Preliminary Concepts For New Mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments

A Report of Task IV
Development Of Improved Methods For Integrating Demand-Side Options Into Resource Planning
(As Part of New Work on DSM and Energy Efficiency in New Electricity Business Environments — Subtask IV/7)

Final Report - June 1997

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Undertaken with Participation and Support from:
Australia (Australian Consortium of Electric Utilities and Government Agencies)
Austria (AAPU)
Denmark (Danish Energy Agency and The Zealand Co-operation)
European Commission (DG XVII)
UK (Energy Saving Trust)
Finland (VTT Energy)
Italy (ENEL)
Japan (Tokyo Electric Power Company and NEDO)
Netherlands (SEP)
Norway (Norwegian Energy and Water Administration)
Spain (Union Fenosa)
Sweden (NUTEK)
Switzerland (BKW)
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FOREWORD

Overview of the IEA and the Demand-Side Management Agreement

International Energy Agency (IEA)

The International Energy Agency (IEA), founded in November 1974, is an autonomous body within the framework of the Organization for Economic Co-operation and Development (OECD) which carries out a comprehensive program of energy co-operation among its 23 member countries. The European Commission also participates in the work of the Agency.

The policy goals of the IEA include diversity, efficiency and flexibility within the energy sector, the ability to respond promptly and flexibility to energy emergencies, the environmentally sustainable provision and use of energy, more environmentally-acceptable energy sources, improved energy efficiency, research, development and market deployment of new and improved energy technologies, and co-operation among all energy market participants.

These goals are addressed in part through a program of international collaboration in the research, development and demonstration of new energy technologies under the framework of over 40 Implementing Agreements. The IEA's R&D activities are headed by the Committee on Energy Research and Technology (CERT) which is supported by a small Secretariat staff in Paris (in Conservation, Fossil Fuels, Renewable Energy and Fusion) are charged with monitoring the various collaborative agreements, identifying new areas for co-operation and advising the CERT on policy matters.

IEA Demand-Side Management Program

The Demand-Side Management Program is a new collaboration with fifteen IEA member countries working to clarify and promote opportunities for demand-side management (DSM).
The members are:

- Australia
- Austria
- Denmark
- European Commission
- Finland
- France
- Republic of Korea
- Spain

- Sweden
- Italy
- Japan
- Netherlands
- Norway
- Switzerland
- United Kingdom
- United States

Six projects or "Tasks" have been undertaken since the beginning of the Demand-Side Management program. The overall program is monitored by an Executive Committee consisting of representatives from each of the member countries. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective Operating Agents are:

- Task I — International Data Base on Demand-Side Management Technologies and Programs (Operating agent: The Netherlands)
- Task II — Communications technologies for Demand-Side Management (Operating agent: United Kingdom)
- Task III — Co-operative procurement of Innovative Technologies for Demand-Side Management (Operating agent: Sweden)
- Task IV — Development and Improved Methods for Integrating Demand Side Management into Resource Planning (Operating agent: United States)
- Task V — Investigation of techniques for Implementation of Demand-Side Management Technology in the Marketplace (Operating agent: Spain)
- Task VI — Mechanism for Promoting DSM and Energy Efficiency in New Electricity Business Environments (Operating agent: Australia).

Task IV Objectives and Workplan

This task focuses on assisting utilities and governments in participants' countries to consider demand-side options on an equal basis as alternatives or additions to conventional and non-conventional supply-side resources. The goal is to have a common exchange of experiences, as well as a common learning process among Annex members. Task IV is divided into five subtasks, these include:

- Subtask IV/1 **—** Review and documentation of utility and market structures, and institutional contexts of agency member countries
- Subtask IV/2 **—** Inventory of available methods and processes for assessing the benefits, costs and impacts of demand-side options

- Subtask IV/3 — Preparation of guidebook on analytical methodologies
- Subtask IV/4 — Development and recommendations of procedures for implementing improved analytical methods and processes
- Subtask IV/5 — Development of guidelines for adoption and application of processes and methods from one country to another

A further description of Annex IV is provided in the Annual Report of the IEA DSM Research Program. There are 12 countries participating in Subtasks IV/1 through 5 of Task IV

DSM and Energy Efficiency for Changing Electricity Business Environments

In addition to the original scope of work (Subtasks IV/1 through 5), the Executive Committee of the IEA DSM Program has decided to undertake new work to investigate available and new mechanisms to promote DSM and energy efficiency in new business environments. The objectives of this work include:

- To present description of and critically review mechanisms which have been used, or proposed for use, to incorporate DSM and energy efficiency into restructured electricity industries
- To present a process model for policymakers to use in developing and evaluating potential new mechanisms for incorporation of DSM in restructured ESIs
- To present examples of potential new mechanisms, and their evaluation, as formulated by a panel of policymakers from the UK, Norway, US and other countries with restructuring experience to share
- To provide an opportunity to apply the process model in an on-going forum and stimulate dialogue and an exchange of experience and results

This work is undertaken in two phases of which Phase I is part of Task IV. Phase II is scheduled to be undertaken by a new Task VI. Phase I has been organized into the following three subtasks:

- Subtask IV/6 — Review of Existing Mechanisms. The objective of this Subtask is to document and review existing mechanisms which have been used, or proposed for use, in incorporating DSM and energy efficiency into restructured electricity industries
- Subtask IV/7 — Preliminary Development and Evaluation of New Mechanisms. This Subtask will assess the factors identified in Subtask IV/6 as contributing to the comparative effectiveness of the various mechanisms.

- Subtask IV/8 — Communication and Dissemination of Results. This Subtask will arrange a series of regional workshops addressing DSM and energy efficiency in restructured markets. Other communications and dissemination strategies will also be included

This report is the final product from the new work.

Available Products from Task IV

Available products from Task IV include:

- **Subtask IV/1 report — "Review and Documentation of Utility Structure and Characteristics of Participating Countries."**[a] This report establishes a framework for discussing and understanding the role of DSM and energy services programs. Such an understanding is necessary in order to perform a meaningful analysis and transfer of results. The report characterizes energy markets, utility industry structures and regulatory types to identify the factors influencing the role and type of DSM and energy services programs in different situations. Four generic situations are established to discuss this. the report also includes a glossary of integrated planning terms and a country summary of utility structure and characteristics using the framework established.

The report characterizes energy markets, utility industry structures and regulatory types influencing the role and type of DSM and energy services

- **Subtask IV/2 report — "Inventory of Available Methods and Processes for Assessing the Benefits, Costs, and Impacts of Demand-Side Options."** The objective of this report is to compile information on the methods, techniques, and models being used in different countries by utilities and governments to address various issues related to the planning, analysis, and forecasting of the benefits, cost and impacts of DSM options. The report includes a survey of more than 40 different tools used for performing the elements of integrated planning, and a survey of the approach taken to integrated planning in 15 different countries.

A survey of more than 40 different computer tools and the approach taken to integrated planning in 15 different countries

[a] IEA DSM Program 1995

- **Subtask IV/3 Report — "Guidebook on Analytical Methods and Processes for Integrated Planning."** This report reviews the key elements involved in integrated planning and describes alternative approaches to demand-side planning and integration of demand-side options in utility resource plans and government policy. The report discusses how approaches might vary with supply characteristics, market conditions, regulatory situations, pricing and tariff structures, government policies, and institutional contexts. The report applies a framework for characterization, and shows how the approach to integrated planning varies between a set of generic situations. As part of the review, case studies with detailed descriptions of alternative approaches to integrated planning are included. Each case study is selected so that it describes an approach taken to integrated planning and focuses on how some unique aspects of the integrated planning process was solved (e.g., how to value flexibility).

Discussion of how the approach to integrated planning varies between utility-market situations

- **Subtask IV/4 Report — "Recommendations for Implementing Improved Analytical Methods and Processes for Integrated Planning."** This report discusses a series of analytical and policy issues for recommended procedures, analytical methods, and processes to improve the integration of demand-side options in utility resource planning. These recommendations are based on two workshops conducted in this project. The first workshop, conducted in Charleston, U.S.A., addressed analytical issues such as valuing the flexibility benefits of DSM, impacts of DSM on system reliability, estimating market penetration of DSM, and multi-fuel optimization. The second workshop, conducted in Copenhagen, Denmark, addressed the treatment of policy issues such as environmental policy objectives, cross-sectoral impacts, and impacts of power sector restructuring on integrated planning.

Recommendation of procedures, method and processes to integrate demand-side options into resource planning

- **Subtask IV/5 Report — "Guidelines for Transferring Methods and Processes for Integrated Planning."** This report reviews the application of processes and methods for assessing integrating planning options across the range of conditions in different countries, and develops a generic approach for transferring the methods and processes given different market conditions, supply characteristics, utility structure, regulatory environments, tariff structures, institutional context, and government policies. The report includes a definition of the factors influencing successful transferability and the key considerations in the transfer of methods and processes from one utility to another. Six case studies of successful transfer of methods/processes are included.

Generic approach for transferring planning methods and processes to new electricity business environments

- **Subtask IV/6 Report — "Review of Existing Mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments."** This report documents and reviews existing mechanisms for promoting DSM and energy efficiency in the new electricity business environments that result from unbundling the traditional electricity utility functions and exposing some of them to competition. The information was collected through extensive telephone and face-to-face interviews with key policy makers and leading decision makers in governments and electricity industry businesses. The survey was carried out in countries or regions that have implemented—or are considering implementing—specific mechanisms to promote DSM and energy efficiency in restructured electricity markets. The report also discusses and indicates key future issues and which mechanisms seem to work better than others in restructured power sectors.

Which mechanisms seem to work best in new electricity business environments?

- **Subtask IV/7 Report – "Preliminary Concepts for New Mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments."** This report identifies preliminary concepts for new mechanisms for promoting DSM and energy efficiency in restructured electricity markets. It is based on the results of two Experts Meetings and two Subtask Workshops. The report builds upon the work completed in the Subtask 6 of this project and has been designed to meet the immediate needs for information about the new mechanisms. It has been produced to maximize the synergies between the Task IV effort and the new Task VI to be initiated in early 1997.

Preliminary concepts for new mechanisms in restructured electricity markets.

Acknowledgments

This effort is supported (through cost and task sharing) by multiple countries. Information has been collected and the document reviewed by Experts from the following organizations:

Name	*Organization*	*Country*
Chris Barklay	OFFER	UK
Anna Englaryd	NUTEK	Sweden
Jesus M. Martin Giraldo	Union Electrica Fenosa	Spain
Walter Grattieri	ENEL S.p.A	Italy
Alf Olav Grinde	Norwegian Energy and Water Administration (NVE)	Norway
Craig Hosking	Western Power	Australia
Seppo Kärkkäinen	VTT Energy	Finland
Eoin Lees	Energy Savings Trust (EST)	UK
Tetsuya Maekawa	Tokyo Electric Power Company	Japan
Jan Moen	Norwegian Energy and Water Administration (NVE)	Norway
Eero Pere	Finnish Electricity Association	Finland
Diane Pirkey	US Department of Energy	USA
Alfred Reichl	Austrian Association of Power Utilities	Austria
Jens Rubæk	NVE	Denmark
Giancarlo Scorsoni	ENEL SpA/DPS	Italy
Juliette Smith	Energy Saving Trust	UK
Fritz Spring	Bernische Kraftwerke AG	Switzerland
Jan van den Berg	SEP	Netherlands

In addition, much of the information has been collected through extensive interviews with leading policy and planning practitioners from energy industry businesses and governments in 15 different countries and in European Union.

The information in this report is based on two Experts meetings, conducted in Amsterdam in April 1996, and in London in June 1996, and two Workshops, conducted in Sydney, Australia in October 1996, and in Copenhagen, Denmark, in November 1996.

The report was prepared by the operating agent, Dr. Grayson Heffner, EPRI, USA, supported by SRC International, Bala Cynwyd, USA. The principal investigators from SRCI include Matthew Rose, Dilip Limaye, and Ståle Johansen. The authors would like to gratefully acknowledge the contributions of the Task IV Experts and the participants in the two Workshops who provided valuable insights and suggestions.

Any errors and omissions are the sole responsibility of the principal investigators and the Operating Agent.

EXECUTIVE SUMMARY

Introduction

This report presents preliminary concepts for new mechanisms to promote DSM and energy efficiency into restructured electricity supply industries. The report supplements the earlier Subtask IV/6 report which reviewed existing mechanisms in eight countries.

The mechanisms identified in this report are not DSM and energy efficiency programs. Rather they assist the implementation of such programs. Two types of mechanisms are investigated. First there are policy and regulatory measures which can be implemented by governments and regulators to promote DSM and energy efficiency. Second there are mechanisms which enable energy businesses to make a commercial return by implementing DSM and energy efficiency programs.

This report presents preliminary work that will be substantially refined and expanded as part of the new Task VI of the IEA project. The report has been designed to meet the immediate need for information about new mechanisms, and has been produced as a part of the Task IV research effort to maximize the synergies with the information that will be developed in Task VI. The information presented in this report is based on two Task IV Experts Meetings and two Workshops with DSM practitioners.

Rationale for DSM and Energy Efficiency in Restructured Markets

Ample literature and public policy debate have pointed out the weaknesses of a monopolistic electricity sector in relation to achieving an economically justified level of energy efficiency. Proponents of intervention have identified a number of market failures that cause customers not to choose a level of energy efficiency that appears to be economically justified. These market failures include:

- The Payback Gap
- Prices Differ from Marginal Cost
- Risk Sheltering of the Utility
- Averch-Johnson-Willig Effect
- Externalities
- Lack of Information and High Transactions Costs

- Disconnected Decision-Maker

Some of the market failures identified above are directly linked to the existence of a franchised monopoly in electricity supply and the type of regulation that has been applied to limit monopoly electricity utilities' market power. With restructuring of the electricity sector to encourage (1) competition in generation and (2) full customer choice of their electric supplier, many of these market failures are either reduced or eliminated.

However, it is important to note that several market failures are likely to remain following restructuring of the electricity market. For example:

- Restructuring in itself does nothing to address externalities. The external costs are likely to remain significant and omitted from decisions which producers, transporters, and consumers make.

- The disconnected decision maker market failure is not affected by the structure of the electricity commodity market and therefore will remain.

The market failures of lack of information and high transaction costs are likely to remain, although they may be reduced by restructuring.

Therefore, the rationale to encourage DSM and energy efficiency still exists, though the nature of the market failures will have altered. Determining whether there is still a compelling rationale to intervene in the electricity market to encourage DSM and energy efficiency will undoubtedly be a policy decision.

Types of DSM and Energy Efficiency Strategies

The introduction of a competitive electricity market is likely to realign the roles of the industry players (generators, transmission businesses, distribution 'wires' businesses, and retail suppliers) relative to customers. A competitive market will also create a need stronger than before to define *why* DSM and energy efficiency programs should be carried out by the various players. A useful distinction can be drawn between DSM strategies pursued by or at the direction of government, and DSM strategies pursued as part of a business or competitive strategy.

In Subtask IV/6, two categories of DSM and energy efficiency activities were identified:

- Public policy-based DSM and energy efficiency — DSM and energy efficiency programs carried out to achieve public policy objectives. Such objectives can be: to reduce environmental damage, to increase overall energy system efficiency, to achieve job creation, etc.

- Business-based DSM and energy efficiency — DSM and energy efficiency programs carried out by energy businesses or their partners to achieve commercial corporate objectives. Examples of such objectives include: to improve the profitability of existing business areas, to improve market positioning, to retain customers, to improve public relations, to increase profitability from new business areas (e.g., new products and services).

Differences in DSM and Energy Efficiency between Traditional and Restructured Markets

There are many differences between the DSM and energy efficiency mechanisms suitable for implementation in traditional regulated markets and those applicable to restructured electricity markets:

- In the traditional markets, DSM/EE is motivated by regulators, while in a competitive market the major motivator is the marketplace.

- In a regulated market, DSM/EE is driven by load shape objectives, while in a competitive market, it is driven by customer needs.

- Traditional DSM/EE is targeted at resource value, while in a competitive market, DSM/EE approaches focus on customer value.

- In regulated markets, DSM/EE is paid for by all customers (ratepayers), but in a competitive market only the direct beneficiaries will pay.

- In the traditional approach, DSM/EE focuses on electricity only; in competitive markets the focus will be on all energy sources.

Identification of New Mechanisms

The uncertainty pertaining to the market structure of new electricity business environments, particularly across (and within) various countries, lends itself to a number of possible opportunities ensuring the advancement of DSM and energy efficiency. Currently, there are a host of "new" mechanisms being considered and applied to promote energy efficiency even as the marketplace continues to evolve and change. As part of this study, effort was placed on convening a range of international experts and interested parties to discuss and solicit insights regarding the shape of new mechanisms to be considered. A formal (yet unscientific) process was applied, as described in Section 3, to allow interested parties to consider future electricity markets and identify methods to ensure continuing efforts to promote DSM and energy efficiency

in restructured markets. Table ES-1 presents the mechanisms identified in this report.

It should be noted that while many of the mechanisms identified here are not entirely new, it is possible to develop new combinations of the type of activity, implementing organization, and funding source, to create new mechanisms that may be effective in promoting DSM and energy efficiency in new electricity business environments. The workshops conducted in this project pointed out both new combinations and entirely new mechanisms.

Examples of new combinations include the following:

- Customer audits tied to the Internet or to home automation, provided by the private sector or the distribution utility, funded by the customer or the government.

- Partnerships for technology improvement implemented by government and manufactures, funded by tax revenues.

Examples of entirely new mechanisms identified in this workshop include:

- Certification of energy service companies (ESCOs) by governments using funds from tax revenues or from ESCOs.

- Development of state of the art energy-efficient construction techniques in collaboration with architect and engineering communities, implemented by governments using tax revenues or distribution charges.

- Provision of "frequent user credits" for large electricity users, with the credits to be redeemable for energy-efficient appliances or equipment.

As noted earlier, the mechanisms for promoting DSM and energy efficiency in new electricity business environments can be characterized as public policy-based or business-based. Most of the public policy-based mechanisms are implemented or funded by government or regulators, while the business-based mechanisms are implemented and/or funded by private organization. A key challenge for government and regulators is to create the market environment and incentives that facilitate the development and implementation of business-based mechanisms. Some innovative mechanisms combine public policy and business objectives.

Table ES-1 shows the classification of the identified mechanisms as public-policy based, business-based or a combination of both.

Table ES-1. *Examples of Mechanisms to Promote DSM and Energy Efficiency*

Type	Description	Implementing Organization(s)	Funding Source	Market Failure(s) Addressed	Public Policy-based or Business Based
General Information	• Advertising • Labeling • Energy centers • Demonstration sites	• Government • Utility partnerships • Distribution utilities	• Env. Taxes • Distribution taxes	• Lack of Information	Public policy-based
Tax Incentives	• Tax credit-manufacturers • Tax credit-customers • Reduced VAT	• Government	• Government funds	• Externalities • Payback gap	Public policy-based
Customer Audits	• Private sector-sponsored on-site audit • Distribution utility audits • Audits tied to Internet • Audits tied to home automation • Need to link audits to financing option	• Distribution utility • Private sector	• Customer financed • Government subsidies	• Lack of Information	Business-based
Pricing Schemes	• Real time pricing • Off-peak pricing • Interruptible rates • Progressive use rates • End use service rates • "Green" pricing	• Distribution utility	• N/A	• Incorrect price signals	Business-based
Partnerships for Tech-nology Im-provement	• Manufacturers' consortium • Govt.-manufacturer partnership	• Government • Manufacturers • Regional distribution utilities	• Government taxes • RD & D funds • Pricing Schemes	• High transaction costs • Disconnected decision-maker	Both public-policy based and business-based
Building Codes/ Standards	• Upgraded building codes • Advanced appliance standards	• Government • Manufacturers	• Government energy taxes	• Externalities • Lack of information • Disconnected decision-maker	Public policy-based
Site-Specific Customer Information	• On-site metering • Design assistance • Improved information on customer bills	• Distribution utilities	• Distribution utilities • Customer fees	• Lack of information	Business-based
Customer Incentives	• Grants (rebates) • Loans • Financing	• Government • Distribution utilities	• Distribution utilities	• Payback gap • High transaction costs	Both public-policy based and business-based

Type	Description	Implementing Organization(s)	Funding Source	Market Failure(s) Addressed	Public Policy-based or Business Based
Customer Contracting	• Shared savings • ESCO certification • DSM bidding	• Utility ESCO • Private ESCO • Government	• Third-party financing	• High transaction costs • Externalities	Both public-policy based and business-based
Efficient Equipment Procurement	• Government procurement	• Government	• Environment/carbon taxes • Transmission charges	• High transaction costs • Disconnected decision-maker	Public policy-based

Types of Mechanisms and Implementing Organizations

Some of the new mechanisms that were identified on the Experts Meetings and Workshops include the following:

- General information campaigns implemented by government-utility partnerships.
- Various pricing options (such as real-time pricing, progressive use rates, "green pricing", etc.) implemented by distribution utilities
- Consortia involving governments manufacturers, and regional distribution utilities to offer energy-efficient products and equipment
- Performance contracting for energy efficiency offered by utility or private-sector ESCOs or by government
- Government-led certification program for trade groups and ESCOs
- Government and utility procurement practices to purchase energy-efficient equipment at a volume discount for sale to customers
- Utility end-use service rates
- DSM bidding
- Focus on market transformation activities based on "pushing" the appliance and trade ally markets

These and other identified mechanisms are presented in Section 4 of this report.

Incentives and Motivations for Implementing Organizations

A wide range of implementing organizations has been identified in this project. The major incentives and motivations for these organizations to implement DSM and energy efficiency mechanisms are summarized below:

- Government and regulators
  - increase energy system efficiency
  - reduce environmental damage
  - stimulate the market to adopt energy-efficient appliances and equipment
  - demonstrate energy-efficiency technologies
  - provide improved information for more efficient functioning of the markets
  - reduce the transaction cost barrier

- Distribution utilities
  - provide correct price signal
  - increase market share
  - reduce operating costs
  - increase profit margins
  - reduce capital requirements
  - provide better information for customer decisions
  - improve customer satisfaction

- Manufacturers
  - increase market share
  - increase revenues
  - improve profitability
  - increase customer satisfaction

- Energy businesses
  - increase market share
  - increase revenues
  - improve profitability
  - create new business areas

Funding Sources

The identification of new mechanisms also included discussion of funding sources to properly advance these opportunities from start-up through on-going implementation. In some cases, this may only require "seed money" to get the efforts up and running. The prevailing thought focused on the use of an environmental tax at the transmission level or a consumers use tax at the distribution level as a primary means of generating funds to promote energy-efficiency. This approach was directed particularly at mechanisms involving a partnership of stake holders including: development of advanced building codes and standards, national or regional demonstration efforts, promotion of regional energy centers, and customer and trade ally education and information.

The funding responsibilities for some of the other mechanisms such as: pricing options, customer audits, on-site metering, and construction design assistance were identified as being borne primarily by distribution utilities, as part of their ongoing interaction with customers. In some cases, some of these costs could be shared by the participating customer(s).

Implications of the Selected Mechanisms

Some of the implications of the new mechanisms are summarized as follows:

- **Shared Risks and Responsibilities** - There appears to be a need for shared risks and responsibilities across all stakeholders as a requisite to assuring energy-efficiency in re-regulated markets. Many of the suggested mechanisms involve "leveraging" from a host of stakeholders and requiring sponsorship from more than one organization. This "Shared risk" approach translates to involvement at a higher level of intervention (i.e., government, manufacturers, consortia of trade groups or utilities) to permit advantages in economies of scale in addressing the market place.

- **Reliance on Government Intervention** - many of the suggestions focused on the need for government intervention to ensure a top-level involvement in advancing energy-efficiency opportunities.

- **Importance of Customer Information** - there appeared to be a consensus that a key ingredient to ensuring energy-efficiency in restructured electricity supply markets is the need to provide proper and understandable information to customers regarding the benefits and costs of energy-efficiency.

- **Mixture of Mechanisms** - most of the suggestions indicated that no single mechanism, by itself, will adequately assure energy-efficiency in re-structured markets. Rather, there is a need to pursue a strategy of combining complementary mechanisms to achieve a greater result.

1. INTRODUCTION

1.1 Background

Until recently, the various functions of the electricity supply industry (generation, transmission, distribution and retail supply) were regarded as being natural monopolies. Frequently, all of these functions were carried out within vertically integrated, monopolistic utilities. Even where some of the functions were carried out by separate utility businesses, each business was still regarded as being a monopoly.

Major structural transformation of the ESIs

However, in many of the countries participating in the IEA DSM Program, the electricity supply industry (ESI) is undergoing, or may soon undergo, a major structural transformation. This restructuring involves separating out the ESI functions into individual businesses and exposing some of these businesses to competition. Typically, generation and retail supply are regarded as being open to competition, whereas the transmission and distribution 'wires' businesses are still seen as being natural monopolies.

In several countries, another element of the industry restructuring involves the privatization of utility businesses where these are currently government-owned.

Changes in the justification and motivation for utility businesses to undertake DSM and energy efficiency

These structural changes fundamentally alter the context in which DSM and energy efficiency programs can be carried out. In particular these changes alter the justification and motivation for utility businesses to undertake DSM and energy efficiency programs. Changes in utility business motivations may establish new roles for governments and non-utility businesses to facilitate and participate in the delivery of DSM and energy efficiency programs.

Significantly, a backdrop to this global power sector restructuring are increased climate change and other environmental concerns resulting in requests for more vigorous work to improve end-use energy efficiency.

Only a handful of countries have any experience in attempting to incorporate DSM and energy efficiency into restructured ESIs

At present, only a handful of countries have any experience in attempting to incorporate DSM and energy efficiency into restructured ESIs. Norway included energy efficiency considerations into the establishment of its competitive electricity market. In UK, Australia and New Zealand, extensive policy work on the role of DSM and energy efficiency has been completed prior to the establishment of competitive electricity markets, but these markets are not yet fully functional. Finally, substantial work is underway in the United States on mechanisms to promote DSM and energy efficiency within an ESI where customers have a choice of supplier.

Many other countries are currently planning the restructuring of their ESIs and there are significant opportunities to incorporate DSM and energy efficiency into these plans. However, a major problem is the lack of precedents and examples to show skeptical legislators and government officials how it can be done. There is still a strong lobby in some countries which maintains that establishing competition is all that is required to achieve effective uptake of all economically viable energy efficiency—despite the years of work on market barriers to energy efficiency.

1.2 Work on DSM and Energy Efficiency in New Electricity Business Environments

To respond to the major changes which are occurring in electricity industries world-wide, the Executive Committee of the IEA DSM Program has agreed that the existing scope of work under the Agreement should be expanded. The expansion includes work on DSM and energy efficiency in new electricity business environments. This new work will:

- develop a range of practical mechanisms whereby economically justifiable DSM and energy efficiency can be incorporated into changing electricity business environments;
- identify the public policy implications of these mechanisms;
- communicate a range of information about the mechanisms.

The mechanisms which will be considered in the new work are not DSM and energy efficiency programs. Rather they assist the implementation of such programs. Two types of mechanisms are investigated in the study. First there are policy and regulatory measures which can be implemented by governments and regulators to promote DSM and energy efficiency. Second there are mechanisms which enable electricity businesses to make a commercial return on DSM and energy efficiency programs.

Mechanisms are targeted at organizations which develop and implement DSM and energy efficiency programs and are intended to make it easier for these programs to be implemented. In contrast, DSM and energy efficiency programs are targeted at customers and are intended to change the way in which energy is used and therefore achieve commercial outcomes for the program implementers.

The new work is not aiming to tell governments and industry regulators what they should do. Neither will it make comparisons between countries in relation to their relative success or otherwise in promoting DSM and

energy efficiency. Rather the new work will make available to responsible authorities objective factual information about the mechanisms they could use to promote DSM and energy efficiency in changing electricity business environments. The decision on whether to implement any of the mechanisms clearly lies with the responsible authorities in each sovereign country. The information provided by the new work is intended to assist and inform this decision.

1.2.1 Objectives

The objectives of the work on DSM and energy efficiency in new electricity business environments are as follows:

- to describe the types of market barriers and/or implementation problems which could frustrate the successful achievement of energy efficiency goals under the various types of new electricity supply industry models/structures likely to be implemented by participating countries;

- to document and review existing mechanisms which have been used, or proposed for use, in incorporating DSM and energy efficiency into restructured electricity supply industries;

- to develop in detail a range of practical new mechanisms whereby economically viable DSM and energy efficiency can be promoted within restructured ESIs;

- to identify the public policy implications of the various new DSM mechanisms including implications for new ESI structures, rules of conduct, regulation, consumer protection, legislation and oversight;

- to identify and discuss transition issues associated with moving from where participating country DSM programs are before restructuring into new program and strategy configurations (including the issue of how to avoid losing momentum and capability during the transition);

- to communicate and disseminate information about both existing and new mechanisms to utilities, legislators, government officials and industry regulators.

1.2.2 Organization of the Work

To maximize the benefit from the related work already carried out under Task IV, the Executive Committee of the IEA DSM Program has decided to organize the new work in two Phases. Phase 1 is an extension of Task IV

and Phase 2 comprises a new Task VI (see Figure 1). This report has been prepared as part of the Phase I/Task IV effort.

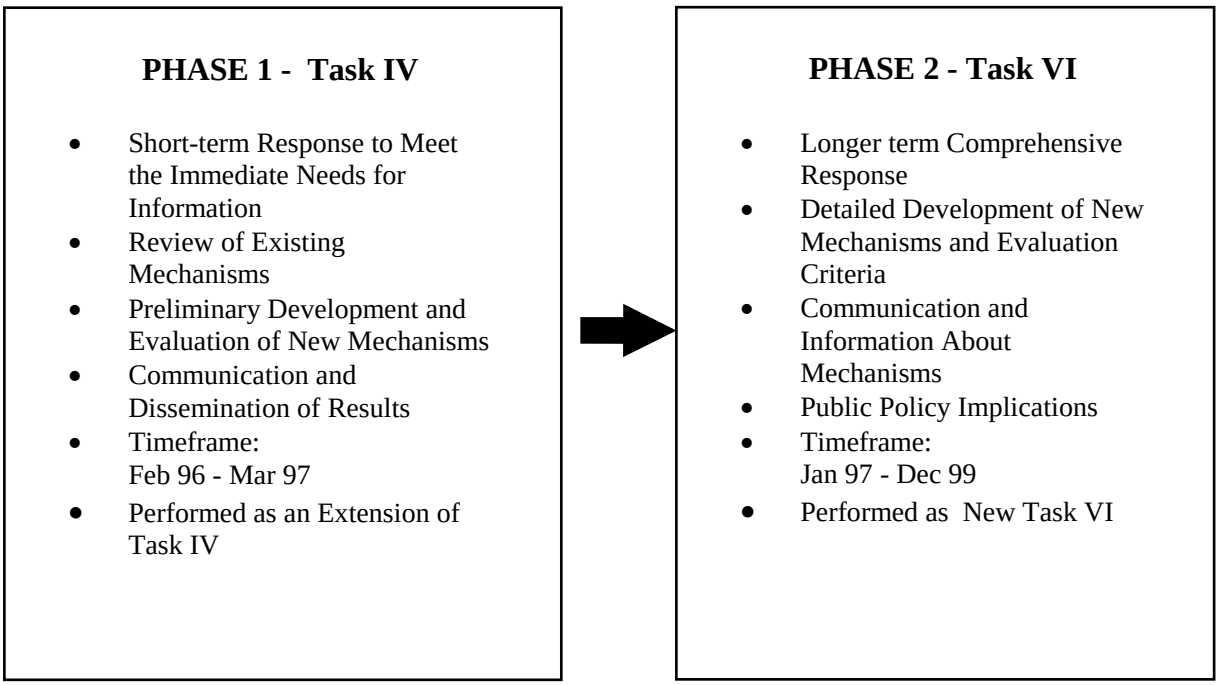


Figure 1 Overview of Research Approach

Phase 1

The Workplan of Phase 1 (undertaken as an extension to Task IV) comprises four Subtasks:

- Subtask IV/6 Review of Existing Mechanisms—To document and review existing mechanisms which have been used, or proposed for use, in incorporating DSM and energy efficiency into restructured electricity industries.

- Subtask IV/7 Preliminary Development and Evaluation of New Mechanisms—To develop the concepts for new mechanisms and evaluate how these mechanisms might work in restructured ESIs.

- Subtask IV/8 Communication and Dissemination of Results—To communicate and disseminate the results from this effort and to establish an on-going forum for dialogue and an exchange of experience and results.

Phase 2

The Workplan for Phase 2 (the new Task VI) comprises three Subtasks:

- Subtask VI/1 Detailed Development of New Mechanisms and Evaluation Criteria—To develop in detail a range of practical new mechanisms whereby economically justifiable DSM and energy efficiency can be incorporated into changing electricity business environments.

- Subtask VI/2 Communication of Information About the Mechanisms—To communicate and disseminate the range of information relating to the mechanisms to government, industry regulators and utilities.

- Subtask VI/3 Public Policy Implications—To identify the public policy implications which would follow a decision by the responsible authorities to implement each of the various mechanisms.

1.3 This Report

This report is the final product from the new work on DSM and energy efficiency in new electricity business environments. It comprises a report of the work carried out in *Subtask IV/7, Preliminary Concepts for New Mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments.*

This report builds upon the work completed in Subtask VI of this project, which resulted in a report titled, *Review of Existing mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments*. It is based upon the results of two meetings involving the Task IV Experts, and two Workshops involving leading practitioners of DSM and energy efficiency in various countries.

The report is designed to provide a starting point for Task VI of the IEA DSM Implementation Agreement, with Dr. David Crossley of Energy Futures Australia as the Operating Agent. It provides some ideas and concepts for new mechanisms that will be further evaluated and refined in Task VI.

The report has been designed to meet the immediate needs for information about new mechanisms to incorporate DSM and energy efficiency into restructured ESIs. It has been produced as part of the Task IV research effort to maximize the synergies between information that will be collected and synthesized in Task VI.

1.3.1 Approach

This report identifies preliminary concepts for new mechanisms for promoting DSM and energy efficiency in the new electricity business environments that result from unbundling the traditional electricity utility functions and exposing some of them to competition.

The information presented in this report was developed from:

- Task IV Experts Meeting - Amsterdam, Netherlands
April 25-26, 1996
- Task IV Experts Meeting - London, U.K.
June 10-11, 1996
- Subtask IV/7 Workshop - Sydney, Australia
October 31, 1996
- Subtask IV/7 Workshop - Copenhagen, Denmark
November 22, 1996

1.3.2 Structure

An overview of the report structure is provided in Figure 2.

Chapter 2 presents a framework for assessing mechanisms for promoting DSM and energy efficiency in new electricity business environments, which was developed in Subtask 6. This includes a fundamental discussion of:

- the original justification for intervention — market failures;
- how restructuring may affect market failures.

Chapter 2 emphasizes that the decision to intervene in electricity markets to promote DSM and energy efficiency is a policy decision which involves political considerations and trade-offs.

Chapter 2 also introduces the terms:

- "public policy-based DSM"; and
- "business-based DSM".

The assessment framework developed in Chapter 2 is used in Subtask IV/7 for the preliminary development of new concepts for new and improved mechanisms.

Chapter 3 describes the approach used for identification of new mechanisms in the Experts Meetings and the Workshops conducted as a part of this Subtask.

Chapter 4 presents the preliminary identification of the new mechanisms based on the Exports Meetings and the Workshops.

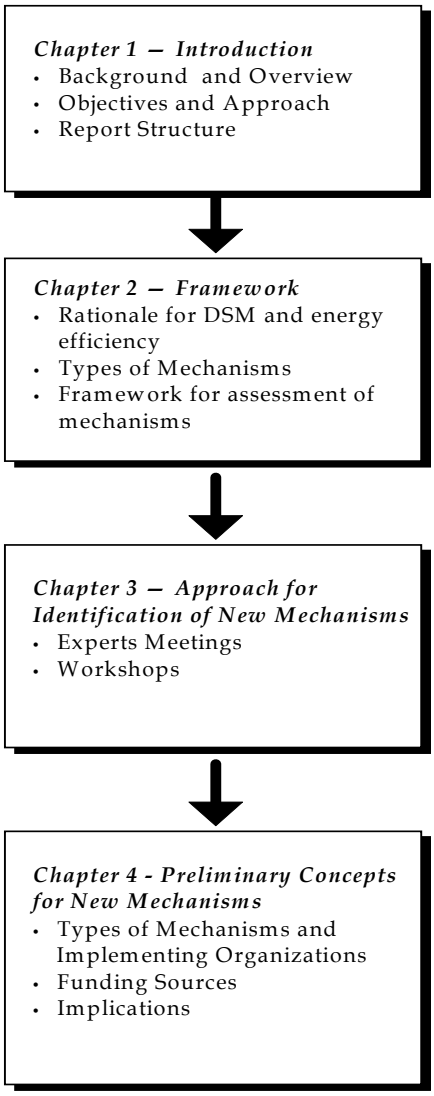


Figure 2 Overview of report structure

2. FRAMEWORK FOR DEVELOPMENT OF NEW MECHANISMS

2.1 Introduction

In the Subtask IV/16 effort[a], a framework was developed to examine how to implement DSM and energy efficiency programs that otherwise would not occur in the market. This framework presupposes that policy makers have already reached the conclusion that some policy and/or regulatory mechanism(s) should be introduced into the electricity market to influence the 'naturally occurring' level of energy efficiency. It is presumed that the introduction of such mechanisms is in the public interest.

The key issues related to DSM and energy efficiency that were discussed in the Subtask IV/6 report include:

- How does the rationale for intervening in electricity markets to promote DSM and energy efficiency change with restructuring of the electricity sector?
- What are the differences between what we will call "business-based DSM" and "public policy-based DSM"?
- What is the nature of the intervention mechanisms included in this study?

A brief review of the Subtask IV/6 findings is provided below.

2.2 Rationale for DSM and Energy Efficiency in Restructured Electricity Markets

2.2.1 The Original Justification – Market Failures

Ample literature and public policy debate have pointed out the weaknesses of a monopolistic electricity sector in relation to achieving an economically justified level of energy efficiency. Proponents of intervention have identified a number of market failures that cause customers not to choose a level of energy efficiency that appears to be economically justified. These market failures include:

[a] See Subtask IV/6 reports, Review of Existing Mechanisms for Promoting DSM and Energy Efficiency in New Electricity Business Environments, October 1996.

- The Payback Gap
- Prices Differ from Marginal Cost
- Risk Sheltering of the Utility
- Averch-Johnson-Willig Effect
- Externalities
- Lack of Information and High Transactions Costs
- Disconnected Decision-maker

These are a selection of the range of market failures that have been cited as a rationale for intervening in energy markets to encourage higher levels of energy efficiency. In the absence of market failures, the market itself would act to select an economically justified higher level of energy efficiency.

2.2.2 How Restructuring Affects Market Failures

Some of the market failures identified above are directly linked to the existence of a franchised monopoly in electricity supply and the type of regulation that has been applied to limit monopoly electricity utilities' market power. With restructuring of the electricity sector to encourage (1) competition in generation and (2) full customer choice of their electric supplier, many of these market failures are either reduced or eliminated. Specifically:

- Since the shielding effects of regulation and monopoly are removed from the generation market, the difference in investment payback between generators and customers is likely to be reduced and approach levels that exist in other segments of the economy. This reduction in the payback gap is achieved through generators requiring a risk-premium, e.g., through requiring shorter payback time on investment in generation. This is different from the objective of many DSM programs (e.g., rebate programs) that were aimed at reducing customer discount rate

- In those countries where rate-of-return regulation applies, the discipline of the market is likely to remove the incentives to overbuild provided by this form of regulation.

- In a fully functioning electricity commodity market, competition is likely to drive prices for electricity towards marginal costs. Thus, pricing market failure is likely to be removed.

- If electricity suppliers choose to use energy efficiency services as one of their competitive tools in the electricity commodity market, then the market failures of lack of information and high transactions costs may be reduced.

However, it is important to note that several market failures are likely to remain following restructuring of the electricity market. For example:

- Restructuring in itself does nothing to address externalities. The external costs are likely to remain significant and omitted from decisions which producers, transporters, and consumers make.

- The disconnected decision maker market failure is not affected by the structure of the electricity commodity market and therefore will remain.

- The market failures of lack of information and high transaction costs are likely to remain, although they may be reduced by restructuring as noted above.

2.2.3 Rationale for Intervention

Restructuring of the electricity market will eliminate some market failures and reduce others. However, some market failures will remain. These are likely to constrain the level of energy efficiency achieved through the "natural" operation of market forces to below the economically justifiable level. Therefore, the rationale to encourage DSM and energy efficiency still exists, though the nature of the market failures will have altered. Determining whether there is still a compelling rationale to intervene in the electricity market to encourage DSM and energy efficiency will undoubtedly be a policy decision. In developing an effective policy for intervention, policy makers would be well-advised to be as specific as possible in identifying the market failures that the intervention is intended to influence, and to prioritize (to the extent possible) the competing objectives of intervention.

2.3 Types of DSM and Energy Efficiency Strategies

The Subtask IV/6 report identified the following two main objectives for DSM and energy efficiency activities:

- Public policy-based DSM and energy efficiency **—** DSM and energy efficiency activities carried out to achieve public policy objectives. Such objectives can be: to reduce environmental damage, to increase overall energy system efficiency, to achieve job creation, etc.

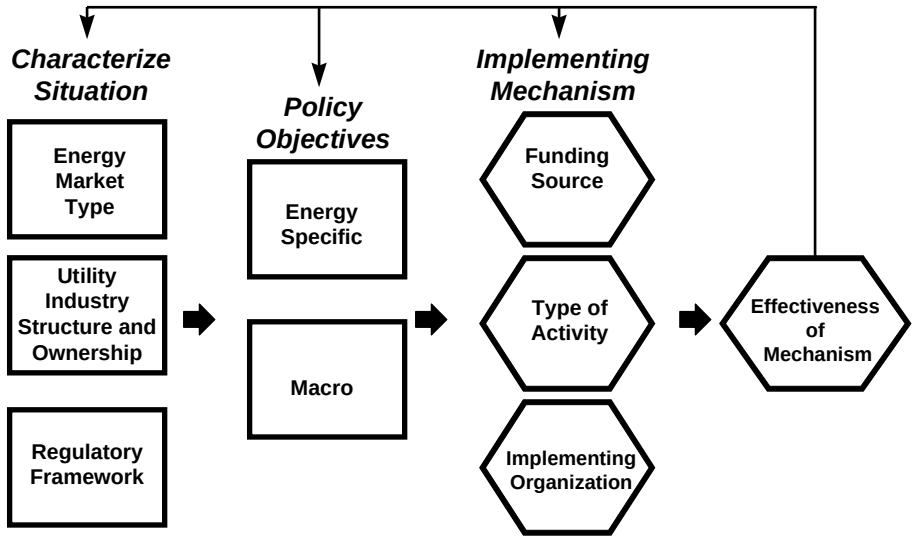
- Business-based DSM and energy efficiency — DSM and energy efficiency activities carried out by energy businesses or their partners to achieve commercial corporate objectives. Examples of such objectives include: to improve the profitability of existing business areas, to improve market positioning, to retain customers, to improve public relations, to increase profitability from new business areas (e.g., new products and services).

2.4 Assessment Framework

Subtask IV/6 developed a systematic approach to identifying the characteristics of the situation in which a mechanism is to be implemented. These characteristics are the key to the effectiveness of the mechanism. A particular mechanism will vary greatly in effectiveness depending on the specific characteristics of the situation in which it is implemented.

An overview of this framework is provided in Figure 3.

Figure 3 Framework for Assessment of Mechanisms



The process begins by characterizing the situation. This provides an initial assessment of the possible incentives for utilities and third parties to develop DSM and energy efficiency as part of their normal business, as well as for government to intervene through other means.

The second step of the process is to identify the specific policy objectives to be achieved through restructuring of the electricity industry. These include objectives directly related to DSM and energy efficiency, as well as those that are more global in scope.

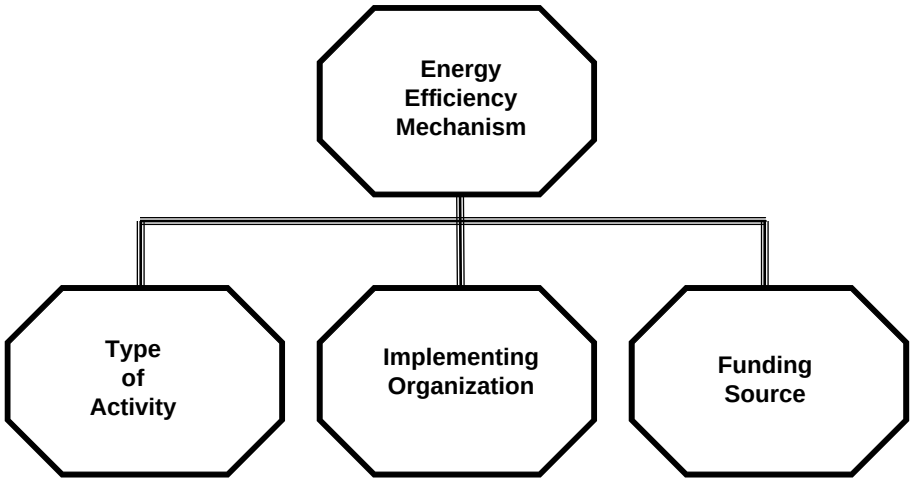
Given the assessment of the market, regulatory and industry structure (step 1) and a set of restructuring objectives (step 2), the next step is to characterize the three key elements of the mechanism itself (see Figure 4):

- the type of intervention activity (how)
- the implementing organization (who)
- the funding source(s)

This process allows all of these considerations to enter the decision-making process.

This framework is utilized in this subtask to identify and characterize new mechanisms.

Figure 4 Key Elements of Mechanisms



2.5 Differences between Traditional and Restructured Markets

There are many differences between the DSM and energy efficiency mechanisms suitable for implementation in traditional regulated markets and those applicable to restructured electricity markets. Figure 5 below illustrates some of the differences.

- In the traditional markets, DSM/EE is motivated by regulators, while in a competitive market the major motivator is the marketplace.
- In a regulated market, DSM/EE is driven by load shape objectives, while in a competitive market, it is driven by customer needs.
- Traditional DSM/EE is targeted at resource value, while in a competitive market, DSM/EE approaches focus on customer value.
- In regulated markets, DSM/EE is paid for by all customers (ratepayers), but in a competitive market only the direct beneficiaries will pay.
- In the traditional approach, DSM/EE focuses on electricity only; in competitive markets the focus will be on all energy sources.

Figure 5 Energy Efficiency Mechanisms — Regulated vs. Competitive Markets[b]

Key Feature	Regulated Market	Competitive Market
Motivation	*Regulators*	*Marketplace*
Driven By	*Load Shape Objectives*	*Customer Needs*
Targeted at	*Resource Value*	*Customer Value*
Paid by	*All Ratepayers*	*Beneficiaries Only*
Focused on	*Electricity Only*	*All Energy Sources*

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[b] From Limaye, Dilip R., *Promoting Energy Efficiency: The Roles of Utilities, Governments, and the Private Sector in Regulated and Competitive Markets*, First Philippine Energy Efficiency and DSM Conference, Manila, Philippines, January 17-18, 1995.

For markets that are transitioning from regulated to competitive markets, a key issue that needs to be addressed is the "stranded benefits" of DSM and energy efficiency programs and how these benefits should be realized. DSM and energy efficiency activities provide opportunities for customers to lower their electric bills and/or increase productivity and competitiveness, while enhancing customer choice, and reducing environmental damage. Many such programs were implemented by utilities in regulated markets. When the market is restructured to introduce competition, there is little or no incentive for utilities to continue such programs, and new mechanisms need to be developed to continue to realize the benefits of DSM and energy efficiency activities.

Another issue that needs to be recognized in developing new mechanisms is that energy efficiency levels are likely to be intrinsically higher when public sector programs are implemented. Therefore, it is desirable to address public sector applications when new mechanisms are being developed.

3. APPROACH FOR IDENTIFICATION OF NEW MECHANISMS

3.1 Introduction

Subtask IV/7 focused on a preliminary definition of new concepts for promoting DSM and energy efficiency in new electricity business environments. The results of Subtask IV/6 were used as the starting point for this subtask. The Operating Agent and the contractor worked closely with the Task IV Experts and the participants in two Workshops to identify and conduct a preliminary review of new mechanisms. The Subtask included an examination of:

- Policy objectives, commercial interests, and roles of the various players involved;
- Possible funding mechanisms;
- Possible ways of intervening in the market; and
- Processes for monitoring, evaluating, planning and refining the various mechanisms developed.

Both public policy based and business-based DSM and energy efficiency mechanisms were included.

3.2 Specific Activities in Subtask IV/7

The specific activities included:

- Meeting of Experts and Early Practitioners - conducted in Amsterdam, The Netherlands, on April 25-26, 1996
- Meeting of Experts and Early Practitioners - conducted in London, U.K., on June 10-11, 1996
- First workshop on Definition of New Mechanisms - conducted in Sydney, Australia on October 30, 1996 in conjunction with the Electricity Supply Association of Australia (ESAA) conference on Energy Management
- Second Workshop on Definition of New Mechanisms - conducted in Copenhagen, Denmark on November 22, 1996 in conjunction with the EU/IEA DSM and Energy Efficiency Conference

3.3 Results of the Amsterdam Meeting

The Amsterdam meeting included the Task IV Experts and a number of other individuals who were "early practitioners." The meeting used a workshop-style format to identify new mechanisms.

The participants were provided templates for generating and evaluating alternative DSM mechanisms. They were asked to choose two or three potential mechanisms - i.e., combination of DSM/EE mechanisms, funding source and implementing organization. The focus group discussion resulted in a series of potential new mechanisms, some of which may be further developed into improved mechanisms for promoting DSM and energy efficiency in new electricity business environments. The draft set of mechanisms provided the experts before the meeting and discussed through the meeting included:

- Appliance Standards - implemented by appliance manufactures appliance retailers, or regional government. This could be funded by carbon taxes, end-users fees

- Performance Contracts - contracts including a guarantee that the new technology will work as advertised, thus reducing the investment risk and costs (similar to an insurance, or quality assurance). The contract could be financed by the technology manufacturers, government, or self-financed.

- Appliance Rebates - e.g., through low interest loans implemented by an ESCO or a regional energy center such as in Norway, or could be self-financing or through carbon taxes.

- Load control - Load control by end-users with compensations from bill savings. The equipment cost could be self-financed, the implementor could be either the end-user or the GridCo

- ESCO formation with government accreditation or authorization or licensing. Carbon tax may be collected for ESCOs to implement low interest loans. (Need to define ESCOs - full service, partial service, electricity provider or other).

- Combine technology procurement with new technology performance guarantee program

- Energy audit plus low interest loans provided by local government and ESCOs together, financed by tax and utility recovery charge

- Demand bidding into a wholesale pool

- Tradable emissions
- Voluntary agreements among end users, governments, utilities and manufactures.
- Right pricing of primary fuels
- International information campaigns for introducing energy efficiency standards (global and targeted)
- Branding - endorsed by IEA or other multilateral agency and offered to governments. This must be grounded on specific behaviors and actions.
- Many strong combinations of mechanisms can be developed, e.g., combining technology procurement and performance contracting (technology guarantee from government), or combining energy audit and low interest loans provided by local government and ESCOs

It was noted that evaluation of individual mechanisms is possibly less sensitive to funding source than other parameters, which may include that possibly funding sources may be discussed separately. Many of the mechanisms proposed are pure commercial arrangements and do not require external funding while other mechanisms may be funded by a range of funding sources.

3.4 Results of London Meeting

The London meeting also included Task IV Experts and early practitioners. A presentation of the results of the Amsterdam meeting was made by the Operating Agent. The participants were then asked to consider a set of potential mechanisms and provide and assessment of which policy evaluation criteria are most important, and how each potential mechanisms would fare when these criteria are applied.

The experts were asked to consider the following policy criteria:

- Promote competitive behavior
- Foster growth of a viable Energy Service Industry
- Equity and minimizing price discrimination (fairness)
- Encourage product and service differentiation
- Other
- Considerations derived from specific energy or utility sector policy considerations, i.e.,

- Low electricity prices
- Energy security and/or fuel import dependency
- Carbon gas emission reductions/target
- Secure that energy system development towards sustainability

The following mechanisms were assessed by all the experts:

- Performance Contracts - contracts including a guarantee that newest technology will work as advertised, thus reducing the investment risk and cost (similar to an insurance, or a quality assurance) could be financed by the technology manufacturers, government or self-finances. Elements from discussion include:

  - Possible positive impacts - could reduce energy use, could promote end-use and manufacturers competition
  - Possible negative impacts - equity impacts, could contribute to increase overall costs

- Bundling value added energy services and power contracts. Elements from discussion include:

  - Possible positive impacts - could reduce energy use, encourages market and product differentiation, approach to market niche markets, can impact company image (e.g., green pricing)
  - Possible negative impacts - could possibly distort competition or customer choice (e.g., was raised the issue that some bundling, could be regarded as unethical and may be forbidded), actions may target only some customers, could contribute to increase prices, raises equity issues

- Multilateral branding of end-use products or services. Elements from discussion include:

  - Possible positive impacts - could reduce energy use, increases customer attention, can impact company image, less equity issues, targets potentially all customers
  - Possible negative impacts - could contribute to increase prices, could discriminate against new entrants in the market, potentially inequitable to non-branded products and services, potentially "freezes the marketplace" (i.e., as soon as a threshold is passed, the manufacturers will not have a similar incentive to improve appliance efficiency)

3.5 Framework for Sydney and Copenhagen Workshops

The framework originally developed in Subtask IV/6 for identification and evaluation of existing mechanisms was adopted in this subtask for preliminary identification of new mechanisms. This framework distinguishes between two types of mechanisms.

- Public policy-based mechanisms, that focus on achieving societal and public policy objectives, such as reducing environmental damage, increase overall energy system efficiency, promoting economic developments, etc.

- Business-based mechanisms, comprising of activities of energy businesses or their partners designed to achieve corporate commercial objectives, such as improving the profitability of existing business areas, improving market positioning, enhancing public relations, and developing profitable new businesses

The mechanisms were characterized by

- type of activity
- implementing organization
- funding source

The first workshop conducted in Sydney, Australia on October 30, 1996 was a half-day workshop included as a part of the program of the ESAA conference on "Energy Management: Opportunities in Changing Energy Markets". The participants in Workshop included the conference attendees.

The second workshop, conducted in Copenhagen, Denmark on November 22, 1996 was a full-day workshop conducted as a post-conference event in conjunction with the Second International Conference on DSM and Energy Efficiency, sponsored by the European Union, Association of Danish Electric Utilities, and Energistyrelsen.

In both workshops, presentations were made by the Operating Agent and Experts from countries where some form of restructuring has already occurred. The participants were then asked to develop a set of new mechanisms.

The participants were given a set of sheets which they used to define new mechanisms including type of activity, implementing organization(s), and funding source. Figures 6, 7, and 8 show the materials handed out to the participants to make their selections.

Figure 6 shows the 2 sheets specifying type of activity, including:

- Energy pricing / tariff strategy
- General information
- Demonstration campaigns
- Financial Incentives
- Site-Specific Information
- Equipment / appliance labeling
- Codes / Standards
- Cooperative effort
- Shared savings / performance contracting
- Warranties
- Financing
- Leasing
- Tax credits
- Demand bidding
- Other (to be filled in by the participants)

Figure 7 shows the list of possible implementing organizations, including:

- Energy service conferences
- Appliance manufactures
- Appliance retailers
- Appliance installers / repairers
- Government
- Non-government organizations
- Regional energy centers
- Power generation company (GENCO)
- Power distribution company (DISCO)
- Power retail company
- Power broker/trading company
- Transmission company (TRANSCO)
- Other (to be filled in by participants)

Figure 8 shows a list of choices for funding sources, including:

- Wires charge
- Taxes
- Customer levy
- Appliance levy
- Bank loans/ financing
- Utility loans / financing
- Customer funding

- Grants
- Other (to be filled in by participants)

The participants were asked to develop combinations of these factors (activity, organization, funding source) that they though would be attractive new mechanisms. The exercise in Sydney was conducted individually. While in Copenhagen the participants were divided into four groups. These individuals and groups were asked to complete a Mechanism Evaluation Worksheet (see Figure 9). The evaluation criteria included

- Promotes competitive behavior
- Maximizes equity – minimizes price documentation
- Encourages growth of energy services industry
- Encourages product-service differentiation
- Reduces CO_2 emissions
- Provides improved customer price signal

The worksheets were collected and examined by the Operating Agent and support contract. The results are presented in section 5 of this report.

Figure 6 - Type of Activity

ENERGY PRICING/TARIFF STRATEGY

Off-Peak Pricing
Real Time
Interruptible Rates
Progressive Rates
Other _____

GENERAL INFORMATION

Brochures
Media Advertising
Workshops
Energy Centers
All
Other _____

DEMONSTRATION CAMPAIGNS

Manufacturing
Utility
Government
Other _____

FINANCIAL INCENTIVES

Customer Rebates/Grants
Loans
Bill Credits
Trade Ally Incentives
Other _____

SITE-SPECIFIC INFORMATION

Energy Audit
Design Assistance
End-Use Monitoring
Other _____

EQUIPMENT/APPLIANCE LABELING

Voluntary Labeling
Mandatory Labeling
Other _____

CODES/STANDARDS

Appliance Standards
Building Codes
Other _____

COOPERATIVE EFFORT

Equipment Consortiums
Other _____

SHARED SAVINGS/PERFORMANCE CONTRACTS

Utility-Sponsored Contracts
Private Sector (ESCO) Contracts
Other _____

WARRANTIES

Utility-Sponsored Appliance Warranties
Private-Sector Appliance Warranties
Other _____

FINANCING

Subsidized Loans

LEASING

Utility-Leasing Agreements

Figure 6 - Type of Activity

Loan Guarantees
Other _____

Other _____

TAX CREDITS

Government Tax Credits - Customer
Tax Credits - Manufacturers
Other _____

DEMAND BIDDING

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Figure 6 - Type of Activity

Figure 7 - Implementing Organizations

ENERGY SERVICE COMPANIES

APPLIANCE MANUFACTURERS

APPLIANCE RETAILERS

APPLIANCE INSTALLERS/REPAIRERS

GOVERNMENT

NON-GOVERNMENT ORGANIZATION

Consortium
National Labs
Non-Profit
Universities
Other _____

REGIONAL ENERGY CENTERS

POWER GENERATION COMPANY (GENCO)

POWER DISTRIBUTION COMPANY (DISCO)

POWER RETAIL COMPANY

POWER BROKER/TRADING COMPANY

TRANSMISSION COMPANY (TRANSCO)

Figure 7 - Implementing Organizations

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Figure 7 - Implementing Organizations

Figure 8 - Funding Sources

WIRES CHARGES

Distribution Charge
Transmission Charge
Other _____

TAXES

CUSTOMER LEVY

APPLIANCE LEVY

BANK LOANS / FINANCING

UTILITY LOANS / FINANCING

CUSTOMER FUNDING

GRANTS

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_____

FILL IN

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_____
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Figure 9 - MECHANISM EVALUATION WORKSHEET

TYPE OF ACTIVITY	**EFFECTIVENESS OF MECHANISM**	POSITIVE	NEGATIVE
	1. PROMOTES COMPETITIVE BEHAVIOR (COMMENTS)	☐	☐
	2. MAXIMIZES EQUITY — MINIMIZES PRICE DOCUMENTATION (COMMENTS)	☐	
IMPLEMENTING ORGANIZATION	3. ENCOURAGES GROWTH OF ENERGY SERVICES INDUSTRY (COMMENTS)	☐	
	4. ENCOURAGES PRODUCT-SERVICE DIFFERENTIATION (COMMENTS)	☐	
	5. REDUCES CO_2 EMISSIONS (COMMENTS)	☐	☐
FUNDING SOURCE	6. PROVIDES IMPROVED CUSTOMER PRICE SIGNAL (COMMENTS)	☐	☐

	7. _____ ☐ ☐ (COMMENTS) _____ _____ 8. _____ ☐ ☐ (COMMENTS) _____ _____

4. PRELIMINARY IDENTIFICATION OF NEW MECHANISMS FOR PROMOTING DSM AND ENERGY EFFICIENCY

4.1 Background

The uncertainties pertaining to the market structure of new electricity business environments, particularly across (and within) various countries, lends itself to a number of possible opportunities to ensure the advancement of energy-efficiency. Currently, there are many "new" mechanisms being considered and applied to promote energy-efficiency even as the marketplace continues to evolve and change. As a part of this study, effort was placed on convening a group of international experts and interested parties to discuss and solicit insights regarding the shape of new mechanisms to be considered. A formal (yet unscientific) process was applied, as described in Section 3, to allow interested parties to consider future electricity markets and identify methods to ensure continuing efforts to promote DSM and energy-efficiency in restructured markets. What follows is a summary of the overall insights captured from participants. These are organized in accordance with the general structure of market mechanisms including the identification of the types of activity, the implementing organizations and funding sources.

4.2 Identification of Mechanisms

There were a wide range of activities identified by participants. A summary of some of the most prevalent activities is shown in Table 1. As shown, many of the suggested mechanisms involve "leveraging" involvement from a host of stakeholders and requiring sponsorship from more than one organization. This "shared risk" approach translates to involvement at a higher level of intervention (i.e., government, manufacturers, consortiums of trade groups or utilities) to permit advantages in economies of scale in addressing the marketplace. A more detailed discussion of the various mechanisms identified follows.

It should be noted that while many of the mechanisms identified here are not entirely new, it is possible to develop new combinations of the type of activity, implementing organization, and funding source, to create new mechanisms that may be effective in promoting DSM and energy efficiency in new electricity business environments. The workshops conducted in this project pointed out both new combinations and entirely new mechanisms.

Examples of new combinations include the following:

- Customer audits tied to the Internet or to home automation, provided by the private sector or the distribution utility, funded by the customer or the government.

- Partnerships for technology improvement implemented by government and manufactures, funded by tax revenues.

Examples of entirely new mechanisms identified in this workshop include:

- Certification of energy service companies (ESCOs) by governments using funds from tax revenues or from ESCOs.

- Development of state of the art energy-efficient construction techniques in collaboration with architect and engineering communities, implemented by governments using tax revenues or distribution charges.

- Provision of "frequent user credits" for large electricity users, with the credits to be redeemable for energy-efficient appliances or equipment.

As noted earlier, the mechanisms for promoting DSM and energy efficiency in new electricity business environments can be characterized as public policy-based or business-based. Some innovative mechanisms combine both public policy and business objectives.

Most of the public policy-based mechanisms are implemented or funded by government or regulators, while the business-based mechanisms are implemented and/or funded by private organization. A key challenge for government and regulators is to create the market environment and incentives that facilitate the development and implementation of business-based mechanisms.

Table 1 shows the classification of the identified mechanisms as public-policy based, business-based or a combination of both. The public policy-based mechanisms are oriented towards increasing overall energy system efficiency, reducing environmental damage, contributing to economic development, etc. These mechanisms focus on addressing market failures such as lack of information (or limited information), high transaction costs, environmental externalities and disconnected decision-maker. Examples of such mechanisms include general information, tax incentives, building codes and standards, and efficient equipment procurement.

Business-based mechanisms are implemented by energy businesses or their affiliates to improve profitability, increase revenues, create new business

areas, capture market share, etc. Examples of such mechanisms include pricing schemes, customer audits, and site-specific customer information.

Examples of mechanisms that combine public policy-based and business-based characteristics include partnerships for technology improvement, customer incentives, and customer contracting.

4.3 Incentives and Motivations

A wide range of implementing organizations has been identified in this project. The major incentives and motivations for these organizations to implement DSM and energy efficiency mechanisms are summarized below:

- Government and regulators
  - increase energy system efficiency
  - reduce environmental damage
  - stimulate the market to adopt energy-efficient appliances and equipment
  - demonstrate energy-efficiency technologies
  - provide improved information for more efficient functioning of the markets
  - reduce the transaction cost barrier

- Distribution utilities
  - provide correct price signal
  - increase market share
  - reduce operating costs
  - increase profit margins
  - reduce capital requirements
  - provide better information for customer decisions
  - improve customer satisfaction

- Manufacturers
  - increase market share
  - increase revenues
  - improve profitability
  - increase customer satisfaction

- Energy businesses
  - increase market share
  - increase revenues
  - improve profitability
  - create new business areas

Table 1. *Examples of Mechanisms to Promote DSM and Energy Efficiency*

Type	Description	Implementing Organization(s)	Funding Source	Market Failure(s) Addressed	Public Policy-based or Business Based
General Information	• Advertising • Labeling • Energy centers • Demonstration sites	• Government • Utility partnerships • Distribution utilities	• Env. Taxes • Distribution taxes	• Lack of Information	Public policy-based
Tax Incentives	• Tax credit-manufacturers • Tax credit-customers • Reduced VAT	• Government	• Government funds	• Externalities • Payback gap	Public policy-based
Customer Audits	• Private sector-sponsored on-site audit • Distribution utility audits • Audits tied to Internet • Audits tied to home automation • Need to link audits to financing option	• Distribution utility • Private sector	• Customer financed • Government subsidies	• Lack of Information	Business-based
Pricing Schemes	• Real time pricing • Off-peak pricing • Interruptible rates • Progressive use rates • End use service rates • "Green" pricing	• Distribution utility	• N/A	• Incorrect price signals	Business-based
Partnerships for Tech-nology Im-provement	• Manufacturers' consortium • Govt.-manufacturer partnership	• Government • Manufacturers • Regional distribution utilities	• Government taxes • RD & D funds • Pricing Schemes	• High transaction costs • Disconnected decision-maker	Both public-policy based and business-based
Building Codes/ Standards	• Upgraded building codes • Advanced appliance standards	• Government • Manufacturers	• Government energy taxes	• Externalities • Lack of information • Disconnected decision-maker	Public policy-based
Site-Specific Customer Information	• On-site metering • Design assistance • Improved information on customer bills	• Distribution utilities	• Distribution utilities • Customer fees	• Lack of information	Business-based
Customer Incentives	• Grants (rebates) • Loans • Financing	• Government • Distribution utilities	• Distribution utilities	• Payback gap • High transaction costs	Both public-policy based and business-based

Type	Description	Implementing Organization(s)	Funding Source	Market Failure(s) Addressed	Public Policy-based or Business Based
Customer Contracting	• Shared savings • ESCO certification • DSM bidding	• Utility ESCO • Private ESCO • Government	• Third-party financing	• High transaction costs • Externalities	Both public-policy based and business-based
Efficient Equipment Procurement	• Government procurement	• Government	• Environment/carbon taxes • Transmission charges	• High transaction costs • Disconnected decision-maker	Public policy-based

4.4 Types of Mechanisms and Implementing Organizations

Examples are given below:

- **Pricing Schemes** — the most prevalent mechanism identified was the use of various non-traditional pricing schemes. More specifically, suggestions included: interruptible rates, real-time pricing and off-peak pricing. A number of the participants acknowledged that these do not necessarily represent innovative rates, but do provide the flexibility for a distribution utility to address various customer needs. Some participants also mentioned the potential associated with "green pricing" and progressive rates. It was also acknowledged that there is a accompanying need to provide customers with information to help them determine the best rate to meet their specific needs. A pricing scheme without accompanying customer information will result in limited success.

- **Partnerships** — many of the participants acknowledged the potential of establishing partnerships with key stakeholders as a means of manufacturing and selling energy-efficient products. These partnerships could be structured to provide manufacturers with incentives or include government seed money to form consortia to accelerate the advancement and introduction of new energy-efficient equipment and appliances in the marketplace. It was mentioned that these partnerships should be flexible, focusing on specific end-uses, emerging technologies and/or key customer markets. It was also mentioned that there is a key role for the government to play in establishing an environment which promotes these partnerships and includes government representation within the partnerships, as needed.

- **Building Codes and Standards** — participants identified potential in advancing building codes and appliance standards beyond current levels. There were some agreement that energy-efficiency can be extended beyond current building codes and standards and thus provide a uniform method of ensuring energy-efficiency impacts across markets, particularly in the new construction and renovation markets. It was acknowledged that this needs to be implemented at the government level, although some participants indicated that perhaps the region-wide effort across adjacent countries (or even through EU countries) could also be considered. This approach would reduce the costs of establishing codes and standards for each country. It should be noted that there was no discussion of the cost implications, particularly the resources required for compliance and enforcement. Experience has shown that this could be a significant cost.

- **Site-Specific Customer Information** — there is some consensus that customers will pursue energy-efficiency in response to having better information about their own energy-use, opportunity costs, and a clear understanding of relevant solutions. More specifically, there are opportunities such as providing on-site metering and energy monitoring to determine site-specific consumption data for customers. Also mentioned was the need for design assistance to integrate state-of-the-art energy-efficient construction techniques prior to actual construction. This would involve close interaction with the architect and engineering communities as part of their design process. Taking greater advantage of providing more detailed information on customer's bills regarding energy use and methods to better control consumption were also indicated. All of these suggestions noted the need for utilities (distribution) to assume the prime role in implementing these opportunities.

- **Customer Audits** — related to the need for site-specific information, a number of responses identified the need to focus on providing audits on customer facilities and residences. These audits could provide tailored information to customers and permit ease of translating this information into actionable items. Some suggestions included the need to directly link a financing mechanism with the audit recommendations so that the customer can take advantage of the preferred actions. Additionally, some responses indicated the opportunity to use home automation systems and the Internet (or computer on-line systems) as vehicles for exchanging customer information and even conducting audits. It was acknowledged that the costs will need to be borne by the distribution utility and/or the participating customer.

- **Demonstration and General Information** —a number of suggestions were directed at focusing efforts on providing customers with general information pertaining to energy-efficiency including: utility and government advertising, equipment labeling programs, and demonstration programs aimed at trade allies and customers. Most of the participants indicated the need for government involvement in spearheading the informational campaign but also identified the need for involvement from manufacturers, distribution utilities, and consortiums/partnerships. Examples included: regional energy centers to present opportunities for state-of-the-art improvements, demonstration homes, testimonials and case studies of successful applications.

- **Tax Incentives** — a focus on government involvement also pointed to opportunities for both manufacturers and customer tax credits, particularly for specified new and emerging technologies and/or renewable technologies. For example, a government reduction on its Value-Added Taxes (VAT) on energy-efficient products should reduce the costs of some technologies and make them more attractive for customer acceptance. The government was identified as being responsible for implementing such a mechanism.

- **Customer Loans and Guarantees** — some discussion was directed at conventional mechanisms including the use of customer financing, grants, and rebates as incentives to pursuing energy-efficient equipment and appliances. This mechanism focused on involvement from government organizations to fund and guarantee customer loans.

Other types of mechanisms mentioned by participants include:

- Government-led certification program for trade groups and ESCOs
- Government and utility procurement practices to purchase energy-efficient equipment at a volume discount for sale to customers
- Utility end-use service rates
- DSM bidding
- Focus on market transformation activities based on "pushing" the appliance and trade ally markets

4.5 Funding Sources

The discussion of new mechanisms also included discussion of funding sources to properly advance these opportunities from start-up through on-going implementation. In some cases, this may only require "seed money" to get the efforts up and running. The prevailing thought focused on the use of an environmental tax at the transmission level or a consumers use tax at the distribution level as a primary means of generating funds to promote energy-efficiency. This approach was directed particularly at mechanisms involving a partnership of stakeholders including: development of advanced building codes and standards, national or regional demonstration efforts, promotion of regional energy centers, and customer and trade ally education and information.

The funding responsibilities for some of the other mechanisms such as: pricing options, customer audits, on-site metering, and construction design assistance were identified as being borne primarily by distribution utilities, as part of their ongoing interaction with customers. In some cases, some of these costs could be shared by the participating customer.

4.6 Implications of the Selected Mechanisms

In reviewing the results of the new types of mechanisms as identified by participants, there are a number of important implications. These results and implications are summarized as follows:

- **Shared Risks and Responsibilities** — the tenor of the suggestions seem to point to the need for shared risks and responsibilities across all stakeholders as a requisite to assuring energy-efficiency in re-regulated markets. This point reflects the need to leverage the involvement of all participants to make certain that no single group needs to assume total sponsorship, and that the interests of all parties are addressed. More specifically this includes: government involvement (federal and local), manufacturers, utilities, and relevant trade ally groups.

- **Reliance on Government Intervention** — many of the suggestions focused on the need for government intervention to ensure a top-level involvement in advancing energy-efficiency opportunities. The examples of building codes, appliance standards, tax credits, labeling and volume procurement all require government involvement. This involvement includes the need to convene other stakeholders to discuss and establish policies to apply to improve these efficiency opportunities. For example, government agencies can work to bring experts together to determine appliance standards or building codes that seem reasonable and relevant.

- **Importance of Customer Information** — there was some consensus that a key ingredient to ensuring energy-efficiency in restructured electricity supply markets is the need to provide proper and understandable information to customers regarding the benefits and costs of energy-efficiency. More specifically, suggestions regarding the use of audits, demonstration programs, design assistance, facility or end-use metering and the creation of energy centers all point to the need of customer knowledge. This information can be applied to helping customers identify and decide on the most attractive energy-related investments.

- **Mixture of Mechanisms** — most of the suggestions indicated that no single mechanism, by itself, will adequately assure energy-efficiency in re-structured markets. Rather, there is a need to pursue a strategy of combining complementary mechanisms to achieve better results. For example, the focus on customer education will be more successful if there is a financing element (such as customer grants, leasing or volume procurement) linked together. Additionally, the use of pricing schemes in combination with other market mechanisms including partnerships,

customer audits and/or contracting provide a more comprehensive and compelling strategy to customers to pursue energy-efficiency.

4.7 Concluding Remarks

The information developed this report provides a starting point for Task VI activities. This new Task VI focuses on detailed development and evaluation of new mechanisms, communication of information on these mechanisms, and assessment of this public policy implications.