the specific recommendations made by FOR to BEE are given below:

- BEE may assist FOR in preparation of draft Regulation for implementation of EE&DSM in electricity distribution sector in India including the guidelines/criteria for evaluation of various DSM proposals. The draft Regulation so prepared may be adopted by FOR as model DSM Regulations. All SERCs may use these model DSM Regulations for framing Regulations for EE&DSM in their respective States.
- BEE may urgently undertake development of Evaluation Measurement and Verification (EM&V) protocols for various DSM programmes, which may be undertaken by utilities
- Agriculture sector is a very important consumer segment from the point of view of DSM. BEE is already facilitating various agricultural DSM programmes
- BEE may continuously interact with FOR to ensure that the proposed DSM programmes are implemented in a successful manner in identified States and

are also replicated in other States. SERCs should provide support necessary to ensure success of such programmes

- Similar steps may be taken by BEE in respect of pilots being tried in different parts of the country for DSM resource bidding
- It is also necessary that information about various DSM implementations is circulated among various utilities. This will help utilities identify programmes suitable for implementation in their areas. BEE is requested to share the case studies initially with SERCs and subsequently with all utilities in the country
- BEE is also requested to develop outreach programme so that learning from various programmes under International Energy Agency – DSM Implementing Agreement (IEA – DSM) are available to Indian utilities.

While some of the abovementioned tasks such as preparation of Draft Regulation are one-time activities, several other activities would require BEE to provide continuous support to FOR. In this regard, BEE appointed ABPS Infrastructure Advisory for providing consultancy support to BEE/FOR on a retainer basis.

2.2 Deliverables & Work Plan

As a part of this assignment, BEE and FOR have identified following seven activities as 'priority' activities for ABPS Infra.

- Activity A: Report on Institutionalising DSM Process
- Activity B: Organisation of Workshop
- Activity C: Development of DSM Regulations
- Activity D: Manual on Cost Benefit Analysis of DSM programmes based on principles of DSM Regulation
- Activity E: Manual on development of standard process for design, development and implementation of DSM programmes
- Activity F: Report on tariff restructuring and impact assessment
- Activity G: Manual on Evaluation Measurement and Verification protocol for DSM programmes

2.3 Outline of the Report

This Report which deals with the Activity A i.e. Institutionalisation of DSM process, is the first deliverable from the above listed seven deliverables. This Report is intended to present the detailed research and analysis undertaken to put forth a potential mechanism for institutionalising EE & DSM in the Indian utility sector. This report is divided into following six chapters.

Chapter 3 of this Report provides the details of the objective of the study and approach and methodology adopted to undertake this activity.

Chapter 4 of the Report presents a review of regulatory and policy framework of DSM in India

Chapter 5 of the Report presents the existing EE&DSM framework in certain identified DSM active States. This chapter provides details of various initiatives undertaken by the existing institutions for EE&DSM (SERCs, SDAs, and Distribution Utilities) in these States

Chapter 6 of the Report provides the international review of administrative structure for energy efficiency programmes in the State of California and Vermont, United States of America.

Chapter 7 of the Report lists down various activities that are a part of a model DSM framework. This chapter presents detailed analysis carried out in order to identify deficiencies in the existing framework vis-a-vis a model DSM framework.

Chapter 8 of the Report discusses various options to overcome the existing deficiencies and identification of additional institutional requirement.

3 APPROACH AND METHODOLOGY FOR THE STUDY

Demand-side management is described as the actions of the utility, beyond the customer's meter, with the objective of altering the end-use of electricity - whether it be to increase demand, decrease it, shift it between high and low peak periods, or manage it when there are intermittent load demands - in the overall interests of reducing utility costs. In other words DSM is the planning, implementation and monitoring of utility's activities designed to encourage customers to amend their electricity consumption patterns, both with respect to timing and level of electricity demand so as to help the customers to use electricity more efficiently.

Various factors such as increasing economic activity and population growth are resulting in additional pressure on ever increasing power demand when the country is already facing power shortage. In such a scenario, DSM can complement supply-side strategies to help meet electric service demands by assisting utilities avoid or delay costly capacity additions by slowing demand growth. Over the past few years, EE&DSM has been identified as a potential option to mitigate power shortages, reduce capital needs for power sector capacity expansion as well as to enhance the energy security of the country.

To promote EE&DSM, the Government is continuously introducing various policies and programmes targeting different sectors such as appliances, buildings, industries, etc. These policies include wide range of instruments such as regulatory directives, voluntary agreements with appliance manufacturers, incentives or subsidies, financing options, education and outreach, etc. Some of the State Electricity Regulatory Commissions have given regulatory directives to distribution utilities to undertake EE&DSM activities. BEE has initiated several initiatives such as Bachat Lamp Yojana, Standards and Labelling programme for appliances, National level agricultural & municipal DSM Programmes, National level certification program for Energy Auditors and Energy Managers, Energy Conservation Awards and Energy Conservation Building Code. The Bachat Lamp Yojana is designed as a public-private partnership between the Government of India, private sector CFL suppliers

and distribution utilities wherein The CFL suppliers would sell high quality CFLs to households at the price of an incandescent bulb. Despite these policies, the potential remains largely unrealized due to various technical, financial, economic, and institutional barriers to EE implementation.

Of these barriers, institutional barrier is probably the most important as without proper institutional mechanism it is not possible to implement large scale DSM implementation. Further, institutional barriers take long period to overcome. Therefore, institutionalisation of EE & DSM has been identified as priority area by Forum of Regulators and Bureau of Energy Efficiency. In this Report, we have identified institutional barriers, regulatory framework causing these barriers and potential options for removal of these barriers.

3.1 Objective of the Study

The objectives of this study are

- To assess institutional set up envisaged under regulatory and policy framework for DSM activities;
- To assess existing institutional structures at the State level for implementation of EE/DSM initiatives;
- To identify gaps in institutional structure for large scale deployment of DSM in the country; and
- To identify appropriate institutional structure to fill the gaps in institutional structure identified above

3.2 Approach and Methodology

A multipronged approach involving preliminary research, discussions with stakeholders and an in-depth research and analysis was adopted for designing an appropriate institutional mechanism for the large scale deployment of EE&DSM in the country. The approach adopted involved developing understanding of a model DSM framework and comparing it with the existing framework to identify deficiencies in the latter. The need for additional institutional requirement to overcome these deficiencies has been studied and accordingly options have been

identified. Various stages of the approach and methodology adopted are presented in Figure 3-1.

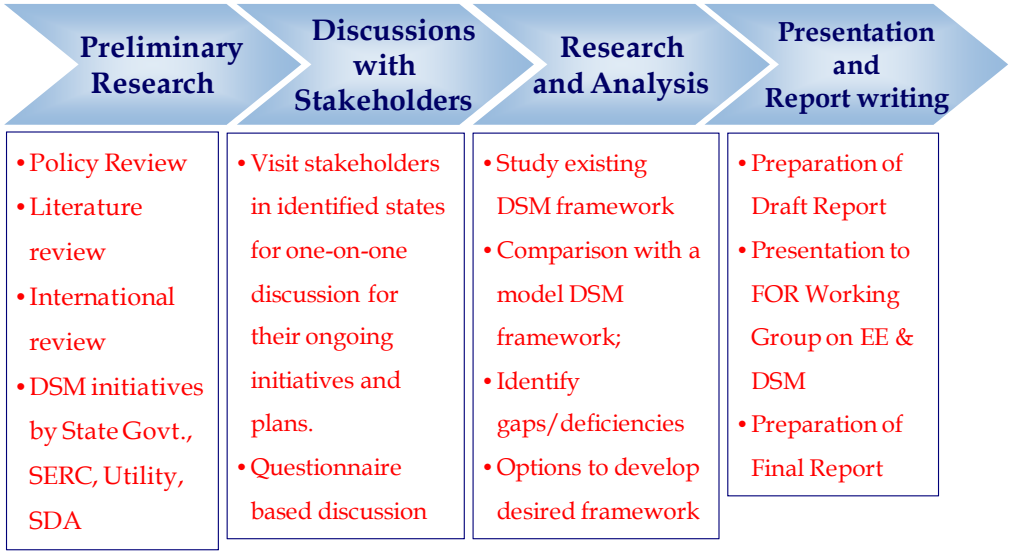

Figure 3-1 Approach and methodology for activity on Institutionalising EE&DSM

In the subsequent paragraphs, we have described in detail our approach for undertaking this Activity.

3.2.1 Preliminary Research

As a part of Preliminary Research, ABPS Infra carried out analysis of current status of DSM implementation through combination of literature review and analysis of regulatory & policy framework. Under regulatory and policy review, relevant provisions in the Energy Conservation Act 2001 (EC Act), EA 2003, National Electricity Policy (NEP), Tariff Policy, Integrated Energy Policy Report (IEPR), and National Action Plan for Climate Change (NAPCC) with regard to EE&DSM were reviewed. The objective of the review was to identify the roles and responsibilities assigned to various institutions and to identify the institutional gaps with regard to DSM implementation in India.

The literature review in this task was aimed at assessment of current status of EE&DSM in identified States. For this purpose, ABPS Infra identified four States in

consultation with the BEE/FOR. These States were Maharashtra, Haryana, Chhattisgarh and Gujarat. The primary criterion for selection of the States was implementation of some DSM measures in the State. Since the objective was to assess the efforts undertaken by these States in implementation of EE&DSM activities, the instruments whether regulatory or market based, through which the efforts have been channelized were studied. For example, regulatory approaches undertaken by Maharashtra Electricity Regulatory Commission (MERC), lighting programme implementation by utilities in Haryana are some of the areas studied as a part of the research. Here, it may be noted that the objective behind this exercise has been to assess the institutional gaps for deployment of DSM in the country and not assessment of effectiveness of individual DSM programme. Therefore, individual DSM implementation has not been assessed for its effectiveness. A snapshot of aspects covered in the preliminary research is given in Figure 3-2.

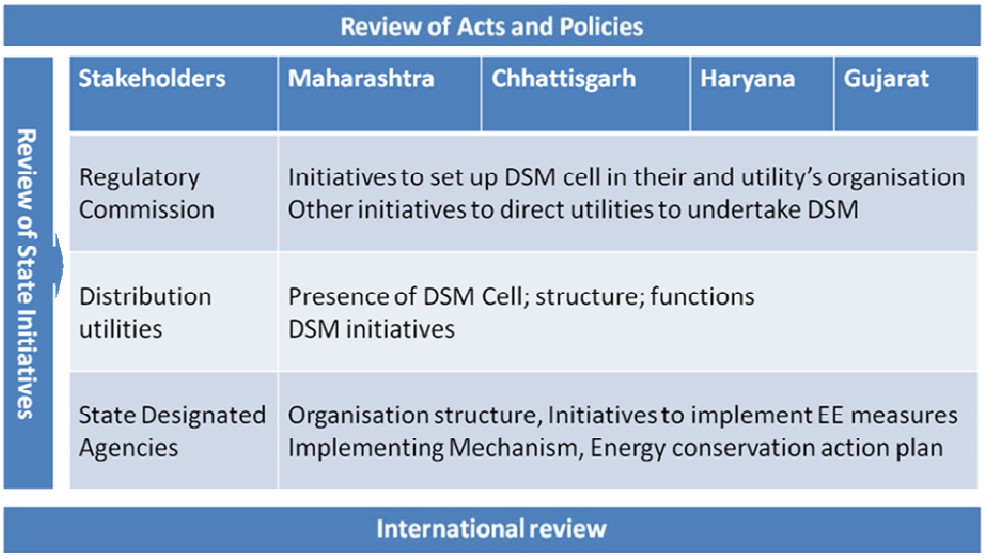

Figure 3-2 Snapshot of aspects to be covered in Preliminary Review

As a part of the study of international best practices, assessment of institutional mechanism in California and Vermont was carried out as DSM has been institutionalised successfully in these States.

3.2.2 Discussion with stakeholders in identified States

While we carried out desktop or secondary research during the earlier phase, in this phase, we carried out primary research by visiting various stakeholders in identified States in the country. This step was critical for the assignment as a practical and implementable approach could not have been developed without strong understanding of the existing efforts towards institutionalisation. Design of new approach required inputs from facilitators and actual implementers of existing DSM projects. This step also proved to be tricky as EE&DSM as an activity has gained momentum in the recent years and institutional structures for DSM are still evolving. Without 'one on one' discussions with various stakeholders, it would not have been possible to get the latest information about their successes and failure as well as ongoing and upcoming plans in the field of EE&DSM.

With this objective, ABPS Infra visited senior officials within the key stakeholders such as the Regulatory Commissions, distribution utilities and the State Designated Agencies. It may be noted that some of the States had multiple utilities operating in different parts of the State. In such cases, we visited two key utilities to understand their perspective and experience with implementation of DSM projects within their area of jurisdiction. Since idea behind stakeholder consultation was to understand the perspective of the utilities, it was not necessary to meet every utility in the State. The stakeholder consultation process was primarily directed at developing understanding of the existing institutional structure, functions performed by DSM cell, if any and suggestions on roles and responsibilities of various other stakeholders to facilitate the whole process. To ensure structured, consistent and coherent data collection from the various stakeholders, the discussions were directed using pre-developed questionnaires for each stakeholder.

3.2.3 Research and Analysis

During this activity, based on the analysis of the data and information collected during preliminary review as well as 'one on one' discussions with different stakeholders in the identified States, we identified existing DSM framework adopted in India for implementation of the DSM programmes. Further, based on the review

of international literature we developed model DSM framework which encompasses all activities that may have to be carried out for the deployment of DSM programmes in the State. The framework was then compared with the existing DSM framework and gaps in the institutional structures were identified. Various options to address these institutional gaps were identified and evaluated.

3.2.4 Presentation and Report writing

Our analysis regarding regulatory and policy issues as well as institutional gaps was presented to DSM & EE Working Group of Forum of Regulators in its meeting held on January 15, 2010. The comments given by FOR Working Group have been taken into consideration. In this Report, we have presented our findings of preliminary review, stakeholders' interactions, research and analysis, gaps in regulatory framework and proposed institutional arrangement for institutionalising EE & DSM for deployment of the DSM in India.

4 REVIEW OF LEGAL, REGULATORY & POLICY FRAMEWORK FOR DSM

Institutional structures are the result of the legal, regulatory and policy framework prevalent in the country. The institutions derive their legitimacy, powers from the legislative provisions and carry out functions as provided in the relevant legislation. Therefore, to identify institutional barriers to implementation of EE & DSM measures, it is necessary to analyse relevant provisions embedded within legal, regulatory and policy framework.

Given that primary objective for this Activity is to identify the institutional gaps in implementation of EE&DSM in India, the Objective of this analysis is to identify the roles and responsibilities assigned to various institutions and to identify the institutional gaps with regard to DSM implementation in India. In order to achieve above mentioned Objective, following Acts and Policies have been reviewed:

- Energy Conservation Act 2001
- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy
- Integrated Energy Policy Report
- National Action Plan for Climate Change

4.1 Energy Conservation Act 2001 (EC Act)

The first major policy initiative in India to coordinate various activities associated with efficient use of energy and its conservation was enactment of EC Act in October 2001. The EC Act provides for efficient use of energy and its conservation and for matters connected therewith. Further, the EC Act provides for creation of Bureau of Energy Efficiency at the Centre level, State Designated Agencies at the State level and Appellate Tribunal for Energy Conservation. The EC Act also defines the roles and responsibilities of these key institutions which are explained below.

Bureau of Energy Efficiency (BEE)

BEE is responsible for spearheading the improvement of energy efficiency in the economy through various regulatory and promotional instruments. Some of the responsibilities of BEE are:

- Plan, manage and implement provisions of the EC Act through
  - Appliance standards and labelling
  - Industrial energy benchmarks
  - Energy Conservation Building Codes
  - Monitor energy use in high energy-consumption units
  - Certify and accredit energy auditors and energy managers
- Provide a policy framework for national energy conservation activities
- Disseminate information and knowledge, and facilitate capacity building, and develop pilot & demonstration projects
- Establish EE delivery systems through Public-Private Partnerships (PPP)

Designated Consumers

A key element of the regulatory function of BEE is the host of activities focused on a set of consumers defined as 'Designated Consumers' under Section 14 (e). Under the EC Act, the designated consumers are required to:

- Undertake energy audit of their plant or factory by an accredited energy auditor;
- Appoint a designated energy manager with prescribed qualifications;
- Enforce prescribed norms and standards;
- Provide information to the state level designated agency;

State Government

Powers entrusted with the State Government include:

- Powers to amend energy conservation building codes to suit regional and local climatic conditions,

- Take measures to create awareness and disseminate information for efficient use of energy and its conservation,
- Take steps to encourage preferential treatment for use of energy efficient equipment or appliances
- Direct 'designated consumers' to comply with efficiency standards, among others.

Based on the analysis of the EC Act, it can be seen that the focus of the EC Act is mainly on 'Market Transformation' driven measures which creates market for energy efficient products. Although the EC Act sets in motion energy efficiency movement in India, it has no reference to Demand Side Management (DSM) or utility involvement in promotion of energy efficiency and conservation in India. Further, as the distribution utilities are designated consumers, they are responsible for energy efficiency and conservation in their own activities but not responsible for 'end use energy efficiency'. The EC Act entrusts the responsibility of 'Adjudicating Officer' on the State Electricity Regulator in case of dispute between Designated Consumer and BEE/SDA. Given that the EC Act does not make any institution responsible for Demand Side Management and/or 'end use energy efficiency', it does not provide institutional mechanism for interaction between BEE and utilities and/or SERCs.

As a part of its activities, BEE has identified several significant opportunities for energy conservation such as domestic lighting, agricultural pumping, and municipal street lighting. However, these opportunities can not be realised without active involvement of distribution licensees and support of the SERCs. It is being felt that SERCs need to develop regulatory framework which will encourage distribution licensees to undertake DSM activities.

4.2 Electricity Act 2003 (EA 2003)

The Indian electricity sector is governed by the Electricity Act 2003, which was enacted on June 10, 2003 by repealing then existing three laws namely, Indian

Electricity Act 1910, The Electricity Supply Act 1948 and The Electricity Regulatory Commissions Act 1998. The preamble of the EA 2003 states:

"…. to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies….".

The preamble to the EA 2003 clearly specifies 'efficiency' and 'promotion of environmentally benign policies' as one of the key objectives of the EA 2003. The following Sections of the EA 2003 translate these objectives in the preamble into operative provisions:

- Section 3(1) (National Electricity Policy and Plan)
  - *"The Central Government shall, from time to time, prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilisation of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy"*
    .
- Section 23 (Direction to Licensees)
  - *"If the Appropriate Commission is of the opinion that it is necessary or expedient so to do for maintaining the efficient supply, securing the equitable distribution of electricity and promoting competition, it may, by order, provide for regulating supply, distribution, consumption or use thereof." (emphasis added)*

- Section 30 (Transmission within a State)
  - *"The State Commission shall facilitate and promote transmission, wheeling and inter-connection arrangements within its territorial jurisdiction for the transmission and supply of electricity by economical and efficient utilisation of the electricity. "(emphasis added)*

- Section 38 2(c) (CTU and functions)
  - *"to ensure development of an efficient, co-ordinated and economical system of inter-State transmission lines for smooth flow of electricity from generating stations to the load centres"*

- Section 42 (1) (Duties of Distribution Licensees and OA)
  - *"it shall be the duty of a distribution licensee to develop and maintain an efficient, co-ordinated and economical distribution system in his area of supply and to supply electricity in accordance with the provisions contained in this Act"*

- Section 61 (c) (Tariff Regulations)
  - *"the factors which would encourage competition, efficiency, economical use of resources, good performance and optimum investment"*

- Part – IX Central Electricity Authority, Section 73 (i) (Functions and duties of Authority)
  - *"collect and record the data concerning the generation, transmission, trading, distribution and utilisation of electricity and carry out studies relating to cost, efficiency, competitiveness, and such like matters"*

- Part X Regulatory Commission, Section 86(2) (Functions of State Commission):
  - *"State Commission shall advise the State Government on all or any of the following matters, namely:-*
    - *(i) promotion of competition, efficiency and economy in activities of the electricity industry;"*

- Part – XVIII Miscellaneous, Section 166 (5) (Coordination Forum):
  - *"There shall be a committee in each district to be constituted by the Appropriate Government...*
    - *(c) to promote energy efficiency and its conservation"*

As evident from the above provisions while EA 2003 has several provisions which require economy and efficiency to be brought into the electricity sector, the Act does not directly mandate any institution to take any specific action to bring in efficiency and economy. Further, Section 86(1) of the EA 2003 which specifies the functions of the SERCs does not contain any specific provision related to EE and DSM. As a result, most SERCs have not taken any initiative in the area of EE& DSM.

Here it may be noted that though the EA 2003 does not entrust responsibility of ensuring efficiency and economy on any particular institution, the Act has provisions, which require key institutions such as SERCs and distribution utilities to promote efficiency and economy in the electricity sector. It should also be noted that some of these issues have been addressed by the Government of India in National Electricity Policy (NEP), a statutory policy under Section 3 of the Act. Relevant provisions of the National Electricity Policy discussed in the following section.

4.3 National Electricity Policy, 2005 (NEP)

Section 86(4) of EA 2003 states that in discharge of its functions, the Commission shall be guided by the National Electricity Policy (NEP) and the National Electricity Plan to be published by the Central Government and the Central Electricity Authority, respectively. The National Electricity Policy notified by the Government of India in 2005 has clear provisions for energy conservation and demand side measures. Under Section 5.9.2 of the National Electricity Policy, the Government of India has mandated BEE to initiate Action Plan to implement Demand Side Management and Energy Conservation measures. Section 5.9 of the NEP is reproduced below:

> ***"5.9 ENERGY CONSERVATION***
>
> *5.9.1 There is a significant potential of energy savings through energy efficiency and demand side management measures. In order to minimize the overall requirement, energy conservation and demand side management (DSM) is being accorded high priority. The Energy Conservation Act has been enacted and the Bureau of Energy Efficiency has been setup.*

5.9.2 The potential number of installations where demand side management and energy conservation measures are to be carried out is very large. Bureau of Energy Efficiency (BEE) shall initiate action in this regard. BEE would also make available the estimated conservation and DSM potential, its staged implementation along with cost estimates for consideration in the planning process for National Electricity Plan.

5.9.3 Periodic energy audits have been made compulsory for power intensive industries under the Energy Conservation Act. Other industries may also be encouraged to adopt energy audits and energy conservation measures. Energy conservation measures shall be adopted in all Government buildings for which saving potential has been estimated to be about 30% energy. Solar water heating systems and solar passive architecture can contribute significantly to this effort.

5.9.4 In the field of energy conservation initial approach would be voluntary and self-regulating with emphasis on labelling of appliances. Gradually as awareness increases, a more regulatory approach of setting standards would be followed.

5.9.5 In the agriculture sector, the pump sets and the water delivery system engineered for high efficiency would be promoted. In the industrial sector, energy efficient technologies should be used and energy audits carried out to indicate scope for energy conservation measures. Motors and drive system are the major source of high consumption in Agricultural and Industrial Sector. These need to be addressed. Energy efficient lighting technologies should also be adopted in industries, commercial and domestic establishments.

5.9.6 In order to reduce the requirements for capacity additions, the difference between electrical power demand during peak periods and off-peak periods would have to be reduced. Suitable load management techniques should be adopted for this purpose. Differential tariff structure for peak and off peak supply and metering arrangements (Time of Day metering) should be conducive to load management objectives. Regulatory Commissions should ensure adherence to energy efficiency standards by utilities.

5.9.7 For effective implementation of energy conservation measures, role of Energy Service Companies would be enlarged. Steps would be taken to encourage and incentivise emergence of such companies.

5.9.8 A national campaign for bringing about awareness about energy conservation would be essential to achieve efficient consumption of electricity.

5.9.9. A National Action Plan has been developed. Progress on all the proposed measures will be monitored with reference to the specific plans of action.

In nutshell, the NEP further highlights the importance of tapping EE&DSM potential. It also makes following specific recommendations:

1. BEE to undertake additional responsibility of estimating EE&DSM potential along with cost estimates for planning process.
2. It acknowledges that in the field of energy conservation, initial approach would be voluntary and self-regulating followed by a more regulatory approach of setting standards.
3. It specifies that the energy conservation measures should be adopted in Government buildings, but does not place responsibility of doing so on any particular institution.
4. The policy identifies differential tariff structure for peak and off peak supply by distribution utilities as key measures for flattening of the load curve.
5. The Policy provides for strengthening ESCOs, awareness campaigns.

The National Electricity Policy for the first time identifies the role of BEE in the field of Demand Side Management. It also recognises the role of BEE in preparation of National Electricity Plan. It further recognises the role of Regulator in promotion of energy efficiency. However, the NEP does not clearly place the responsibility to initiate the DSM measures on any particular institution. Further, it does not identify the institutional structure required to implement DSM projects in the country. In short, while NEP brings more clarity on role of BEE, it does not provide institutional structures that may be required to ensure design, development and implementation of DSM in the country.

4.4 Tariff Policy

The objectives of the Tariff Policy are to:

(a) Ensure availability of electricity to consumers at reasonable and competitive rates;

(b) Ensure financial viability of the sector and attract investments;

(c) Promote transparency, consistency and predictability in regulatory approaches across jurisdictions and minimise perceptions of regulatory risks;

(d) Promote competition, efficiency in operations and improvement in quality of supply.

While the Tariff Policy provides for Time of Day tariffs, it does not have any specific provisions related 'Demand Side Management' or 'Energy Efficiency'.

4.5 Integrated Energy Policy Report (IEPR)

In August 2006, the Planning Commission of India released the Integrated Energy Policy Report (IEPR) prepared by its Expert Committee. The IEPR targets sustainable development and covers all sources of energy and addresses all aspects of energy use and supply including energy security, access and availability, affordability and pricing, as well as efficiency and environmental concerns. Chapter VI of the IEPR, 'Policy for Energy Efficiency and Demand Side Management' not only restates the importance of EE and DSM and provisions already specified in the above-mentioned Policies, but also suggests various policy initiatives. Two of these initiatives are given below:

1. Regulatory Commissions can allow utilities to factor EE/DSM expenditure into the tariff.
2. Each energy supply company/utility should set-up an EE/DSM cell. The BEE can facilitate this process by providing guidelines and necessary training inputs. A large number of pilot programmes that target the barriers involved and have low transaction costs need to be designed, tested with different institutional arrangements, with different incentives, and with varied implementation strategies. Innovative programme designs can then be rewarded.

Further, the IEPR has also suggested technology based initiatives and the process for implementing various DSM measures. Further, IEPR specifically admits the need to develop large number of pilot DSM programmes and implement them with different institutional arrangements. The IEPR does not make any specific recommendation on institutional arrangement to be deployed for implementation of DSM programmes in the country.

4.6 National Action Plan for Climate Change (NAPCC)

The National Action Plan for Climate Change was announced by the Honourable Prime Minister of India on June 30, 2008, which gives significant importance to energy efficiency and implementation of DSM programmes. One of the principles of NAPCC is to devise efficient and cost effective strategies for end-use Demand Side Management. One of the eight Missions of the Plan is the National Mission for Enhanced Energy Efficiency (NMEEE). The four pillars of the NMEEE are:

- Market based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive industries through certification of energy saving that could be traded;
- Accelerating the shift to energy efficient appliances in designated sectors and to make the products more affordable;
- Creation of mechanisms that would help finance demand side management programmes;
- Development fiscal instrument to promote energy efficiency.

National Mission on Sustainable Habitat is another programme, which is being designed to ensure optimal usage of energy in the residential and commercial sector:

"Energy Conservation Building Code, which addresses the design of new and large commercial buildings to optimize their energy demand, will be extended in its application and incentives provided for retooling existing building stocks."(emphasis added)

4.7 Gaps in current regulatory framework for DSM

Analysis of the existing regulatory and policy framework illustrate that although the importance of EE&DSM has been identified at the policy level, a strong regulatory framework for successful implementation of DSM is still absent. Some of the gaps in this framework that emerge from the analysis are enumerated below:

- There are no specific provisions related to DSM implementation in two major Acts (EC Act & EA 2003) governing the electricity sector;
- The National Electricity Policy, a Statutory policy under EA 2003 refers to DSM but fails to provide clear guidance on institutional framework or process of deployment;

- Tariff Policy, another statutory policy provides for ToD tariffs and other tariff related measures without referring to DSM;
- Other policies such as IEPR & NAPCC, though have specific provisions, are not statutory in nature, hence not binding on key institutional players

5 EXISTING DSM INSTITUTIONS AND INITIATIVES IN IDENTIFIED INDIAN STATES

To be able to identify the most appropriate institutional framework for DSM in India, it is necessary that we understand the status of EE&DSM initiatives undertaken by existing institutions and identify barriers faced by those institutions and the lessons which can be learnt. For this purpose, we identified four States viz, Maharashtra, Haryana, Chhattisgarh and Gujarat. An approach involving secondary research through literature survey and primary research with 'one on one' meetings with key stakeholders was adopted to collect information on EE&DSM initiatives undertaken by these States. For 'one on one' meetings with key stakeholders, questionnaires were developed which addressed the following aspects with respect to each of the stakeholder:

- State Electricity Regulatory Commission
  - Directives, Guidelines to distribution utilities
  - Tariff based incentives/penalties for DSM
  - Recovery of DSM related costs through ARR
  - Capacity building initiatives in SERC and the distribution utility;
- Distribution Utility
  - Presence of DSM Cell; structure; functions
  - DSM initiatives; implementation mechanism; challenges
  - Need for other stakeholder support e.g. SDAs
- State Designated Agencies
  - Organisation structure for EE&DSM
  - Implementing Mechanism
  - Study of energy conservation action plan
  - Need for other stakeholder support while implementation e.g. Distribution Utility

The following sections present our analysis of the abovementioned issues for each State.

5.1 Maharashtra

Maharashtra is the pioneering State in the country to undertake EE&DSM activities. The Maharashtra Electricity Regulatory Commission (MERC) was established in August 1999, under the erstwhile Electricity Regulatory Commissions (ERC) Act, 1998, with the powers to determine tariffs, regulate power purchase, and promote competition, efficiency and economy in the electricity sector. Subsequent to the enactment of the EA 2003, the powers of MERC have been broadened, and several Regulations like Standards of Performance, Supply Code, etc., have been notified. The consumers in the State of Maharashtra are supplied electricity by one of the following five distribution licensees:

1. Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL)
2. The Tata Power Company Ltd (TPC)
3. Reliance Energy Ltd. (REL)
4. Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST)
5. Mula – Pravara Electric Cooperative Society (MPECS)

Out of the abovementioned five entities, all utilities except MPECS supply power in different parts of Mumbai while MSEDCL supplies power in entire Maharashtra except part of Mumbai which is supplied by TPC, REL and BEST. Maharashtra thus, has the most varied mix of distribution utilities in the country, which has the presence of two private distribution licensee, the largest (in terms of sales and revenue) public sector distribution licensee in the country, one local authority vested with the distribution licence, and finally one rural co-operative distribution licensee.

Further, in exercise of power conferred under clause (d) of section 15 of EC Act, the Government of Maharashtra has designated Maharashtra Energy Development Agency (MEDA) to coordinate, regulate & enforce the provisions of EC Act within the State of Maharashtra in March 2003. MEDA also operates as State Nodal Agency of the Ministry of New and Renewable Energy in the State of Maharashtra.

In the following sub-sections, various EE&DSM initiatives undertaken in the State by these organisations are discussed.

5.1.1 Maharashtra Electricity Regulatory Commission (MERC)

MERC recognised the importance of end-use EE&DSM in the overall context of the huge demand-supply mismatch prevalent in the State of Maharashtra which was resulting in consumers facing prolonged hours of load shedding. MERC has been actively promoting efficient utilisation of electricity, its conservation and DSM as a power shortage mitigation strategy, by exercising the power vested in it to regulate supply, distribution, consumption or use of electricity in times of exigencies under Section 23 of the EA 2003. Various initiatives undertaken by MERC have been summarised in the following paragraphs:

A) Directives / guidelines for distribution utilities in the State

- *Directive to prepare DSM Plan and undertake DSM & EE/EC Programmes*

The Commission, in its Order dated March 4, 2005, on a petition filed by a consumer organisation seeking the Commission's direction to the largest distribution Utility in the State (MSEDCL) to undertake steps, including implementation of DSM and EE programmes, to ward off load shedding that was being resorted to by MSEDCL to balance its demand-supply situation; directed MSEDCL to submit a DSM plan for capturing energy conservation (EC) and energy efficiency (EE) potential in various electricity-consuming sectors in Maharashtra. Subsequently, when the prospect of a prolonged phase of load shedding began to loom large over the city of Mumbai, which hitherto had not witnessed load shedding, the Commission directed the distribution utilities supplying power in Mumbai city, viz., BEST, REL and TPC, to prepare DSM plans and undertake DSM and EE/EC programmes.

- *Formation of DSM Cell*

The Commission has directed all distribution utilities in the State to develop necessary infrastructure for implementation, monitoring and verification of DSM programmes. The Commission has also suggested that all distribution utilities in

the State should create a dedicated DSM Cell to carry out various DSM related activities.

- *Load Research*

Distribution Utilities in the State does not have category-wise demand and consumption data beyond the system level demand i.e. data on contribution of sector or segment or end-use or technology to the total demand and consumption, both, in terms of quantum or timing. In the absence of such data, it is difficult to strategise and plan EE&DSM programmes. Consequently, the EE&DSM initiatives undertaken so far by the Utilities in the State have been ad-hoc, and at best have been in the nature of demonstration or pilot projects. Recognising the absence of planning data as a major constraint for speedy development and implementation of full-fledged EE&DSM programmes, the MERC through its Multi Year Tariff (MYT) Orders of April/May 2007, directed all the distribution Utilities in the State to undertake systematic load research and to make load research an integral part of their the day-to-day operations.

- *Recovery of DSM/energy efficiency related costs*

Recognising that the distribution utilities, who are regulated entities, would need to recover costs associated with undertaking of EE&DSM programmes, MERC allowed distribution utilities in the State to specifically recover all costs incurred by the distribution utilities in any EE&DSM related activity, including planning, designing, implementing, monitoring and evaluating EE&DSM programmes through their aggregate revenue requirement.

- *Cost Effectiveness Assessment Guidelines Draft, January 2009:*

It is recognised by MERC that the DSM programmes undertaken by the distribution utilities need to be cost effective for the consumers as well as to the distribution utilities themselves. To ascertain the cost effectiveness of the DSM programmes, MERC has prepared draft guidelines to provide guidance to the distribution utilities for assessing the cost effectiveness of the DSM programmes and thus reduce the uncertainty faced by the distribution utilities in regulatory

approval. Further, this guideline was prepared to reduce the regulatory burden while scrutinising DSM programme proposal from the distribution utilities.

- *Overall Regulatory Framework for DSM*

While MERC had earlier issued directives and guidelines, clarity was necessary on the regulatory framework it would adopt. In response to this requirement, MERC, in June 2009 prepared a draft discussion paper on the Regulatory Framework for DSM. The framework discusses[1]

- Possible policy objectives of MERC vis-à-vis DSM
- Guiding principles of MERC for the DSM efforts in the State
- Eligibility criteria for DSM programmes too be allowed by MERC
- DSM under multi-year tariff regime
- Institutional structure for management of DSM in the State
- Targets and funding levels
- Procedure for approval of DSM plans/programmes
- Criteria for inclusion of DSM programmes in five year DSM plan
- Evaluation, measurement and verification
- Monitoring and reporting
- Post Programme reporting
- Possible contents of a DSM Plan Document
- Possible Contents of a DSM Programme Document

B) Tariff signals

In order to provide appropriate signals to the consumers to adopt EE&DSM measures, MERC deemed it necessary to provide tariff signals to the consumers in higher consumption bracket as well as certain categories of consumers like shopping malls, multiplexes, advertisement hoardings, etc. Accordingly, through the April/May 2007 Multi Year Tariff Orders for distribution utilities in the State, the Commission steeply increased the tariffs applicable to the abovementioned categories by around 80% to 100% with a view to provide them an economic signal to adopt appropriate EE measures. Further, instruments such as 'Time of

[1] Draft Discussion Paper On Regulatory Framework for DSM, MERC, May 2009

Day' tariffs for several categories, Power Factor incentives/penalties and Additional Supply Charge have been used by the Commission for load management.

C) Capacity building within MERC

MERC created a dedicated DSM Cell within itself in early 2006, to facilitate the regulatory processes related to EE&DSM activities. Further, recognising that the distribution utilities in the State have limited experience and knowledge in establishment of EE&DSM programme development, financing and implementation, the MERC provided support and guidance to the distribution Utilities in this regard. Further, the Commission entered into a Memorandum of Understanding (MOU) with the California Energy Commission (CEC), California Public Utilities Commission (CPUC) and Lawrence Berkeley National Laboratory (LBNL) of the United States, to develop its own capacity and also that of the distribution utilities in the areas of load research, integrated resource planning, demand response, etc.

5.1.2 Reliance Energy Limited (REL)

REL incorporated DSM Cell in their organisation in July 2007. The existing Cell is headed by Assistant Vice President and four junior management cadre executives (Fig 5-1). The executives have experience in various fields such as marketing, utility operations, Energy Audits etc. The Cell has submitted various EE&DSM proposals to MERC and is awaiting approval. The Cell keeps in loop other executives of the organisation who are Certified Energy Auditors/Managers, so that as and when the DSM programmes are approved, the resources are available within the organisation. The Cell undertakes various activities including load research, energy audit of consumers, internal office energy efficiency improvements and development of EE&DSM ideas among others.

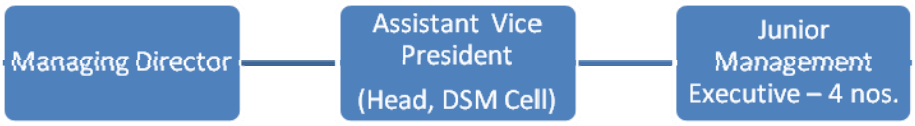

Figure 5-1 Existing DSM Cell structure in Reliance Energy Limited, Mumbai

EE&DSM Initiatives by REL

- Reliance Energy CFL Scheme: The objective of the scheme was demand and energy saving during peak hours. Under the scheme, energy saving CFL worth Rs. 165 was provided at Rs. 63 with monthly instalment of Rs. 7 for 9 months. The scheme was implemented in two phases – pilot scheme and main scheme. 2.05 Lakh consumers participated in the programme and 6.17 Lakh CFLs were distributed. This resulted in energy saving of 16.85 MU per annum and demand saving during peak time of 10.79 MW.
- Energy audit scheme: Under this scheme which is open for any non residential consumer having load > 5kW, initially the consumer pays 25% of the energy audit fees. If the consumer implements 50% of the measures suggested in the audit, the fees is refunded back to the consumer. More than 30 energy audits have already been done.
- Load research and preparation of five year plan: The Cell has completed load research of 2007-08; load research for 2008-09 will be completed by October'09. The REL has appointed consultants to prepare five year plan for the Cell.
- Project on street lights: Under this project, replacement of High Pressure Mercury Vapour (HPMV) with Medium Pressure Sodium Vapour (MPSV) was carried out. Estimated savings in Energy terms is 4.56 million kWh per year and in demand terms it is 1.1 MW.
- Apart from these programmes, REL has also undertaken other programmes such as DSM Bidding for 8th Khar Road through ESCO mode, New CFL programme, Capacitor installation programme, etc

REL implemented most of these programmes through manufacturers with REL negotiating the best price on behalf of the consumers who pay for the equipment/service. Marketing and consumer awareness campaign is also undertaken by REL.

Some of the challenges faced by REL in implementation of programmes include delay in approval of programme by the regulator, prioritisation of programmes and

determination of market scale required to be adopted. Apart from these, M&V is found to be the most challenging aspect of programme implementation.

REL recognises that the utility infrastructure for EE&DSM activities will largely depend on the kind and number of DSM programmes. REL has drafted proposed the following organisation structure for the DSM Cell (Figure 5-2).

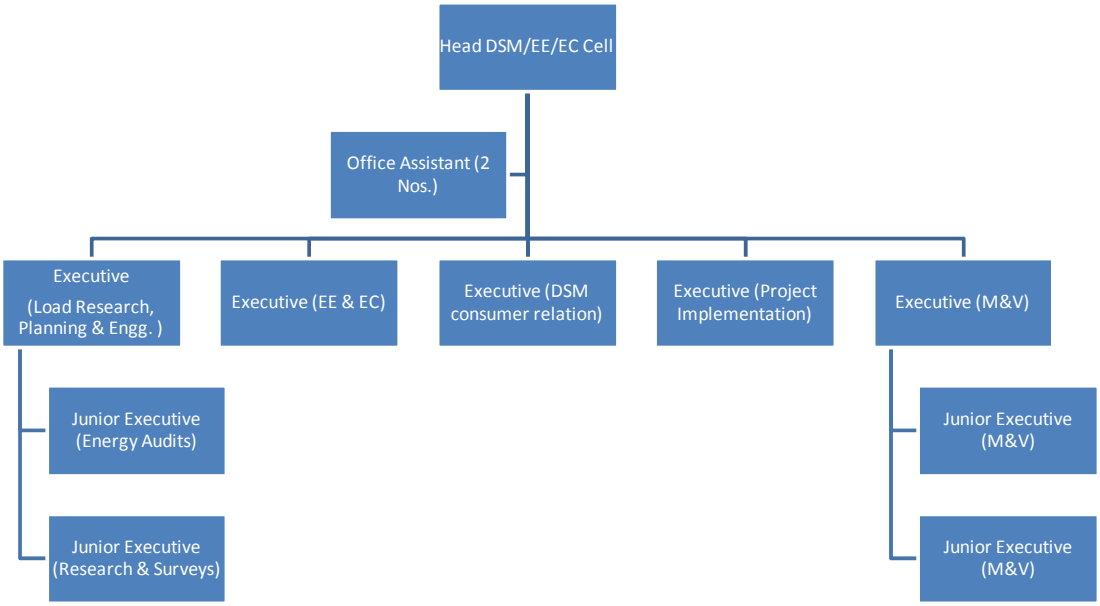

Figure 5-2 Proposed DSM Cell structure

With regard to working with MEDA, the State Designated Agency, REL experienced that the programmes initiated by MEDA are generally restricted to rural areas and are not available for the urban areas. REL recognises that MEDA has very useful database, capacity and experience required for designing EE&DSM programmes and a collaborative approach with it could add significant impetus to the whole efforts.

5.1.3 Tata Power Company (TPC)

In response to MERC directive, TPC incorporated DSM Cell in March 2008. The existing Cell consists of three members with experience in generation, transmission and distribution businesses all of whom are Electrical Engineers. One member of the team is also BEE Certified Energy Auditor. The Cell also keeps in loop other

executives of the organisation who are Certified Energy Auditors/Managers so that as and when the DSM programmes are approved, the resources are available within the organisation. TPC recognises that as and when DSM programmes are approved by MERC, more team member will be required for implementation.

The Cell undertakes various activities including load and market research, consumer awareness through exhibitions, conferences, energy audit and internal energy efficiency improvements among others. TPC has appointed a consultant for formulation of three year plan for EE&DSM activities. TPC undertook a demonstration project in lighting sector which involved replacement of T-8 fluorescent lamps and conventional ballasts by T-5 fluorescent tubes with electronic ballasts. 50,000 tube lights were replaced in the LT commercial and LT industrial consumers' premises. One of the major ongoing activities in TPC is in-house lighting improvement programme. Total of 1800 FTLs are being replaced by T-5 and electronic ballast. Floor wise Central Monitoring System (CMS) has been put in place and feeders for lighting, personal computer and air-conditioning load have been separated.

The challenges faced by TPC are primarily implementation challenges such as availability of premises only on weekends, changes required to false ceiling, need of direct supervision, improper wiring in old building and LT commercial consumers where building is on lease, etc. One of the areas where TPC expects challenges is independent Monitoring and Verification. TPC is of the opinion that in future independent agency may be required to undertake M & V.

5.1.4 Brihan Mumbai Electric Supply & Transport Undertaking (BEST)

In response to the MERC directive, BEST incorporated DSM Cell in its organisation in June 2008. The existing Cell is a three member team with experience in distribution business in the electricity sector (Figure 5-3). All the members of the team are Electrical Engineers/diploma while one of them is also BEE Certified Energy Auditor. The Superintending Engineer is responsible for M&V activities and Assistant Engineer for implementation of ongoing DSM projects.

Figure 5-3 Existing DSM Cell Structure in BEST

The cell proposes to undertake various activities including load research, DSM potential assessment, and preparation of DSM plan, implementation and M&V activities. BEST is also considering appointment of consultants for carrying out these activities.

One of the programmes proposed by the BEST is replacement of 40 W FTLs having electromagnetic chokes with 36 W FTLs having electronic chokes in Mumbai Municipal Corporation Hospitals. This programme is being financed through the Load Management Charges Fund. As part of the M&V, sample of 30 per 1000 FTLs will be taken. The wattage of the old tube-light will be measured and hours of usage will be metered through hour meter. BEST is in the process of developing DSM programme for high-rise building for which it has already undertaken energy audit of water pumping systems in ten high rise buildings.

Some of the challenges faced by BEST include requirement of energy auditors and staff at lower levels. BEST has been participating in FOR training programmes for capacity building. BEST believes it has in-house capacity for undertaking M&V activities and shall seek consultants support for financial matters.

5.1.5 Maharashtra Energy Development Agency (MEDA)

Registered as a Society in July 1985, MEDA as an organization commenced functioning from July 1986. MEDA's objective is to undertake development of renewable energy and facilitate energy conservation in the State of Maharashtra. MEDA is a state nodal agency under the umbrella of the Ministry of New and Renewable Energy (MNRE). Further, in March 2003, in exercise of power conferred under Section 15(d) of the EC Act, the Government of Maharashtra has designated

MEDA as State Designated Agency to coordinate, regulate & enforce the provisions of EC Act. Therefore, it is MEDA's prime responsibility to carry out energy conservation activities in the state of Maharashtra. The organisation structure within MEDA responsible for energy conservation activities in the State is shown in Fig 5-4.

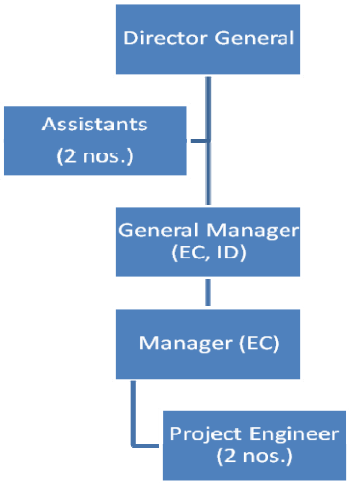

Figure 5-4 Organisation Structure of EC officials in MEDA

Some of the activities initiated by MEDA are explained below:

Strategic Action Plan

The MEDA, consistent with its responsibility as State Designated Agency, has developed and released Strategic Energy Conservation Plan as a blueprint for energy conservation activities in the State of Maharashtra. This Plan, which develops mechanisms to balance the State's electricity supply and demand includes the following key elements:

- Statutory responsibilities of MEDA under the EC Act
- Implementation of a set of Energy Conservation Programmes
- Establishment of an Energy Conservation Fund
- Development of databases and promotional campaigns
- Capacity building for development, implementation and evaluation of energy conservation programmes

Energy Conservation Programmes

To achieve the objectives set out in Strategic Energy Conservation Plan, MEDA has developed a set of proactive energy conservation programmes. These programmes will be implemented in cooperation with the relevant state government agencies and the private sector. The 11 programmes for which MEDA has already developed preliminary designs are as follows

1. Home Bright : Residential high efficiency lighting programme (Replacement of Incandescent Lamp by Compact Fluorescent Lamp (CFL))
2. Agricultural Efficiency: Installation of capacitors on pump sets
3. Bright Streets: Municipal Street Lighting using advanced technology
4. Municipal Energy Efficiency programme: Improvement of energy efficiency in municipal pumping and street lighting
5. SME Programme: EE improvement in small and medium enterprises
6. Public Buildings Partnership Programme: Energy efficiency implementation in public buildings using ESCOs as the implementing mechanism
7. Green Buildings Programme: Cooperate with existing Green Buildings Centre; construct one or two new Green Buildings in Maharashtra
8. Solar Water Heating: Solar Water Heating Programme
9. Work Bright Programme: Commercial High-Efficiency Lighting Programme
10. Motor RE-Power: High Efficiency Motor Rewinding Programme
11. Financing of EE improvement using the Energy Conservation Fund
12. Awareness Programme on Energy Conservation and Electrical Safety

State Level Energy Conservation Committee

In order to guide MEDA on matters related to Energy Conservation Policy, Government of Maharashtra has constituted State Level Energy Conservation Committee in April 2005 under the Chairmanship of Principal Secretary (Energy) and 15 members from various government departments and energy sector.

Potential Assessment

MEDA has also carried out assessment of potential for energy conservation in the State. As per MEDA assessment,

- The greatest consumer of electricity in Maharashtra is the industrial sector. It consumes about 37.58% of the total generated energy. The potential for energy conservation in this sector is 25%, which means avoided capacity of 726 MW.
- The agriculture sector consumes about 18.82%of the total generated energy. The potential for energy conservation in this sector is 30 per cent, which means avoided capacity of 436 MW.
- The commercial sector consumes about 9.47 per cent of the total energy generated. The potential for energy conservation in this sector is 30 per cent, which means avoided capacity of 220 MW.
- The domestic sector consumes about 25.65 per cent of the total generated energy. The potential for energy conservation in this sector is 20 per cent, which means avoided capacity of 396 MW

Other Activities undertaken by MEDA to implement EC Act 2001

- Industry energy audit is continuing activity since 1987
- MEDA signed MoU with IIEC for DSM under ECO II Project of USAID.
- DSM study in Nashik and Thane Municipal corporations.
- Save Energy Programme Status: 379 industrial energy audits which resulted in saving of energy worth Rs. 27.61 crore
- MEDA signed MoU with Alliance to Save Energy (ASE) and United States Asia-Environmental Partnership (USAEP) for energy audit in Pune Municipal Corporation
- Taking massive awareness programme for energy conservation
- Energy efficiency awards instituted for different sectors

5.2 Haryana

Haryana was the second State in India to initiate the process of Reform & Restructuring of the power sector in India. Haryana Electricity Regulatory Commission (HERC) was established on 17th August 1998 as per the provisions of

the Haryana Electricity Reform Act, 1997. Under the reform process, Haryana State Electricity Board (HSEB) was unbundled into two corporate bodies namely Haryana Power Generation Company Limited (HPGCL) for the Generation of Power and Haryana Vidyut Prasaran Nigam Limited (HVPNL) for the Transmission & Distribution of power within the state of Haryana. Subsequently, with effect from 1st July 1999, the activity of distribution and retail supply of power has been entrusted, to Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL) for north and Dakshin Haryana Bijli Vitran Nigam Limited (DHBVNL) for south circles of Haryana.

Further, the Government of Haryana has designated the Department of Renewable Energy as the Designated Agency to co-ordinate, regulate and enforce the provision of the EC Act in the State of Haryana. The Haryana Government has identified energy conservation as one of the thrust areas and many initiatives have been taken in this regard. In the following sub-sections, various EE&DSM initiatives undertaken by various organisations in the State are discussed.

5.2.1 Haryana Electricity Regulatory Commission (HERC)

HERC has issued directives in its tariff orders to distribution utilities to undertake various EE & DSM measures. Though the Commission does not have DSM Cell it has been very active in pursuing EE&DSM initiatives and has issued several directives/guidelines to the utilities in the State.

Guidelines

The HERC issued Guidelines for Load Forecasts, Resources Planning, and Power Procurement Process for compliance by the licensees as provided in transmission and Bulk Supply Licence and Distribution and Retail Supply Licence in July 1999. Section 2.3(a) of the guidelines state: *The Commission may from time to time specify particular matters which should be dealt with in the Load Forecasts .These shall include, inter alia, the following:*

a) *Demand Side Management (DSM) programmes and anticipated increases in end use efficiency. HVPNL and Distribution and Retail Supply. Licensees shall co-ordinate the planning and implementation of their respective DSM programmes.*

The Demand Side Management Programmes have been defined in the guidelines as *"These are programmes introduced and administered by electricity supply companies with the object of encouraging more economical and efficient use of power, as an alternative to increasing supply. While the programmes may include any action which reduces demand, including more efficient use of energy by the utility itself, DSM usually emphasises involvement of the end user. The programmes may utilise rates, for example, time of day tariffs that encourage customers to shift their consumption to the lower cost part of the load curve or tariffs linked to metering that discourage excessive power consumption."*

Directives to Utilities

The Commission in its Tariff Order 2003-04 directed the licensee to establish DSM Cell for proper monitoring of DSM activities. An annual report was required to be submitted to the Commission by 30th April every year. However, no such report was submitted. The Commission directed the utilities in Tariff Order 2004-05 to comply with this direction of the Commission. Subsequent orders of HERC are silent on the issue of DSM directives and their implementation.

5.2.2 Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL)

While UHBVNL has undertaken several DSM programmes, it is yet to establish dedicated DSM Cell. Currently, all programmes are being undertaken in decentralised manner under direct control of the Managing Director of the company. The Utility is planning to constitute a Cell with SE level officer who may report to either Haryana Power Procurement cell or directly to Managing Director.

EE&DSM Initiatives by UHBVNL

- UHBVN started CFL distribution with BPL consumers, which it subsequently extended to all the domestic consumers. As on June 2009, it has distributed around 75000 CFLs of 14 W each.
- AP feeder separation is at completion stage. Rescheduling of supply to AP feeders in staggered manner is expected to reduce peak significantly.
- UHBVN has a major proportion of its energy sales to agriculture consumers. Therefore, it is of vital importance to undertake DSM initiatives in the

agriculture supply. In this regard, UHBVN plans to introduce High Voltage Distribution System (HVDS) in the existing agriculture feeders.

- UHBVN has initiated programme similar to Solapur AgDSM for two feeders in Kaithan sub-division. For pumping efficiency improvement, ESCO mode is being explored.

The Monitoring and verification of savings in terms of energy and rupees has not been done so far by the Utility. The Utility is keen to implement Bangalore Electricity Supply Company's (BESCOM) PF improvement measure at feeder level. With regard to support from other organisations, UHBVN suggested that BEE may depute a competent officer to assist UHBVN in development of EE & DSM plan and to assist in monitoring and verification of DSM projects.

5.2.3 Department of Renewable Energy, Haryana (HAREDA)

In July 2003, the Government of Haryana designated the Department of Renewable Energy, Haryana as the Designated Agency to co-ordinate, regulate and enforce the provision of the EC Act in the State. The organisation structure for energy efficiency and conservation in HAREDA is shown in Figure 5-5.

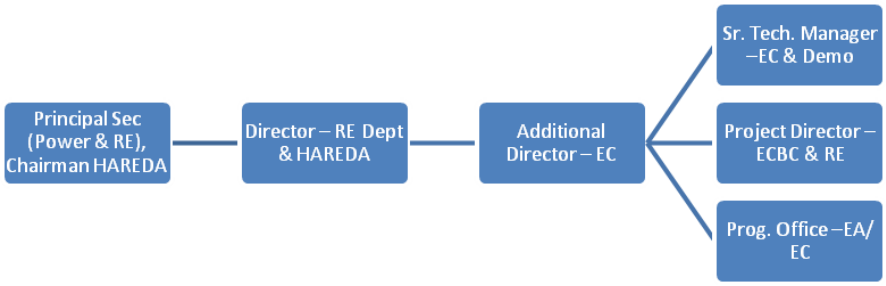

Figure 5-5 Organisation structure of EC officials in HAREDA

The Government of Haryana had issued a comprehensive notification vide Haryana Government Gazette (extra ordinary) in July 2005 for adoption of various energy conservation measures such as, mandatory use of solar water heating systems, Compact Fluorescent Lamp (CFL) & T-5 28 W energy efficient tube lights in Govt. buildings/ Govt. Aided Institutions/ Boards/ Corporations, Use of ISI marked

Motor Pump sets and accessories and promotion of Energy Efficient Building Design in Govt. / Govt. Aided Sector.

In order to monitor the implementation of these energy conservation measures and provisions of the Energy Conservation Act, a State Level Monitoring Committee has been constituted.

EE&DSM Initiatives by HAREDA

- Lighting
  - CFLs and T-5 tube lights in Govt. buildings have been made mandatory and use of conventional bulbs have been banned in govt. buildings. In the existing state government buildings, T5 fixtures and CFLs have been placed through government provided fund. So far 1,12,500 CFLs & 1,14,497 T-5 Tube lights have been replaced with an investment of Rs 5.03crores resulting in annual saving of Rs 9.44crores in the electricity bills translating into an equivalent annual saving of 3.75 MW
  - 702 villages made CFL villages with installation of 6,71,166 CFLs by power utilities and HAREDA.
  - Haryana is the first state in the country to implement EE street lighting in Hisar & HUDA Sectors, Panchkula through ESCO mode
  - With effect from 15th August, 2008, use of CFLs and/or T-5 (28 watt) tube lights and/or Light Emitting Diode (LED) lamps has been made mandatory for all electricity consumers in industrial, commercial and institutional sectors having connected load of 30 kW or above.
- Solar Water Heating System (SWHS)
  - To promote SWHS, rebate up to Rs.300/- per month for three years in electricity bills for domestic users
  - During 2008-09, SWHS of more than 2,00,000 litres capacity was installed resulting in a peak load shaving of 2 MW.
- Energy Audit
  - Survey of 14 designated consumers has been completed and the survey of 715 other consumers and commercial buildings is in progress.
- Promotion of efficient technology

- All Govt. Departments / Boards / Corporations have been instructed to purchase only star labelled products.
- Use of ISI marked pump sets and accessories for new tube-well connections made mandatory.
- Scheme on providing financial incentives on the purchase of ISI marked Pump-sets @ Rs. 400/- per HP of pump with maximum ceiling of Rs. 5000/- per farmer. Up to 2007-08, Rs.1.05 crore has been spent on upgrading 3308 pumps
- Incorporation of energy efficient building design and RE technologies for new Govt. buildings made mandatory.

- Consumer Awareness
  - BURM, Bal Urja Rakshak Mission have been started to educate school children about energy conservation under funding from BEE
  - Awareness campaign has been launched through radio jingles, interactive radio programmes, T.V films, Seminars and Workshops, School Education Programmes & Press advertisements.
  - Internet platform for communication among the stakeholders and BEE is under process

5.3 Chhattisgarh

Chhattisgarh is a new State which was carved out of Madhya Pradesh in November 2000. It is one of the few states in the country, which has a robust power sector since its inception. In the state of Chhattisgarh, the Chhattisgarh State Electricity Regulatory Commission (CSERC) was constituted by the Government of Chhattisgarh vide Notification No. 3190/S/E/2002 dated 23/08/2002 read with Notification No. 432/R/352/03 dated 11/05/2004.

Chhattisgarh State Electricity Board (CSEB) was a statutory body constituted under Section 5 of the since repealed Electricity (Supply) Act, 1948. In January 2009, the CSEB has been unbundled into five independent Companies viz. Holding company, Generation Company, Transmission Company, Distribution Company and Trading Company. Chhattisgarh State Power Distribution Company Limited (CSPDCL) is a

State Power Distribution Company responsible for distribution and supply of electricity in the State of Chhattisgarh.

Chhattisgarh State Renewable Development Agency (CREDA) was established in May 2001 to promote non-conventional and alternative energy sources. CREDA has been constituted under Department of Energy, Govt. of Chhattisgarh for implementation of various schemes pertaining to Renewable Energy sources and Energy Conservation. Registered under The Societies Act 1973, controlling body of CREDA is the governing body with Energy Minister, as Chairman. The Government of Chhattisgarh notified CREDA, as the Designated Agency to coordinate, regulate and enforce the provision of the EC Act and implement schemes under the said Act within the state if Chhattisgarh.

In the following sub-sections, various EE&DSM initiatives undertaken in the State by these organisations are discussed.

5.3.1 Chhattisgarh State Electricity Regulatory Commission (CSERC)

Chhattisgarh State Electricity Regulatory Commission (CSERC) has been proactive in the area of EE&DSM. Considering the ample scope for reducing costs and increasing efficiency in the operation of erstwhile CSEB, the CSERC has given several directives to erstwhile CSEB in the last three tariff orders. The initiatives undertaken by CSERC can be summarised in the following categories:

- *Capacity building of CSERC*

  Although CSERC does not have a dedicated DSM cell in the Commission, it is in the process of implementing staffing pattern as suggested by FOR. For capacity building within the organisation, Director and Dy. Director level officers of Commission are regularly attending BEE/FOR workshops for the EE & DSM.

- *Directives to utilities*

1. In its Tariff Order 2005-06, the Commission directed the Board to take up the work of energy audit and demand side management in the selected areas of large industrial consumers and large agricultural consumers.

   Directive in Tariff Order 2005-06

   "*The Board shall take up the work of energy audit and adoption of demand side management practices. These works may be taken up in selected pockets, preferable in large industrial pockets such as Raipur, Bhilai, Bilaspur and Raigarh district and also in pockets of large agriculture consumption say Dhamatrim Rajim, Mahasamund, Durg, Balod, Kawardha and Rajnadgaon. The Board's own power stations, administrative office complexes and colonies should also be subjected to energy audit. The Board shall urgently take up energy audit of Raipur, Bhilai, Dhamtri, Durg and Rajnandgaon in the first phase and submit a quarterly report on the above.*"

2. Subsequently, in the Tariff Order of FY 2006 -07, the Commission directed the CSEB to take up DSM activities.

   Directive in Tariff Order 2006-07

   "*The Board is again directed to undertake the studies systematically and take up at least one significant measure of DSM.*"

3. Directive in Tariff Order 2007-08

   "*Demand side management is an important area which should be in focus in the Board, particularly in the context of the unmanageable spike in the peak load. TOD tariff is one of the measures which this order contains. Fortunately, the Board appears to be conscious of this aspect and has referred to various measures for energy conservation in para 2.5 of its application. However, the objective could be achieved only if the Board takes bold and effective steps to implement the measures catalogued in the application. Presently they would appear to be in the drawing board only. Some of these measures such as support to domestic consumers to use CFL lamp through payment in instalments, in association with CFL manufacturers; free distribution of CFL to BPL consumers; support to local bodies for change-over to CFL or T8 tubelight fitting in street lights; and promotion of energy efficient pumps etc;, can be taken up quickly provided detailed implementable schemes are prepared in collaboration with manufacturers*

of CFL and other equipments where necessary. The Commission would be willing and happy to grant concession in tariff for consumers who adopt these measures.

The CSEB should prepare workable schemes as early as possible. To begin with, at least on use of CFL in place of incandescent lamps and energy efficient pumps schemes should be taken up. It would be useful if uses of CFL and of energy efficient pumps are made necessary condition for all new connections. However, the Commission would like to leave it to the Board to come with workable schemes."

4. CSERC Order 2009 on 'Pricing of power required to be purchased in the short-term from captive generating plants and IPPs'

   "...TOD tariff has been implemented for large consumers in the State in order to flatten the peak load curve and for energy conservation during peak hours. The other DSM measures may also be adopted by CSPDCL to limit the peak demand…"

5. Energy Efficiency Cells at generating stations

   For reduction in Auxiliary Power Consumption (APC), the Commission suggested in its Tariff Order 2005-06 that the Board should set up an Energy Efficiency Cell in each power plant which shall monitor coal consumption, coal handling, specific heat rate, specific oil consumption, auxiliary consumption, break downs, pollution, etc. on a regular basis, examine the reasons for deviations and suggest measures for improvement.

6. Allow recovery of DSM/energy efficiency related costs

   Interaction with CSERC officials indicate that the Commission is keen to allow various DSM related projects in ARR.

- *Tariff signals*

  In order to provide appropriate signals to the consumers to adopt EC/EE measures, variety of tariff signals is given to the consumers. These include Time of Day tariff, power factor incentives/penalties and load factor penalty/incentives.

5.3.2 Erstwhile Chhattisgarh State Electricity Board (CSEB)

The EE&DSM activities that were being undertaken by the erstwhile CSEB are now under the purview of CSPTCL. Although a DSM Cell has not yet been constituted in the Organisation, an Executive Engineer (EE) level officer is looking after these activities. Based on the Commission directive to erstwhile CSEB, CSPTCL is carrying out DSM study with the help of consultant. As the restructuring process progresses, this charge is likely to be handed over by CSPTCL to CSPDCL. The consultants have recommended constitution of DSM cell in the Distribution Utility with Superintending Engineer level officer directly reporting to Managing Director. The Superintending Engineer shall be supported by two Executive Engineers which in turn will be assisted by Assistant Engineers. The Utility is keen to set up such a DSM Cell and also implement consultants' suggestions.

As part of EE&DSM initiative, a consultant has been hired for the CDM based CFL distribution. Presently two villages are covered for CFL distribution. The CFL distribution work has been completed in Aari Village in Rajnandgaon Dist under this scheme.

5.3.3 Chhattisgarh Renewable Energy Development Agency (CREDA)

CREDA has been notified as the State Designated Agency for implementation of EE&DSM measures within the State of Chhattisgarh. CREDA is responsible for implementing various provisions of the EC Act. The organisation structure for energy conservation within CREDA is depicted in Fig 5-6.

Figure 5-6 Organisation structure of EC officials in CREDA

The head of the energy conservation department is responsible for project identification, formulation, initiation, project study and strategy for implementation.

All the members of the department are Engineers in Electrical or Mechanical Engineering or MSc while some of them are BEE certified Energy Auditors.

Activities undertaken by CREDA to implement EC Act

CREDA has:-

- Established State Energy Conservation Fund (SECF) to initiate Energy Conservation activities in Chhattisgarh with a budget provision of Rs. 2.3 Crores for energy conservation programmes
- Prepared list of Designated Consumers, Certified Energy Auditors, Certified Energy Managers, List of vendors of household appliances and uploaded the same on CREDA's website; ;
- Completed Energy Audit on 20 government buildings under investment grade scheme of BEE
- Completed energy audit of eight municipal water works, five industries, and two rice mills through SECF
- Successfully implemented energy conservation awareness and publicity, campaigning through Posters, Brochures, Booklets, T.V., Radio, print media etc., and also organized energy conservation week all over Chhattisgarh
- Established seven Energy Conservation clubs in Engineering Colleges
- Prohibited the use of electric geysers and made the installation of Solar Water Heating Systems (SWHS) mandatory in government sector
- Chhattisgarh Housing Board is in process of installing SWHS in 3000 High Income Group's
- Under DSM demo project the Airport road of 9.5 Kms has been illuminated by replacing 300 W sodium vapour lights with solar powered T-5 lamps
- Replacement of all sodium vapour lamps in street lights on an identified route with 4 x 25 W T-5 luminaries
- Appointment of inspecting officers and their powers & functions as per Act
- Installation of Automatic Power Factor Correction (APFC) panels in medical college, hospital in selected cities having capacity 825 KVAR with an investment of approximately Rs.19.00 lakhs and envisaged saving of approximately Rs. 24.00 lakhs per year in their electrical bills

- Avoided the capacity addition of approx. 792 MW by implementing Energy Conservation and Renewable Energy activities. In view of BEE estimates of avoided generation capacity of 1480 MW in the year 2008-09 for entire country, the estimates of CREDA appears to be on a higher side. This further enhances the need for robust EM&V methodology for measurement and verification of savings through DSM measures.

CREDA has been implementing these projects with the help of consultants and implementing agencies. A few energy audit consultants have also been asked to demonstrate the savings recommended in the report on pilot basis for recently conducted programmes. The source of funds for administration and implementation of these programmes has been SECF, MNRE and BEE. CREDA has been taking efforts for capacity building. It has organised various seminars and workshops for its own engineers as well as CGHB, PWD, ULB and other govt officers.

One of the challenges faced by the CREDA is lack of staff strength at the Assistant Engineer and Junior Engineer level. CREDA is of the opinion that it is necessary to increase interaction between SERC and utility for effective implementation of EC Act 2001. Further, it is felt that that BEE should work to enhance coordination between SERC, Utility and SDA.

5.4 Gujarat

Under the reform process, in April 2005, erstwhile Gujarat Electricity Board (GEB) was reorganized into Seven Companies with functional responsibilities for trading, generation, transmission and distribution etc. The Companies incorporated are:

- Gujarat Urja Vikas Nigam Ltd. (GUVNL) - Holding Company
- Gujarat State Electricity Corp. Ltd.(GSECL) - Generation
- Gujarat Energy Transmission Corp. Ltd.(GETCO) - Transmission
- Uttar Gujarat Vij Company Ltd. (UGVCL) - Distribution
- Dakshin Gujarat Vij Company Ltd. (DGVCL) - Distribution
- Madhya Gujarat Vij Company Ltd. (MGVCL) - Distribution
- Paschim Gujarat Vij Company Ltd. (PGVCL) - Distribution

The GUVNL is engaged in the business of bulk purchase and sale of electricity, supervision, coordination and facilitation of the activities of its six subsidiary companies. The GSECL is engaged in the business of generation of electricity. The GETCO is engaged in the business of transmission of electricity. The UGVCL, DGVCL, MGVCL and PGVCL are engaged in the business of distribution of electricity in the northern, southern, central and western areas of Gujarat respectively.

The Gujarat Electricity Regulatory Commission (GERC) was originally established under the Electricity Regulatory Commission Act (ERC), 1998. The Commission subsequently assumed powers conferred on it under the Electricity Act 2003.

Gujarat Energy Development Agency (GEDA) is the Nodal Agency of the Government of Gujarat for promotion and popularization of Renewable Energy and State Designated Agency for Energy Conservation in the state of Gujarat, India.

5.4.1 Gujarat Electricity Regulatory Commission (GERC)

The GERC is yet to set up dedicated cell for EE&DSM activities. Further, the Commission has preferred to implement EE&DSM measures related to tariffs such as time of day tariff and power factor penalty/incentives.

5.4.2 Uttar Gujarat Vij Company Limited (UGVCL)

Although UGVCL has not institutionalised a dedicated DSM Cell in the organisation, the EE&DSM activities are being coordinated by Superintending Engineer (Comm. /Division). The GUVCL is planning to form Energy Management Cell. In Gujarat, GUVNL (Holding Company) is responsible for coordination of various energy efficiency and DSM activities in the State of Gujarat. It prepares the yearly action plan for the implementation of various energy efficiency and energy conservation projects. GUVNL also sets and provides budgets for the implementation of suggested energy conservation and energy efficiency projects.

EE&DSM initiatives by GUVNL

- Agricultural Feeder Separation Programme

- Replacement of Incandescent bulb with CFL in Company's Own Buildings
- Installation of APFC panel for Industrial/Urban and Agricultural Feeders
- Consumer Awareness Programme to promote EE & EC
- Replacement of inefficient Agri Pump sets with high efficiency ones

Replacement of inefficient Ag Pumpsets with high efficiency Pumpsets

The Utility has undertaken replacement of inefficient agriculture pump-sets with high efficiency pump-sets. The programme is a State Government Project with State Government, GUVNL (Holding Company), UGVCL (Distribution Utility), GEDA (State Designated Agency) & Farmers as the stakeholders. Salient features of the programme are given below:

- GEDA identified various Ag pumpsets manufacturers & approved them as GEDA approved Ag. Pumpsets manufacturers.
- GEDA has prepared technical specifications, innovative financing mechanism & M&V mechanism for the effective implementation of the projects
- UGVCL is the main implementing body
- Farmers, interested in participating in this programme, contact UGVCL.
- UGVCL person visits the site & confirm the ratings of the pumps & suggest the new pumpsets
- Farmers select the new pumpsets from the various GEDA approved manufacturers
- Pump manufacturers install the new pumpsets
- Old pumpsets are taken back by UGVCL & will be scrapped
- With regard to payment, farmers pay one third amount of cost of the new pumpsets. The remaining amount is paid by UGVCL. Utility gets the same amount from the State Government at the later stage
- Out of total applications of 3800, implementation of 1500 has been completed.

All other utilities are undertaking programmes on similar lines as these programmes are primarily designed by GUVNL for all implementation by all utilities in the State.

5.4.3 Gujarat Energy Development Agency (GEDA)

In GEDA, the Energy Conservation Department was incorporated in 1985. Various initiatives of GEDA include replacement of inefficient agriculture pump-sets with new pump-sets; subsidised industrial energy audit; walk through energy audit for SME sector for 2000 enterprises; demonstration of EE technology for diamond process industries; awareness and training programmes for designated industries, consultants, educational sectors; promotion of innovative energy efficiency devices (for example: CFL, LED) and energy audit of Government buildings. The mechanism adopted by GEDA include hiring of manufacturers of specific technology providers, appointment of consultants for preparation of the feasibility report and appointment of ESCO/Consultants for the implementation of identified energy conservation measures

5.5 Analysis of State wise DSM initiatives

Based on the information collected during stakeholder consultation, ABPS Infra has analysed existing institutions, EE & DSM related initiatives in the different States. This analysis is presented in the form of comparison between various States with respect initiatives undertaken by SERCs, formation of DSM Cell in distribution utilities, initiatives related to DSM measures undertaken by distribution utilities and initiatives related to EE & EC measures undertaken by SDAs.

5.5.1 DSM initiatives by SERCs

As discussed in the previous sections, the SERCs in the four States have taken certain initiatives and issued several directives related to & DSM programmes to the distribution utilities in their jurisdiction. In order to compare the directives/initiatives of SERCs of various States, we have broadly categorised various initiatives/directives into following six broader categories:

- Creation of DSM Cell in SERCs;
- Directives to distribution utility for creation of DSM Cell;
- Directives to distribution utility to undertake DSM activities;
- Tariff related directives that promote DSM e.g. ToD, PF Incentives/Penalty;
- Guidelines to assist distribution utility in undertaking DSM programmes;

- Initiatives to allow recovery of DSM related costs through ARR

The comparison of the initiatives of the four SERCs on the basis of these parameters is presented in Figure 5-7.

DSM initiative	MERC	HERC	CSERC	GERC
Creation of **DSM cell** in SERC	√	-	-	-
Directive to utility for **creation of DSM Cell**	√	√	-	-
Directives to utility to **undertake DSM activities**	√	√	√	-
Approval of **tariff signals** that promote DSM e.g. ToD, PF incentives/penalty etc.	√	√	√	√
Guidelines to assist utilities in undertaking DSM programs	√	-	-	-
Allow **recovery of DSM related costs** through ARR	√	Selected initiatives; No directive	-	Willing to do so

Figure 5-7 DSM initiatives by SERC

Based on the analysis of the above Figure, it can be seen that most SERCs have issued several tariff related directives such as ToD & PF incentives and penalties as there is a strong legal backing for these initiatives under EA 2003. Most SERCs have also understood the importance of EE & DSM and directed distribution utilities to undertake DSM related activities. However, initiatives related to formation of DSM Cell in the distribution utilities as well as in Commission itself have not been taken up so easily. Various other innovative initiatives such as preparation of guidelines and allowing recovery of DSM related cost through ARR have been taken up by only MERC though SERCs in other States, during 'one-on-one' discussions have shown their willingness for doing the same.

5.5.2 DSM Cell in Utilities and EE&DSM initiatives

DSM Cells have been created by utilities in Maharashtra and Haryana. Followed by MERC directive, the three electricity distribution companies operating in the city of

Mumbai have constituted DSM Cells. One of the utilities in Haryana also has a DSM Cell. In Chhattisgarh and Gujarat, a few officials are looking after EE/DSM activities as additional charge. Details of the DSM Cells, officials working on EE/DSM and various EE&DSM activities undertaken by them are summarised in Figure 5-8.

	Maharashtra	Haryana	Chhattisgarh	Gujarat
Creation of **DSM cell in utilities**	REL, TPC, BEST	DHBVNL	-	-
Officials working on EE&DSM	**REL**: 5 member team headed by Assistant VP **TPC**: 3 member team headed by Assistant GM **BEST**: 3 member team headed by Dy. CE	**DHBVNL**: **UHBVNL**: directly looked after by MD; Planning to constitute DSM Cell with SE level officer as head	**CSPTCL** (charge will be handed over to CSPDCL): EE level officer looking after DSM activities; consultants recommended DSM Cell with SE level officer as head	**UGVCL**: Headed by SE (Comm./Div) and EE and Dy. Engineer working on EE&DSM activities **MGVCL**: No dedicated staff
EE&DSM activities	**REL**: Load research, energy audit, 5 yr plan, CFL project, DT based project; **TPC**: Demo project FTLs; In house lighting **BEST**: Ballast , FTLs	**UHBVN:** CFL, AP feeder separation, HVDS , Ag pumps	Consultant hired for DSM study; CDM based CFL distribution	**UGVCL:** AP feeder separation, CFLs, APFC panels, Ag pump-sets, consumer awareness
Implementing mechanism & Funding arrangement	**REL:** implemented through manufacturers; utility assures best price and quality; bears marketing expenses **TPC, BEST:** LMC fund, Govt. funds, negotiation with manufacturers for best price and quality	REC funding, ESCO mode explored	Consultant	Manufacturers of specialised product/ technology; GUVNL will prepare action plan; set and provide budgets;
Interaction with SDA	-	CFLs in 702 villages by HAREDA & utilities	-	Ag pump project implemented with GEDA

Figure 5-8 EE&DSM initiatives by distribution utilities in select States

5.5.3 DSM Initiatives by State Designated Agencies

BEE had engaged National Productivity Council to review performance of SDAs. As per the report, the SDAs of the identified States are categorised as ones that are having 'good performance'. The criteria for evaluation used by NPC included broad understanding, resourcefulness, management style and HRD & exposure. SDA's in

all the four States have dedicated teams of officials working on energy efficiency and energy conservation activities. They have dedicated resources, funds and implementation mechanisms in place to undertake various activities. Some of the initiatives/achievements of the SDAs are summarised in Figure 5-9.

	MEDA	HAREDA	CREDA	GEDA
Organisation structure of **officials working on EE and EC**	6: General Manager (EC&ID) Manager (EC) Project Eng. (2) Assistants (2)	4: Additional Director – EC Project Director – ECBC & RE STM, PO	4: Director (EC); EE (EC) AE – 2 JE	6: Director; Sr. Project Exec; Asst. Project Exec. (3 nos.); Jr. Prog Officer
State level committee for Energy Efficiency	State level energy conservation committee in 2005	State level monitoring committee in 2005	-	-
EE/EC activities undertaken	Strategic Energy Conservation program; Save Energy Program	Audits, SWHS, CFL, T5, ISI pumps, awareness	Audits, SWHS, T5, Ag pumps, APFC, awareness	Ag pumps, audits, CFL, LED, awareness
Implementation mechanism/ Funding	BEE, State Govt. funds/ MEDA own resources	BEE, State Govt funds	Calling offers, tenders, selection of consultants for implementation , SECF	Hire manufacturers of technology providers, consultants for feasibility & implementation

Figure 5-9 DSM initiatives by State Designated Agencies

5.5.4 Key observations

The review of State initiatives reveals the following key points

- Most SERCs have adopted tariff related DSM measures;
- Most SERCs as well as Distribution Utilities lacks have limited dedicated resources to take up DSM related activities;
- Distribution Utilities have taken up several DSM measures but most of them are pilot scale in nature;
- SDAs have taken initiatives in the area of energy efficiency/ conservation which are mostly market transformation in nature
- Limited capacity in the sector to assess EE & DSM potential in the sector

- Limited capacity to undertake Monitoring & Verification of projects
- Many stakeholders indicated need to engage independent agency for M&V, as well as potential assessment
- Currently very little interface exists between SDA and SERC or utility on EE/DSM issues;
- While SDAs have teams designated for EE/ EC activities, limited understanding of DSM implementation issues
- Limited or no institutional capability at utility level.

It is evident here that there is a need to establish institutional framework for coordination of activities between SDA, Distribution Utility & Regulatory Commission.

Prior to further analysis of the existing institutional framework and developing options for desired framework, a review of international best practices with regard to administrative structure for EE & DSM may prove useful. In this regard, we have studied the administrative structure for EE programmes in the State of California and Vermont, USA. The same has been discussed in the following chapter.

6 REVIEW OF INTERNATIONAL BEST PRACTICES

For the purpose of international survey, the case of California energy efficiency and Vermont Energy Efficiency has been considered. Both California and Vermont are leading States in establishing energy efficiency as an integral part of the electricity business. The administrative structures adopted in the two States for energy efficiency programs are different from each other. These have been chosen to get a wide perspective on possible institutionalising mechanisms for energy efficiency.

6.1 Energy Efficiency Initiatives in the California

In California the energy sector is regulated by three regulatory bodies: Federal Energy Regulatory Commission (FERC), California Public Utilities Commission (CPUC) and California Energy Commission (CEC). FERC regulates the interstate transmission of electricity, natural gas and oil. CPUC regulates California's privately owned electric, natural gas, water, telecommunications, railroad, rail transit, and passenger transportation companies. It also plays a key role in making California a national and international leader on a number of clean energy initiatives and policies designed to benefit consumers, the environment, and economy. CEC is California's primary agency for energy policy and planning. One of the responsibilities of CEC is to promote energy efficiency by setting appliance and building standards and work with local governments to enforce those standards.

6.1.1 Investor & Publicly owned utilities in California

Investor owned utilities in California are Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric. Investor-owned utilities administer programmes with overall oversight by the CPUC, which establishes key policies and guidelines, such as setting programme goals and approving spending levels. A certain share of public benefits funding is designated to go to non-utility organizations. California's publicly owned utilities such as large municipal utilities serving Los Angeles & Sacramento fund & provide programmes to their customers.

6.1.2 Administrative structure for EE programmes

In 2003, CPUC and CEC jointly developed and adopted the Energy Action Plan. The plan established a 'loading' order of energy resources that first optimizes increased conservation and efficiency. The same was reaffirmed in Decision (D.) 04-12-048 on Long-Term Procurement Plan of IOUs. The goal was to reduce the per capita energy use and reduce toxic emissions and greenhouse gases through increased conservation and efficiency. The approved funding was increased for the plan by CPUC at the beginning of year 2004 by instructing the utilities to integrate cost effective EE programmes into resource planning.

In 2005, Decision 05-01-055 on Interim Opinion on the Administrative Structure for Energy Efficiency: Threshold Issues was adopted. The decision established new Administrative Structure for Post-2005 Energy Efficiency Programmes. The objective was to develop common language, shared view of administration functions and roles, and to establish criteria for evaluation proposals. The structure placed utilities in lead role for developing programme plans & managing portfolios with input from advisory groups. It required that utilities put at least 20% of the total portfolio to bid to non-utility implementers in each planning cycle. It established safeguards: advisory group structure, competitive bidding minimum requirements and ban on affiliate transactions. Responsibility of all EM&V studies, policy oversight, research & analysis, quality assurance, dispute resolution was placed on CPUC Energy Division. Further, for research and analysis & EM&V Energy Division & CEC staff was proposed to work in collaborative manner (Figure 6-1)[2].

The energy efficiency programs in the State are guided by the Policy rules contained within the Energy Efficiency Policy Manual. The Manual is a 'living document' updated periodically to reflect Commission's new policies and other changes (current Version 4.0).

[2] *Source: Climate Change, Energy Efficiency & Demand Response Programs, CPUC Staff Presentation, January, 2007*

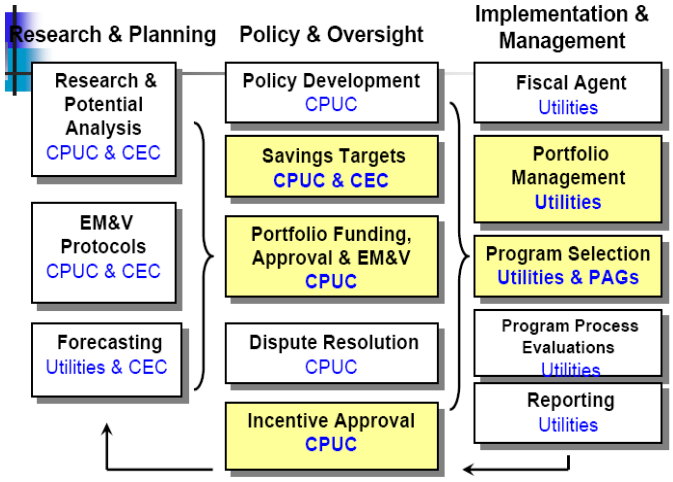

Figure 6-1 EE Program Administration in California: Post 2005

Further, Commission issues decisions addressing specific topics as and when required on continuous basis. In September 2008, the CPUC adopted California's first Long Term Energy Efficiency Strategic Plan as a single roadmap to achieve maximum energy savings across all major groups and sectors in California. It is the State's first integrated framework of goals and strategies for saving energy, **covering government, utility and private sector actions.** This Plan was developed through a collaborative process involving the CPUC's regulated utilities –PG&E, SCE, SDG&E and Southern California Gas Company (SoCalGas) and over 500 individuals and organizations working together over an eleven-month period.

The EE programme administration post 2005 in California had role of two major players, CPUC and Utilities with some role of CEC. Under this structure the utilities played lead role for developing programme plans & managing portfolios with input from advisory groups. Both these entities with inputs from advisory groups and services from consultants and contractors were able to undertake all possible activities in a DSM process.

6.2 EFFICIENCY VERMONT

Vermont's electric distribution companies are regulated monopolies that operate under a "certificate of public good" granted by the Vermont Public Service Board (PSB or Board). As regulated monopolies, their rates and policies are subject to review by the Vermont Department of Public Service (DPS) and approval by the PSB. The PSB is a three member, quasi-judicial board that supervises the rates, quality of service, and overall financial management of Vermont's public utilities: electric, gas, telecommunication, private water companies and cable television companies. The Board also reviews the environmental and economic impacts of proposals to purchase energy supply or build new energy facilities; monitors the safety of hydroelectric dams; evaluates the financial aspects of nuclear plant decommissioning and radioactive waste storage; reviews rates paid to independent power producers; and oversees the statewide Energy Efficiency Utility. The Department of Public Service is an agency within the executive branch of Vermont State Government. Its function is to represent the public interest in matters regarding energy, telecommunications, water and wastewater.

Vermont has had extensive energy efficiency programmes since 1990. Originally, programs were run by the state's utilities under jurisdiction of the PSB, but in 1999 the PSB transferred these energy efficiency programmes to Efficiency Vermont, a state-wide "Energy Efficiency Utility" (EEU) supported by public benefits funding.

6.2.1 Origin of Efficiency Vermont

The Energy Efficiency Utility concept was initially considered as a part of electric sector restructuring deliberations in 1996-97, but the Vermont Legislature did not proceed with restructuring and retail competition. At the same time, the Vermont Department of Public Service (DPS) was asked to produce a report that included a review of efficiency potential and utility administered energy efficiency efforts since 1990. The report concluded that a state-wide, non-utility alternative should be considered regardless of whether or not the state proceeded with restructuring. The primary benefits that the DPS found with this approach were:

1. Increased state-wide availability of services and uniformity of services, instead of varied program offerings from 22 separate utilities;
2. Reduced regulatory contentiousness and cost;
3. Reversal of a downward trend in utility program spending since 1993; and
4. Greater administrative and delivery effectiveness and efficiency

In 1999, the Vermont Legislature confirmed the authority of the PSB to create an Energy Efficiency Utility, set an annual funding cap for it of $17.5 million, and notably did not include a "sunset" of the authorization. The PSB ordered the creation of an Energy Efficiency Utility, adopting a negotiated settlement among the state's regulated utilities, the DPS, and business, consumer and environmental groups that spelled out many of the details of how the efficiency utility would operate. A "Request for Proposals" for contractors to act as the EEU was issued in October 1999, with the contractor selection made by the end of the year, and March 1, 2000 was established as the start date for full delivery of services.

The Energy Efficiency Utility (EEU) created to administer electric-ratepayer funded energy efficiency resource acquisition at a state-wide level operates under the name "Efficiency Vermont". It is funded by a small "energy efficiency charge" on all ratepayer bills. Services are delivered by a non-utility entity operating under a three-year, performance-based contract with the Public Service Board. This performance contract has a fixed budget and 35 specified measures of performance. It provides technical assistance and financial incentives to Vermont households and businesses, to reduce energy costs with energy-efficient equipment and lighting and with energy-efficient approaches to construction and renovation. Unlike other state-wide non-utility administrators to implement efficiency efforts funded by system benefit charges, Efficiency Vermont had a broader scope of responsibility, accountability and independence. Efficiency Vermont provides a comprehensive portfolio of services and has achieved significant success in meeting its objectives. In 2007 and 2008, savings from energy efficiency measures more than offset the average underlying rate of electricity load growth.

6.2.2 Administrative structure of Efficiency Vermont

The structure for Vermont's efficiency utility is illustrated in Figure 6.2. The model uses a "Contract Administrator," who is hired as an independent contractor by the PSB, and handles all day-to-day contract administration responsibilities on behalf of the PSB. It also includes a "fiscal agent," also an independent contractor, who receives EEC collections from the utilities and disburses funds against bills submitted by Efficiency Vermont upon approval by the Contract Administrator. It is notable that because the funds collected never become funds of the State, they are less exposed to redirection, and many procurement limitations associated with use of state funds are avoided.

The responsibility for the design, marketing and implementation of public-benefits energy efficiency in Vermont sits entirely with the PSB's contractor: Efficiency Vermont. This entity acts as an independent contractor to the State, under an extensive and detailed contract with the PSB. In addition to a detailed scope of work, the contract contains policy guidance, legal and accounting rules, and a lengthy set of negotiated measures of performance for the contractor. These performance indicators include quantified goals for MWh energy savings and Total Resource Benefits for the end of the initial three-year contract period, as well as over thirty additional activity milestones and result indicators. A financial performance incentive equal to approximately 2.9% of the contract value was agreed upon for 100% attainment of these performance results, which is far less than the typical rate historically allowed under most utility-administered arrangements.

The DPS has responsibility for review of the savings claims made by the Efficiency Vermont contractor each year. It engages with Efficiency Vermont in an ongoing process of review and update of prescriptive savings algorithms, and conducts an annual verification process of all savings claims. The DPS is also responsible for assessing and reporting on market potential, setting efficiency baselines, program evaluation, and making recommendations to the PSB on directions and priorities for the future of Efficiency Vermont.

The PSB also established an Advisory Committee composed of representatives from distribution utilities, consumers, the DPS, and others deemed necessary by the Board to provide substantive public and utility input on program design, annual re-allocation of funds within programs, and other policy issues.

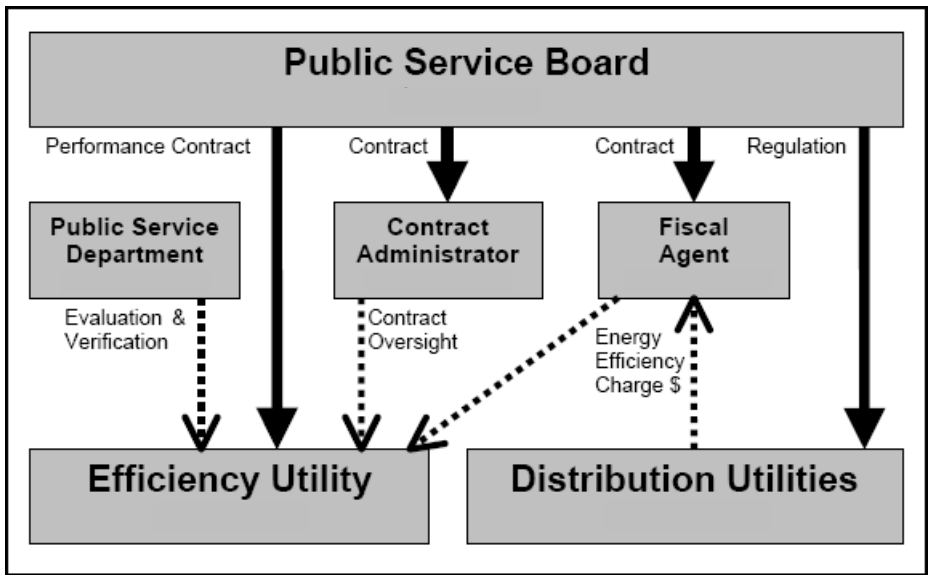

Figure 6.2 Structure of Vermont's Energy Efficiency Utility

6.2.3 Efficiency Vermont's experience

Based on the Vermont's experience, the lessons learnt from the administrative structure, scope and objectives fall under following five areas:

- **Achieving balance among multiple objectives:** Sound energy resource portfolios inherently involve trade-offs to achieve both near and long term objectives. As a part of these portfolios, energy efficiency efforts also have multiple, potentially conflicting goals. Vermont's experience suggests that the use of carefully-crafted performance indicators in the context of a performance-based contract for delivery of measurable results can be a highly effective vehicle for seeing that multiple resource acquisition and policy goals are appropriately balanced in implementation as well as in design.

- **Flexibility/Freedom in Design/Implementation:** In case of Efficiency Vermont, the contractual/regulatory context allowed an unprecedented flexibility in how the contractor achieves goals. The PSB and the contractor operate under a mutual understanding that while the Board wants to understand and monitor the activities of Efficiency Vermont; its highest interest is in results. The benefits of this approach are:
    - Increased flexibility to respond to changing markets in real time;
    - Quick response to time-sensitive opportunities
    - Reduced administrative cost associated with deliberation and formal approval processes over program changes; and
    - Timely response to feedback mechanisms, including both evaluation findings and the contractor's implementation experience.
- **Moving from 'Programs' to a 'Market Based Approach':** Since 2003, Efficiency Vermont stopped offering "programs" and adopted a more market based approach. Service offerings, marketing, business development and all other implementation is now organized by broad and target markets that are based on customer perspectives, and often cross over traditional program (new construction vs. existing) or sector (residential vs. commercial) divisions.
- **Addressing all sectors:** Efficient Vermont has the responsibility for state-wide energy efficiency resource allocation and results in all sectors. This allowed recognition of opportunities and implementation of efficiency efforts that cut across traditional sector definitions.
- **Use of performance contract:** The use of a competitively-bid, performance-based contract with consequential impacts for delivering measurable results on a firm schedule has proven to be highly effective.

6.2.4 Proposed structure of Efficiency Vermont

In Mid-2007, the PSB convened a process to consider alternatives to the EEU structure. Two specific reasons to consider modifying the structure are; one, problems associated with a short, fixed-term contract, and two, difficulties associated with the contractual relationship. The Vermont Legislature has supported

moving to the new structure by passing enabling legislation and adding responsibilities for energy efficiency in the use of non-regulated fuels.

6.3 Lesson for institutionalisation EE&DSM in India

Some of the lessons for institutionalising EE&DSM in India from the case studies of California and Vermont are discussed below.

6.3.1 Enabling legal and/or policy framework

In both the States, it is observed that the energy efficiency initiatives have been continuously backed by enabling legal and/or policy framework. CPUC instituted rulemaking to establish rules governing the evaluation, funding and implementation of DSM programs in August 1991. Since then, through constant support of the Commission, the State has become one of the pioneers in energy efficiency. Similarly, in Vermont, amendment in legislation passed in 1999, enabled PSB to appoint an entity to develop and provide energy conservation services. This led to creation of Efficiency Vermont which has proved to be a highly effective model for efficiency resource acquisition. The amendment clearly spelled out the powers of the Board and the roles of EEU and DPS.

To establish an institutional mechanism for the large scale deployment of EE&DSM in India, it is important to establish an enabling legal and policy framework.

6.3.2 Development of model DSM framework

Review of institutional framework of California for EE&DSM provided an insight into various activities that form an essential part of a DSM framework. Based on the review, we developed model DSM framework which encompasses all activities that may have to be carried out for the deployment of DSM programmes in the State. These functions/activities have been mapped with institutions responsible for the functionalities in California and Vermont in the Table given below

Functionality	California	Vermont
Guidelines and Regulations for DSM administration	CPUC	An extensive and detailed contract between PSB and Efficiency Vermont contains detailed scope of work, policy guidance, legal and accounting rules, and a set of negotiated measures of performance
Technical Potential Assessment	CPUC & CEC	DPS (Assessment and reporting of market potential)
Goal and target setting	CPUC & CEC	Specified in the contract between PSB and Efficiency Vermont
Load Research	Utilities	Efficiency Vermont
Market Research	-	-
Economical potential assessment	CPUC & CEC	DPS (Assessment and reporting of market potential)
Preparation and design of DSM portfolio	Utilities with input from PAGs and PRGs	Efficiency Vermont with inputs from **Advisory Committee**
Approval of DSM portfolio	CPUC	-
Preparation and design of DSM projects	Utilities	Efficiency Vermont
Approval of budget for DSM projects	CPUC	-
Project implementation	Utilities, Non-utilities	Efficiency Vermont
Monitoring and reporting	Utilities	DPS
Evaluation measurement and verification	CPUC	DPS
Dispute resolution	CPUC	-

Figure 6-2 DSM Framework in California and Vermont

To assess the applicability of these models in Indian context, it is important to note that a good part of Efficiency Vermont's success is attributable to the consistency of

prime contractor's organisation mission with that of the Efficiency Vermont enterprise. In India, the possibility of a private sector enterprise to operate under performance based contract in implementing energy efficiency programs is low in the near future. On the other hand, lessons from the administrative structure, operative in California where CPUC provides policy and oversight and utilities takes care of implementation and management of programmes can be drawn while designing the institutional framework for EE&DSM in India.

Based on the preliminary research, stakeholder consultation and international review, the analysis of DSM institutional framework has been undertaken and options for institutional framework has been developed in the following chapter.

7 DSM INSTITUTIONAL FRAMEWORK

Demand-side management is described as the actions of the utility, beyond the customer's meter, with the objective of altering the end-use of electricity - whether it be to increase demand, decrease it, shift it between high and low peak periods, or manage it when there are intermittent load demands - in the overall interests of reducing utility costs. In other words DSM is the planning, implementation and monitoring of utility's activities designed to encourage customers to amend their electricity consumption patterns, both with respect to timing and level of electricity demand so as to help the customers to use electricity more efficiently.

Several activities are involved in successful implementation of DSM measures. These activities are potential assessment, goal setting, load and market research, preparation and approval of DSM plan and projects, implementation, monitoring and reporting and EM&V. As discussed earlier, most of the DSM measures implemented in our country are pilot scale in nature. In the current scenario, the DSM programmes are implemented by undertaking some of the abovementioned activities. Implementation of DSM measures has always been ad-hoc and holistic view has been rarely taken in the country on design, development and implementation of DSM measures. This is one of the reasons that DSM has not been able to gain the required momentum in India.

Now, given the issues related to global warming and climate change, there is a renewed thrust on DSM in the country. Need for implementation mechanism for large scale sustainable deployment of DSM programmes is being felt. It has been appreciated that there may not be capacity within several existing institutions to undertake specialised tasks required for DSM implementation. In this Chapter, we have presented the Proposed Institutional Framework.

In this Chapter, based on the assessment of DSM implementation in four states and international literature survey, model DSM framework has been developed. Subsequently, the DSM processes currently being used in India have been mapped

onto the model framework to identify the functional gaps. While doing so, institutions currently responsible for the functionalities have also been mapped on the model DSM framework. On identification of institutional gaps, options have been developed to fill those gaps. These options have been further analysed in the next Chapter.

7.1 Model DSM framework

A model DSM framework would contain mapping of all activities that are required to be undertaken in a DSM process with the institution responsible for undertaking these activities. These activities should cover all facets of the DSM process such as planning, design, development, implementation, monitoring, etc. The model DSM process is presented in Figure 7-1. The following section discusses the functionalities under each element of the framework in detail.

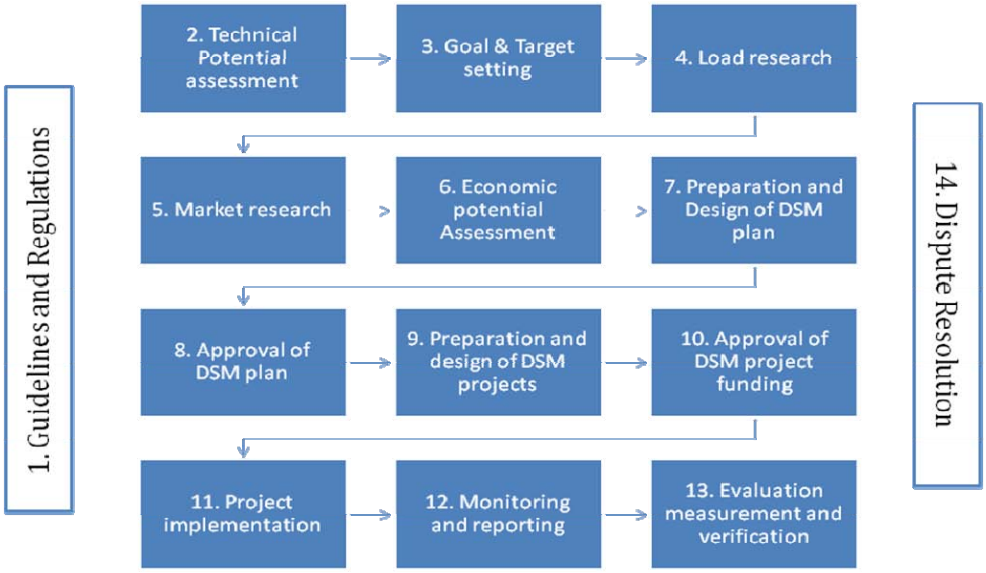

Figure 7-1 Processes in a model DSM framework

7.2 Functionalities in Model DSM framework

For each of the activities identified in the model DSM framework, the following list provides the sub-activities or functionalities. An attempt has been made to prepare

an exhaustive list of activities and sub-activities that would form part of DSM process in India.

1. **Guidelines and Regulations for DSM administration:** It is well acknowledged that a regulatory framework would provide the much needed impetus to the DSM initiatives in the States. While the regulations will mandate the utilities to undertake activities related to DSM, the guidelines will guide the utilities in execution of the activities. It is envisaged that initially the SERC will issue guidelines for Cost – Benefit Analysis, Monitoring and Reporting and Evaluation, Measurement & Verification (EM&V) related issues.

2. **Technical Potential Assessment:** To be able to set the target for DSM activities, it will be necessary to identify the DSM potential in the study. The potential would depend upon the consumption pattern, electricity generation mix, availability of technologies such CFL/LED, etc. It is possible to identify the potential for DSM programmes without regard to financial viability of such DSM programmes. Such potential usually referred to as 'Technical Potential', represents the upper limit for target. It is learnt that the BEE has already awarded study to National Productivity Council (NPC) to assess DSM potential in four sectors in four States. It is envisaged that based on the findings of this Study, BEE shall develop methodology for assessment of Technical Potential which would be used by the 'DSM EA' (described in the subsequent sections) identified in the State.

3. **Goal and target setting:** In the current scenario, DSM targets are rarely specified for the distribution utilities. One of the rare cases where the target was specified is that of Maharashtra. MERC specified DSM target for the three private distribution utilities in their respective Tariff Orders for FY 2007-08. As per the order, the distribution licensees were required to achieve a 2% reduction in costly power purchase requirement through DSM measures. This was done because it was observed that the distribution

utilities ignore demand side options due to which consumers had to pay higher overall cost of power procurement.

While Goal would be long term vision for the State, targets would be intermediate goals for the specific utility. For example, on the basis of Technical Potential assessed by MEDA as per guidelines issued by BEE may set the Goal of 5000MW for DSM for the State over next ten years. The MERC may set short term and medium targets for individual utilities such MSEDCL, REL, TPC, etc. Target based approach is an efficient approach to capture the potential of DSM. The Commission may consult the utilities and other stakeholders before setting the targets.

4. **Load Research:** Load research is the foundation of any DSM framework. The objective of the Load Research is usually to identify the consumer segment/s or assessment of penetration of a specific technology and potential for introducing an efficient technological option etc.

   It is important to identify the target population e.g. residential, commercial, industrial consumer or consumers in urban and rural areas etc. Along with the target population, the end uses which may be targeted needs to be identified e.g. lighting, air conditioning etc. Further, if any specific appliance segment is to be targeted, the same needs to be identified at this stage.

   To undertake load research, it may be required to undertake consumer survey. On the basis of target population, end uses and appliances, the survey components will be designed. This would include design of questionnaire, estimation of sample size, criteria for sample selection etc. The survey may include combination of mail-in surveys, in-person surveys, and actual measurements. Frequency, duration, timing, and budget: These are important components of load research and each of these needs to be identified at the planning stage.

While these surveys will be undertaken by the utilities, guidelines for load research may be issued by the respective State Regulator.

5. **Market Research:** Market research includes identification of new energy efficient technologies available in the market for consumers, estimation of penetration/sale of efficient appliances etc. High-quality market research is fundamental to any DSM program design or evaluation effort. Estimating market potential for specific energy efficiency technologies and applications, establishing key performance indicators, and determining existing baseline market conditions are critical starting points for all DSM programme designs and assessments.

6. **Economical Potential Assessment:** Economic potential is that subset of the technical potential which can be achieved in a cost effective manner. To identify the DSM programs that are cost effective, it will be necessary to carry out broader cost benefit analysis. While the cost-benefit analysis for any programme would vary from the utility to utility, economic benefit from the broad state or society perspective would remain same irrespective of the cost structure of the utility. During this activity, it is envisaged that macro level analysis would be carried out which will guide goals and targets being set by the State Regulator.

7. **Preparation and Design of DSM Plan:** Assessment of consumer category wise DSM potential will help in identifying the DSM programmes that would form a part of the overall DSM plan of the utility. The portfolio may contain description of DSM programmes, estimated levels of energy and capacity savings, costs and benefits of the planned programmes; marketing and delivery plans, implementation schedule; EM&V plans, plan for administration of the programs etc. Each utility will prepare its own DSM plan and submit the same to the Regulator.

8. **Approval of DSM Plan:** The DSM Plan is required to be approved by the regulatory authority. The regulator may have to establish protocols, standard tables, outlines, and guidelines and evaluation criteria for measurement of programme performance (e.g. energy savings).

9. **Preparation and design of DSM projects:** While the portfolio plan will include brief description of each of the DSM projects, under this activity, utilities will carry out detailed design and development of the projects identified in the portfolio. This will include Cost benefit analysis, implementing strategy, proposed funding arrangement, EM&V plan and budget assessment for approval.

10. **Approval of budget for DSM projects:** Depending of the guidelines issued by the State Regulator, the utilities will submit to the Regulator, the project plan for approval of budget for each DSM project in the portfolio. On assessment of the proposals, adopting appropriate regulatory process, the Regulator will give approval to each project.

11. **Project implementation:** On receipt of the approval from the Regulator, the utility is expected to undertake project implementation as per the approved plan. Utilities may use energy service companies and/or other external resources to implement DSM programmes. In such case, the utilities may have to undertake preparation of bidding documents, selection of contractors/consultants and contract management. The utilities will also have to undertake marketing and consumer awareness for implementation of the DSM programmes.

12. **Monitoring and reporting:** This activity would involve overall project management & coordination, tracking programme savings and expenditures against programme savings goals and budgets, development of report on programme performance, reporting etc.

13. **Evaluation measurement and verification (EM&V):** Prior to undertaking any DSM programme, it is required to develop protocol for EM&V. If EM&V is envisaged to be undertaken by the third party, eligibility criteria for EM&V agencies are required to be set. On the basis of the eligibility criteria, EM&V agencies will be identified and empanelled. Utilities can then appoint third party EM&V agency from the empanelled list to undertake EM&V of DSM programmes. The guidelines may be issued by the State Regulator for EM&V.

14. **Dispute resolution:** It is possible that disputes may arise between any two agencies such as ESCO and the utility or utility and SDA. In such cases, dispute resolution mechanism would be required. It will be necessary to establish such dispute resolution mechanism. In the absence of such a mechanism, this activity will have to be undertaken by the Regulator.

7.3 Existing DSM framework

Based on the review of EE&DSM activities in select States, the existing DSM framework may be presented as shown in Figure 7-2. It may be noted that in comparison to other States, Maharashtra has taken a number of steps. As a result, many activities depicted in Figure 7-2 are based on the way those are executed in Maharashtra. Other States have initiated some of the steps and these states are following Maharashtra model as far as possible utility driven DSM programmes are concerned.

In most cases, SERCs have taken initiatives and have directed the utilities through either licensing or other regulations to undertake EE&DSM activities. Also, SERCs have indicated willingness to allow pass through of the cost of DSM programmes through ARR. As a process, utilities are required to submit their DSM projects to the SERC which in turn is expected to approve the proposal as well as funding arrangement proposed by the utility. Although this process has been put in place in some States, very few DSM programmes have gone through this route to implementation. In most cases, utilities have not submitted any proposals for approval to SERC. With regard to the project activities, the utilities are hiring

consultants for in various activities such as preparation of long term DSM plan, load and market research, energy audits etc. Monitoring and Verification is rarely conducted. Wherever it is carried out, it is done with the help of external consultants.

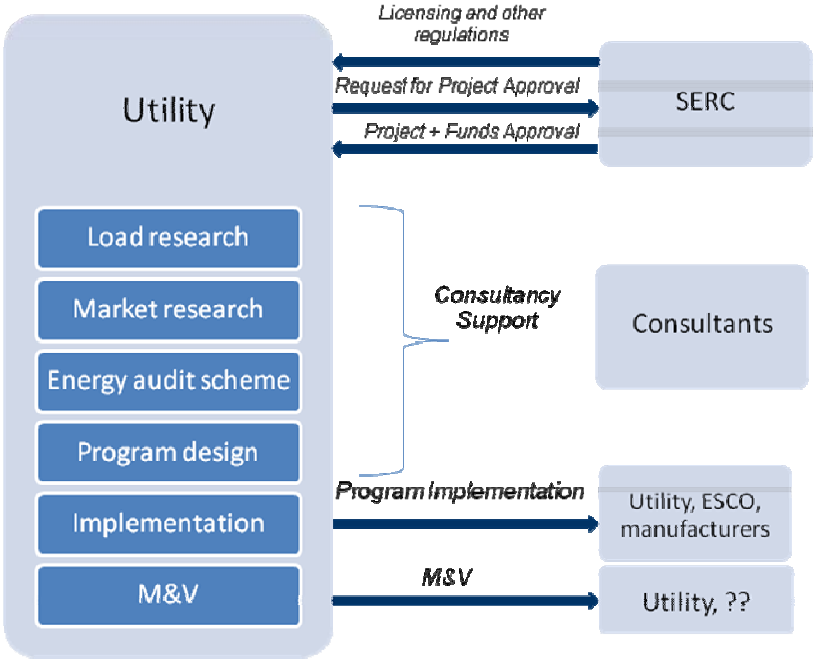

Figure 7-2 Existing DSM framework

We have also carried out comparison of existing DSM framework with model DSM framework to identify deficiencies and steps required to overcome them. We have also tried to identify the institution responsible for those activities of model DSM framework which is being undertaken in the existing scenario. Subsequently, we have identified activities that are not being undertaken by any of the existing institutions. The following figure maps those activities of the model DSM framework with existing activities and institutions responsible for performing those activities. Consequently, the activities that are not being undertaken by any of the existing institutions could be easily identified.

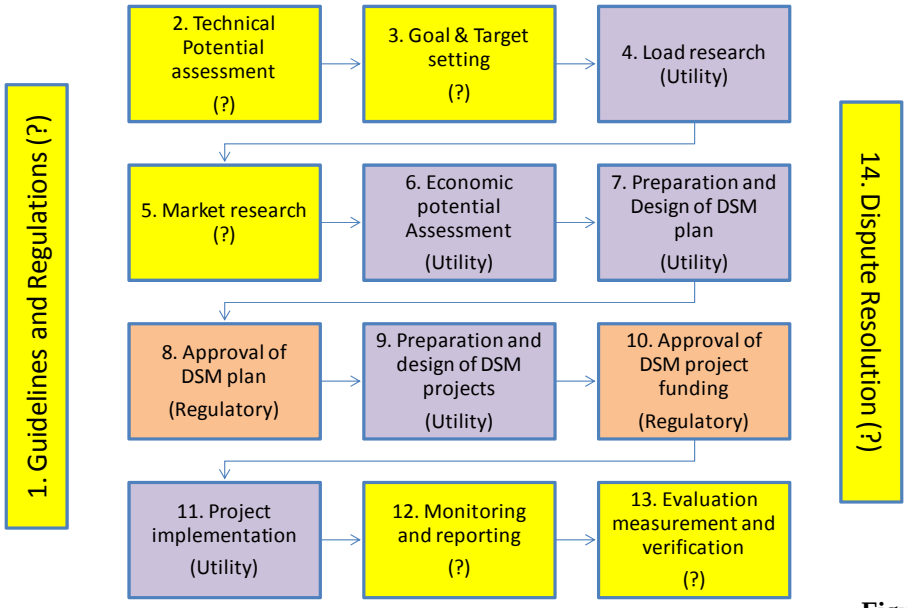

Figure 7-3
Comparison of Model DSM framework with actual DSM framework

7.4 Deficiencies in existing DSM framework

Based on the comparison of model and existing DSM framework, we have primarily identified the deficiencies in the regulatory & policy framework and institutional framework and the same have been presented in the subsequent sections:

7.4.1 Deficiencies in existing regulatory and policy framework

Based on the comparison of the model and existing DSM framework, it can be seen that one of the reasons for non-deployment of larger scale DSM programmes is the absence or deficiencies in the existing regulatory and policy framework. Some of the activities of model DSM framework mentioned below clearly highlight the deficiencies in the existing regulatory and policy framework:

- Absence of requirement for distribution utilities to take up DSM measures;
- Absence of clear mandate to the SERCs to ensure development and implementation of DSM programmes;
- Absence of Regulations/guidelines for design, development and implementation of DSM activities;

- In the absence of an overall target/goal, DSM programmes are undertaken on piecemeal basis;
- Lack of institutional mechanism for coordination between SDAs, distribution utilities and SERCs to undertake EE&DSM

7.4.2 Deficiencies in existing institutional framework

Comparison of the model DSM framework and existing DSM framework highlights that in the existing DSM process, some activities are not being undertaken by any institutions. These activities are:

- Technical potential assessment
- Goal and target setting
- Market research
- Development of guidelines for preparation and design of DSM plan/projects and project implementation
- Monitoring and Reporting
- Evaluation Monitoring and Verification
- Dispute resolution

It is necessary to identify an appropriate institution to undertake these activities.

7.4.3 Capacity building issues in the existing institutions

As discussed in earlier chapters, the most of the DSM programmes implemented are pilot in nature. One of the reasons for non-deployment of larger scale DSM programmes is lack of capacity within institutions such as distribution utilities and SERCs. It will be necessary to identify 'capacity building' requirement against their anticipated roles under model DSM framework. However, for that purpose, it is necessary to finalise the regulatory and policy framework and institutional framework for DSM implementation. ABPS Infra suggests that the exercise to identify 'Capacity Building and Training Needs Analysis' may be undertaken by BEE/FOR as soon as clarity emerges on likely DSM framework.

8 OPTIONS FOR INSTITUTIONAL ARRANGEMENTS

As discussed in the previous chapters, the key players in design and implementation of DSM measures are SERCs and distribution utilities. Though, State Designated Agencies carry out energy efficiency related activities, these are rarely involved in DSM related activities.

In Section 6.4.2 of this Report, we have identified the activities in the model DSM framework which are not being undertaken by anybody. It is necessary to identify institution to undertake these activities. As a part of this assignment, we have clearly identified the list of activities in the model DSM framework which are not being undertaken by any institution. We propose to call this set of functions as 'DSM Executive Functions' and the entity on which these functions may be entrusted as 'DSM Executive Agency'. Several options are available to house this 'DSM Executive Agency' (DSM EA). In our Report, we have identified following four major options for the same:

a. Separate entity incorporated under the appropriate statute
b. Part of State Electricity Regulatory Commission
c. Part of the State Designated Agency
d. Part of the Distribution Utility

These options have been briefly discussed in the following paragraphs.

8.1 Separate Entity incorporated under Appropriate Statue

Given that the activities identified under 6.4.2 are not being undertaken by any institution currently, it may be possible to create separate entity with specific responsibility to execute some or all of those activities. Such an entity will be a new independent entity without any past baggage. As a result, the entity will able to focus on the activities envisaged for it. Ownership of such as an entity could be in private or public domain. However, given the nature of activities it is expected to perform i.e. technical potential assessment, monitoring and verification, it is desirable that such an entity is public sector entity. The entity, if structured properly,

may be able to draw private sector talent to execute the tasks. However, it may be difficult to create new entity only for this activity as role of this new institution will be extremely limited. Further, the ownership and funding of such an entity could be an issue. Individuals working in this entity will have limited career opportunities because of limited scope of work of this entity. The activities envisaged under this entity are the ones that are not being undertaken by any of the existing institutions in any of the States. Given the unclear and undefined territory of activities for a separate new entity, capacity building may emerge as one of the major issues.

8.2 Part of State Electricity Regulatory Commission

The second option that has been explored with respect to creation of DSM EA is locating this functionality within SERC. In other words, the DSM Cell within SERC may act as 'DSM EA'. In this case, since some of the DSM activities are already being carried out by the SERC, it will have better control over the complete DSM process. Single entity will be responsible for potential assessment, target setting, EM&V, dispute resolution etc. If SERC is given overall control over the DSM process, it will provide certainty to utility about the cost recovery.

This option appears to be attractive but it is likely to create conflicts. Firstly, inherent conflict would be between some of the DSM functions which are executive in nature and quasi-judicial nature of the SERCs. Since, SERC is a quasi-judicial body; it is desirable that it does not take up executive functions such as DSM potential assessment, monitoring and verification, etc. Further, given the capacity constraint within SERCs, ability of SERC to undertake such wide variety of activities may be an issue.

8.3 Part of State Designated Agency

The third option that has been explored is, creating of DSM EA as a part of State Designated Agency. As discussed earlier, although both utilities and SDAs undertake EE&DSM activities, their activities are rarely coordinated. Currently, there is no institutional mechanism for them to cooperate on DSM related activities. If this institutional gap could be bridged, a stronger institutional structure for

EE&DSM will emerge. This option is better suited in comparison to the previous two options for following reasons:

a. SDA is an entity already identified under statute i.e. EC Act.
b. Additional responsibility envisaged under 'DSM EA' is complementary to existing role of SDA.
c. Capacity of SDAs, though limited, already exists and it is more than the institutions proposed under other two options.
d. Will lead to creation of single point responsibility for EE/DSM related issues at the State level.
e. Unlike the previous option, in this case the executive function will be effectively separate from the 'Adjudication' function.

One of the major concerns with this option is the ability of the SDAs to undertake additional responsibility. This issue is closely linked to the issue of constitution of the State Designated Agency. In this regard, ABPS Infra reviewed the report prepared by the National Productivity Council on 'Performance of State Designated Agencies'. As per the report, the SDAs can be divided in to three categories; Renewable Energy Organisation (59%), Electrical Inspector-Cum-Advisor (18%) and Power Distribution Companies (23%). If SDA is a distribution company, its role as SDA and that of a distribution company are likely to conflict. In that case, it may be necessary to change the SDA in that particular state before entrusting any further responsibility related to DSM.

Further, wherever SDA is an Electrical Inspector cum Advisor, there is significant lack of capacity. The legal structures of the SDAs also differ from one state to another. The institutional capacity issue and the fact that it may not be possible to implement the proposed structure uniformly across country are two of the major challenges in considering this option.

8.4 Part of Distribution Utility

The last option that has been explored is creating DSM EA as a part of Distribution Utility. The onus of executing various activities under DSM programme essentially

lies with Distribution Utilities. Some of the activities as identified above are being undertaken by them in some of the States. In addition, some of the activities such as technical potential assessment, market research and monitoring and reporting can well be undertaken by Distribution Utilities. One of the issues that need to be addressed in this option is to bring accountability of the Distribution Utilities to undertake these activities. This can be done through appropriate regulatory mechanism such as DSM regulations.

Further, the Distribution Utilities are not suited to undertake some of the other activities identified under the model framework, such as preparation of guidelines and regulations, goal and target setting, evaluation, monitoring and verification, coordination with Bureau of Energy Efficiency and dispute resolution.

The four options discussed above have been analysed in the following sub section.

8.5 Analysis of Options for DSM EA

The four options explained above have been further analysed in Figure 8-1.

Parameters	DSM EA: Separate Entity	DSM EA: SERC	DSM EA: SDA	DSM EA: Utility
Specify Guidelines and Regulations	Lacks authority	Best suited	May not have sufficient authority	Lacks authority
Technical Potential Assessment	Depending on resources may develop high competency, though unlikely	Lacks manpower, resources and experience	Although have resources and experience, lacks capability	Best suited
Preparation of Market Research				
Goal setting & Target Setting	Lacks authority	Best suited	Lacks authority	Lacks authority
Evaluation, Measurement & Verification	Independent entity and hence a good option	Not independent, Lacks manpower and capacity	Independent entity with experience, lacks capacity	Not independent agency, not suited
Dispute Resolution	Lacks authority	Best suited	Lacks authority	Lacks authority

Number of dedicated manpower for carrying out above mentioned work	Given limited career opportunities, will not be able to draw good talent	Low	Dedicated officials already working in EE/EC	Some of the States have established DSM Cells, others are following
Knowledge about EE/EC & DSM	Low	Medium	High	Medium/requires capacity building

Figure 8-1 Competency/Authority of the entities proposed under the four options

On analysis, it can be seen that none of the proposed options for DSM EA is fulfilling the entire requirement on its own. Considering the suitability of Distribution Utilities to undertake various activities under DSM, it appears that it is better equipped to take over most of the executive functions of the DSM EA. However, it will not be able to perform the tasks such as preparation of guidelines, target setting and dispute resolutions. Hence, to ensure that all the tasks identified in the gap analysis are performed by the agency most suitable to execute those tasks, it is proposed to divide tasks between Distribution Utility and SERC. The tasks of DSM EA may be divided in the following manner

- SERCs may take up the following functions:
  - Preparation of Guidelines & Regulations;
  - Goal and Target Setting;
  - Evaluating, Monitoring & Verification
  - Coordination with Bureau of Energy Efficiency
  - Dispute Resolution;
- Distribution utility may carryout following activities:
  - Technical Potential Assessment
  - Market Research;
  - Monitoring & Reporting

In order to ensure effective execution, utility may carry out abovementioned activities themselves or may consider deployment of a separate agency for the same. In this regard, the utility may give preference to Energy Efficiency Services Limited

(EESL) for carrying out these activities. EESL is a joint venture company formed by state-owned power utilities NTPC, Power Finance Corporation, Rural Electrification Corporation and Power Grid Corporation of India to promote energy efficiency projects in the Country. Similarly, keeping in view the lack of capability within SERCs, it is suggested that some of the activities such as EM&V may be carried out through engagement of consultant/third party. However, it is necessary to ensure that agency responsible for EM&V should be independent of other agencies deployed for carrying out other relevant activities.

8.6 Proposed DSM framework

On the basis of discussion on options in the previous sub sections, the proposed DSM framework with institutions responsible to undertake each activity in the process is presented in Figure 8-2. The activities suggested here may not always flow in the same sequential order. It is an iterative process and the activities are revisited as and when required.

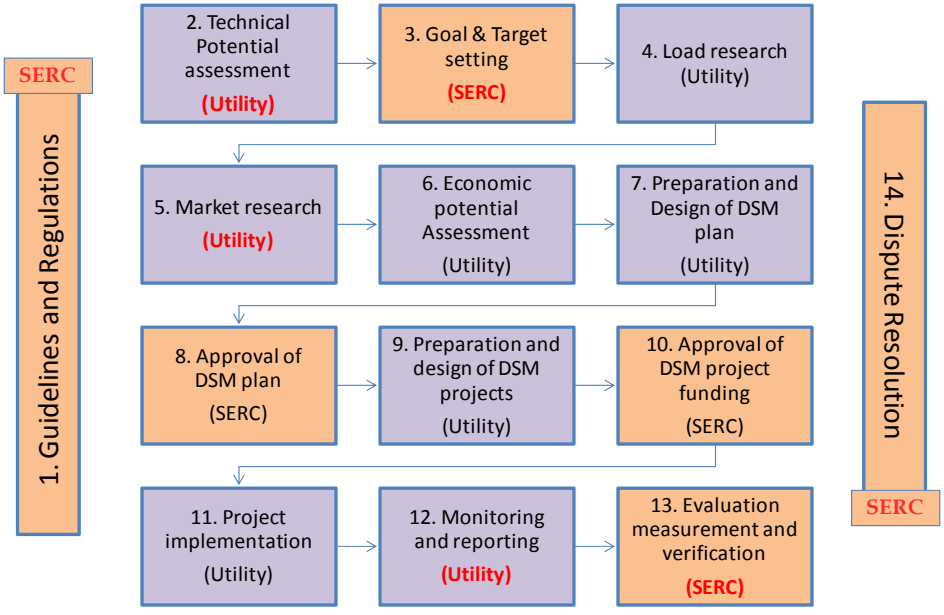

Figure 8-2 Proposed DSM framework

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