Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses

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THE IEA DSM PROGRAM

The International Energy Agency (IEA) was established in 1974 as an autonomous agency within the framework of the Organization for Economic Cooperation and Development (OECD) to carry out a comprehensive program on energy cooperation among its 24 member countries and the Commission of the European Communities.

An important part of the Agency's program involves collaboration in the research, development and demonstration of new energy technologies to reduce excessive reliance on imported oil, increase long-term energy security and reduce greenhouse gas emissions.

The IEA's R&D activities are headed by the Committee on Energy Research and Technology (CERT) and supported by a small Secretariat staff, headquartered in Paris. In addition, three Working Parties are charged with monitoring the various collaborative energy agreements, identifying new areas for cooperation, and advising the CERT on policy matters.

Collaborative programs in the various energy technology areas are conducted under Implementing Agreements, which are signed by contracting parties (government agencies or entities designated by them). There are currently forty Implementing Agreements covering fossil fuel technologies, renewable energy technologies, efficient energy end-use technologies, nuclear fusion science and technology, and energy technology information centers.

The Demand-Side Management (DSM) Program is a relatively new collaboration. Since 1993, the seventeen Member countries and the European Commission have been working to clarify and promote opportunities for DSM.

The following countries are participating in the IEA Demand-Side Management Program:

Australia	France	Norway
Austria	Greece	Spain
Belgium	Italy	Sweden
Denmark	Japan	Switzerland
European Commission	Korea	United Kingdom
Finland	Netherlands	United States

A total of six Tasks have been initiated, two of which have been completed. Each Task is managed by an Operating Agent from one of the participating countries. Overall control of the program rests with an Executive Committee comprised of one representative from each contracting party to the Implementing Agreement. In addition, a number of special ad hoc activities – conferences and workshops – have been organized.

The Tasks of the IEA Demand-Side Management Program, both current and completed, are as follows:

Task I International Database on Demand-Side Management Technologies and Programs

Task II Communication Technologies for Demand-Side Management

Task III Cooperative Procurement of Innovative Technologies for Demand-Side Management

***Task IV** Development of Improved Methods for Integrating Demand-Side Options into Resource Planning

***Task V** Investigation of Techniques for Implementation of Demand-Side Management Technology in the Marketplace

Task VI Mechanisms for Promoting Demand-Side Management in Changing Electricity Businesses

* Completed Tasks

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FOREWORD

This report is a result of work completed within Task VI of the International Energy Agency Demand-Side Management Program. The title of Task VI is "Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses." The objective of Task VI is to develop in detail a range of practical mechanisms for promoting the implementation of economically justifiable DSM in changing electricity businesses, such as in restructured electricity industries and competitive electricity markets.

Task VI is organized into three subtasks as follows:

Subtask VI/1: Detailed development of new mechanisms and evaluation criteria;

Subtask VI/2: Communication of information about the mechanisms;

Subtask VI/3: Public policy implications.

The project team for Task VI consists of:

- Energy Futures Australia Pty Ltd, based in Sydney, Australia (Operating Agent);
- SRC International ApS, based in Copenhagen, Denmark (contractor responsible for the report on existing mechanisms in participating countries).;
- Electric Power Research Institute, based in Palo Alto, USA (contractor responsible for reports on existing mechanisms in non-participating countries);
- Ressurskonsult, based in Oslo, Norway (European project manager);
- As/Tech, based in Paris, France (contractor for Subtask VI/2);
- Center for Resource Solutions, based in San Francisco, USA (contractor for Subtask VI/3 and responsible for this report).

The work of Task VI is supported (through cost and task sharing) by thirteen participating countries plus the European Commission. Participants provide one or more Experts who are responsible for contributing to the work of the Task and to review work as it is completed.

Information for this report has been collected and the document reviewed by Experts from the organizations listed in Table 1 over the page.

The Principal Investigator for, and main author of, this report is Jan Hamrin of the Center for Resource Solutions, USA. Jan was supported by Ed Vine from Lawrence Berkeley National Laboratory, USA and Nick Eyre from Eyre Energy Environment, United Kingdom. Any errors and omissions are the sole responsibility of the Principal Investigator.

Table 1. Experts Participating in Task VI

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Jesús Maria Martín-Giraldo	Union Electrica Fenosa	Spain
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Kyu-Hyeong Nam	Korean Energy Management Corporation	Korea
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CHAPTER 1 INTRODUCTION

1.1 PURPOSE OF REPORT

This report is a result of work completed within Task VI of the International Energy Agency's Demand-Side Management Program. The title of Task VI is "Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses." Task VI is in the process of developing a range of practical mechanisms for promoting the implementation of demand-side management (DSM)[1] in changing electricity businesses, such as in restructured electricity industries and competitive electricity markets.

The primary purpose of this report is to analyze how the effectiveness of existing mechanisms in promoting the implementation of energy efficiency and load management is influenced by different structural models for the electricity industry. Effectiveness is judged by reviewing the barriers to energy efficiency, and analyzing the implications of different electricity sector structural models on mechanisms for promoting energy efficiency and load management. The findings from this report will be used to (1) identify existing mechanisms that need to be examined in more detail, and (2) identify new mechanisms that are needed to promote load management and energy efficiency in restructured electricity industries and competitive electricity markets.

This report is primarily targeted to key decision makers who can use it to make more informed decisions about efficiency initiatives in their countries. These decision makers include government officials, utility executives, government energy agencies, electricity sector organizations, energy service industries, and consumer and environmental non-governmental organizations.

1.2 POLICY ANALYSIS

Electricity industry reform is occurring as other markets are becoming more competitive (e.g., gas, telecommunications, etc.). This is resulting in many changes with uncertain outcomes. In addition, electricity services are, in some places, being integrated with other services such as gas, telecommunications and water. It is too early to tell if the positive results of reform of the electricity industry will outweigh any negative impacts. This report takes a neutral stance on electricity reform in general but rather focuses on the potential impacts of electricity industry changes on the ability to effectively deliver energy efficiency and load management programs.

Many countries are initiating reforms of their electricity sectors to stimulate private investment, increase operation and management efficiencies, and lower the cost of electricity. These countries are unbundling vertically-integrated utilities into distinct generation, transmission, distribution and retail supply companies; introducing commercial management principles to government-owned monopolies; and in many cases transferring operation or ownership to private companies[2]. In addition, independent regulation may be introduced for the first time

[1] In the context of this IEA Agreement and this report, DSM is defined to include both energy efficiency and load management. When the report is specifically referring to one or the other, they will be separately identified.

[2] Electric Power Research Institute 1998 *DSM and Energy Efficiency in Changing Electricity Businesses*, IEA/DSM Programme, Task IV Report.

for certain utility functions. A few countries are "liberalizing" (or reforming) the electricity sector for the purpose of promoting energy efficiency and working with market-based solutions. Regulation or re-regulation is likely to continue. It is premature to say whether liberalization will result in higher or lower prices.[3] Early evidence suggests prices may increase for some customers and decrease for others. This is dependent upon the initial electricity sector conditions, the supply/demand balance, age and cost of existing compared to new supply, and the overall efficiency of the system.

Electricity industry restructuring requires regulators and policy makers to re-examine existing mechanisms for promoting energy efficiency and load management. In some cases, electricity industry restructuring replaces the long-standing relationship between a single monopoly provider and protected franchise customers with a new set of relationships among retail electricity suppliers and customers who may now be free to choose suppliers. In these types of situations markets, not government regulators and utility monopolies, are seen as determining future energy production and consumption decisions. However, it is uncertain whether this type of restructuring will overcome important market barriers to energy efficiency that limit markets for energy-efficient products and services from functioning effectively. As a result of these barriers, a large, untapped potential for cost-effective energy efficiency investments exists. Supporters of public policies argue that energy efficiency programs are an appropriate government strategy to capture economic efficiencies that the market cannot secure unassisted[4].

There are a number of questions surrounding how liberalization might affect a country's efforts to improve the efficiency of its electricity industry:

- How do reforms influence the use of energy efficiency in meeting important public interest goals?
- How have reforms influenced barriers to delivering energy efficiency?
- What mechanisms can stimulate energy efficiency investments in a liberalized system?
- How can electricity sector liberalization include specific mechanisms to support energy efficiency?
- What kinds of market infrastructure and capabilities are required to deliver energy efficiency in a reformed market?

Because electricity sector reform is still in its early stages, it is premature to expect concrete answers to these questions. But these are the kinds of questions that were used to guide this study.

One of the critical questions for this study is the role of government in promoting energy efficiency. This issue was examined by asking a broader question: will refinements in electricity pricing and changes in structural or regulatory roles for the electricity sector be sufficient to promote the market response to energy efficiency, or will there be a need for other public initiatives that could influence the size of the market response to energy efficiency?

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[3] Though many identify lower prices as a primary reason for reforming the electricity sector.

[4] Eto, J., Prahl, R and Schlegel, J. 1996. *A Scoping Study on Energy efficiency Market Transformation by California Utility DSM Programs*. LBNL-39058. Lawrence Berkeley National Laboratory, Berkeley, CA.

Many of the existing and new mechanisms deal with market transformation which requires a broader analysis of markets and market actors than previously conducted – as well as multiple perspectives on how to proceed. In addition, with rapidly changing circumstances, evaluation of programs needs to be conducted early rather than waiting until the mechanisms are fully developed so that adjustments can be made in the early stages to improve program effectiveness. Both market transformation and evaluation issues are discussed in the later chapters of this report.

1.3 METHODOLOGY

The mechanisms analyzed in this report were provided by Experts in carrying out the work of Task VI. Examples of existing mechanisms implemented in the various countries participating in Task VI are described in the first Task VI report[5].

At Expert meetings, the contractors discussed with the Experts the different components of the research: e.g., public policy goals and objectives, program and policy barriers, electricity industry structural models, and mechanisms for promoting load management and energy efficiency. The Experts and contractors identified "holes" where new mechanisms might be needed, developed new mechanism concepts, and held workshops to further refine the most promising of these concepts.

The information provided by the experts was organized and analyzed by the contractors in the context of the policy implications of electricity sector liberalization on energy efficiency and load management activities. The results of that analysis are presented in this report.

1.4 TERMS AND DEFINITIONS

To clarify the following discussion, the same distinction is made between mechanisms and programs as was used in the first research report for Task VI[6].

Mechanisms are initiatives that attempt to overcome policy and program barriers that prevent the pursuit of cost-effective energy efficiency and load management activities and the achievement of national energy policy goals. Mechanisms assist the implementation of programs but are targeted at organizations that develop and implement these programs.

In contrast, energy efficiency and load management *programs* are specific actions taken by utilities and others targeted to energy end-users.

The examples in Table 2, over the page, illustrate the distinction between mechanisms and programs. In some cases, it may be difficult to distinguish clearly between a mechanism and a program; nevertheless, the distinction between the two should be kept in mind.

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[5] Crossley, D, Dyhr-Mikkelsen, K, Maloney, M 1998 *Existing Mechanisms for Promoting DSM and Energy Efficiency in Selected Countries*, IEA/DSM Programme, Task VI Research Report No 1.

[6] Ibid.

Table 2. Examples of Mechanisms and Programs

Mechanism	Program
A regulator allows a utility to increase its prices to cover the cost of providing cash rebates to customers who purchase energy-efficient appliances.	A utility provides cash rebates to customers who purchase energy-efficient appliances
A government establishes an energy efficiency funding agency.	A utility implements energy efficiency programs that are funded by the energy-efficiency funding agency.
A wholesale electricity pool establishes a protocol for demand-side bidding into the pool.	A utility offers low-priced interruptible tariffs to customers and then bids demand reductions into the pool.

1.4.1 Definitions

The following are definitions of some terms commonly used throughout this report. Other definitions will be included in the text where a term first occurs.

Commercialization – Introducing commercial objectives and processes into the management and operation of a state-owned electricity utility.

Competitive Markets – An electricity market (in one or more functional areas) where there is reasonably free entry; several reasonably comparable competitors (firms offering similar competitive products); and an absence of single-firm dominance (where one firm has a market share of 40 percent or more).

Demand Side Management (DSM) – In this report, the term demand side management is used to include both energy efficiency (overall reduction in demand) and load management (the shifting of load peaks and general management of electricity loads).

Deregulation – The elimination of regulation from a previously regulated industry or sector of an industry. (Also see re-regulation)

Energy Efficiency – Minimizing the amount of energy (e.g., electricity) required to accomplish a particular task. Some use the term to describe all types of demand-side activities including those that change the shape of the load curve. For the purposes of this report the first definition is being used.

Energy Provider - An organization that sells gas, electricity and other fuels and/or provides energy services (e.g., energy performance contracting, energy audits, etc.).

ESCOs (Energy Service Companies) – Most often are privately-owned, non-regulated companies that sell energy services (most commonly energy efficiency services) to retail customers.

Horizontal Integration - Merging of electricity companies that previously served different geographic areas or the merging of several companies that provide different services within the same geographic area (e.g. gas, water, telecommunications and electricity).

Independent Marketer – A retail or wholesale marketer of electricity or energy services who is not associated with the incumbent utility firm in that geographic area.

Integrated Resource Planning (IRP) – Integrated resource planning (IRP) is a public planning process and framework within which the costs and benefits of both demand- and supply-side resources are evaluated to develop the least-total-cost mix of resource options. Key characteristics of IRP include a long-term forecast of electricity needs; a comprehensive evaluation of all resource options, both supply- and demand-side; and public review of the process.

Independent System Operator (ISO) – A neutral and independent organization with no financial interest in electricity generating facilities who administers the operation and use of the transmission system (wires business). This may be a separate entity from the one that operates the wholesale electricity exchange market (see Power Exchange).

Liberalization [see also Restructuring] – [Reform of the electricity sector.] The privatization of utilities and deregulation of prices, where effective competition is established. Some regulation remains in place for consumer protection, to control market power and to shape the markets.

Load management – Managing the load shape including: load-shifting, peak-shaving, load-leveling and related activities. Load management does not necessarily result in a reduction in consumption.

Market Transformation – The reduction in market barriers resulting from market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced, or changed. Market transformation is sometimes seen as a goal in itself, as well as a strategy to achieve particular goals. For the latter, market transformation mechanisms can be targeted to manufacturers ('upstream'), distributors and retailers ('midstream'), and/or consumers ('downstream').

Oligopoly – Dominance by a small number of firms (usually less than five) who are able to influence prices, product quality and other conditions in a particular market.

Performance-Based Regulation (PBR) – Any price setting mechanism that attempts to link rewards (generally profits) to desired behavior. PBR sets prices or components of prices for a period of time based on external indices rather than on a utility's cost-of-service.

Power Exchange - A government or quasi-government public benefits institution which provides a competitive marketplace where buyers and sellers of electricity complete trades through an electronic auction.

Privatization – Transferring publicly owned electricity sector assets to private ownership.

Public Interest Goals – Public interest goals relate to meeting the basic electricity needs of the public at large (such as the need to have reliable electricity supply) as well as needs associated with the health and safety of citizens (e.g., the provision of "universal service"), and environmental and social goals[7] that are viewed as part of the responsibility of the electricity sector in some states and countries.

Public Policy – The policies undertaken by governments – parliaments, legislatures, federal, state and local agencies and governing bodies – in support of public interest goals.

[7] Such as improving the quality of life of the citizens.

Reform – Making major changes in an industry particularly those associated with regulation, market rules, pricing and competition. In this report reform is used synonymously with "liberalization".

Regulatory Support System – The oversight of an industry (including rules of behavior, economic oversight and price setting, and establishment/evaluation of programs) for the purpose of the promulgation and preservation of the public interest[8]. Formal regulation is often defined as being administered by an independent governmental body overseeing a privatized industry. But regulatory support can also be provided for government-operated industries and to shape competitive markets.

Re-regulation – The design and implementation of regulatory practice to be applied to the remaining regulated entities after unbundling or restructuring a vertically-integrated, previously regulated electricity system.

Restructuring – The reconfiguration of a country's or state's electricity sector. Restructuring can include the following (singly or in combination): commercialization, privatization, unbundling, and/or the introduction of competition into various utility business funsctions. The term restructuring may be used interchangeably with "reform" or "liberalization" (though liberalization is sometimes considered a specific type of reform).

Sustainable Development – Satisfying present needs without compromising the ability of future generations to meet their own needs.

Unbundling – Separating vertically integrated electricity utility business functions into legally distinct companies providing generation, transmission, distribution and retailing services.

Universal Service – The provision of sufficient electricity for basic needs (e.g., heating and food preparation) available to virtually all members of a population regardless of income.

Vertical Integration – Where a single firm owns and operates facilities in all phases of the production and delivery of electricity.

1.5 ORGANIZATION OF REPORT

- Chapter 2 examines four prototypical electricity sector structural models – on the continuum of possible electricity industry structures – and the generic implications of moving from one structure to another for promoting energy efficiency and load management.
- Chapter 3 comprises a discussion of public policy goals for the electricity sector related to energy efficiency and the general policy implications of these goals.
- Chapter 4 analyzes the implications of reforms on the barriers to energy efficiency and load management, and discusses the general policy implications of changing barriers on energy efficiency activities.
- Chapter 5 describes a conceptual framework for analyzing the mechanisms developed by the participants in Task VI, evaluates how mechanisms vary by generic structural model, identifies the key elements that change with changing structures, and the policy implications

[8] James C. Bonbright, *Principles of Public Utility Rates,* Columbia University Press, New York (1961).

of these changes illustrated through specific examples. This chapter also discusses market transformation.

- Chapter 6 focuses on periods of transition when a state or country's electricity sector is moving from one structure to another, identifying transition issues, policy implications and including suggestions for stabilizing energy efficiency activities during transition times.
- Finally, Chapter 7 presents an overview of the report's findings and conclusions.

Note to practitioners: The analysis is organized in a manner which highlights the impacts of particular types of changes. Practitioners reading this report can focus their attention on the discussions of those changes relevant to their state or country. The analysis assumes that only one major change is occurring at any one time. To the extent that more than one change is occurring simultaneously, analysis may seem complex and confusing. The authors can only recommend dissecting the pieces step-by-step and taking a deep breath.

CHAPTER 2 ELECTRICITY INDUSTRY STRUCTURES

Prior to examining energy efficiency and load management mechanisms in detail, it is important to understand the major influences shaping the reform of the electricity industry.

2.1 REFORM OF THE ELECTRICITY INDUSTRY

In many countries, the electricity industry is starting to change as reforms are made to the present system. The reform process results in one, or typically more, of the following changes in the electricity sector: commercialization, privatization, unbundling, and the introduction of competition. It is important to recognize that most reforms occur over a period of years, and thus tend to occur in stages across a continuum of policy and structural changes.

2.1.1 Commercialization

Commercialization involves introducing commercial objectives into the management and operation of a state-owned (public) utility. Most countries view commercialization as an intermediate step toward privatization and other reforms. Under commercialization, the utility becomes a business entity subject to the same tax laws, prices and accounting rules as other private sector companies. Commercialization often imposes separate cost accounting for generation, transmission, and distribution services. Cost recovery is improved by changing tariff structures to better reflect the true costs of service to various customer classes, by upgrading revenue collection through more effective metering and billing practices, and by differentiating tariffs for a given customer class according to the time of day at which electricity is demanded.

2.1.2 Privatization

Privatization means transferring publicly-owned electricity sector assets to private ownership. A country may decide to allow private development of some or all of the new electricity sector infrastructure. Many countries' electricity sectors have traditionally been publicly owned and often dominated by a central planning philosophy. Governments tend to view electricity as a public service. Regulatory institutions are established to protect the public interest and balance social objectives with the financial health of the utility. So under privatization, some countries are opening generation to private investment, further privatizing transmission and distribution, and even restructuring the sector to introduce competition and independent regulation. However, privatization can be undertaken while maintaining the franchise monopoly structure, as was the case in the United States for many decades.

2.1.3 Unbundling

When the electricity sector is "unbundled", vertically integrated utilities are separated into legally and functionally distinct companies providing generation, transmission, distribution and retailing services. Implementation of unbundling varies between countries. In some unbundled electricity sectors, the distribution subsectors are horizontally divided according to geographic franchises. Some countries have separated the physical aspect of distributing electricity to final customers from retail services (marketing, bill collection, customer information, energy efficiency and load management, etc.) while others have kept them within the same entity. Unbundling can be combined with privatization, and/or can be undertaken for a government-owned utility without moving to privatization.

2.1.4 Competition

Although the "wires" portion of the electricity sector (transmission and distribution services) is generally considered a natural monopoly, competition may be introduced into the system for selling electricity to the grid (wholesale competition) and providing electricity to end-use customers (retail competition). Wholesale competition may take the form of independent power producers (IPPs) bidding for long-term contracts with electricity purchasers. Although there are almost as many different styles of bidding as there have been solicitations, in most cases, the monopoly utility issues a solicitation seeking bids from project sponsors for capacity and energy, with the award going to the lower cost supplier. The selection emphasizes lowest fixed costs and the winning bidder receives payment sufficient to cover levelized capital and operating costs.

As an alternative to long-term contracts, some countries are creating spot or short-term markets for wholesale electricity. Under this structure, multiple generators bid (typically over half hourly intervals) to be dispatched by a transmission company or independent operator of the transmission system (ISO). The wholesale purchaser relies on competition to ensure that bids approximate marginal costs.

In addition to wholesale competition, a few states and countries are experimenting with retail competition for some or all customer classes. Typically, competition is phased in over time to aid in the transition to competitive markets where it is believed it would not be possible to change the system for all customers at one time.

Retail competition can be introduced through different mechanisms. In one, multiple electricity generators have direct access to the transmission and distribution networks (for a charge), allowing them to compete to supply final customers regardless of their location and who owns the wires. In another structure, independent retail service providers (which do not own any generation facilities) buy electricity from generators, contract for the use of transmission and distribution facilities, and sell the electricity to end-use customers. Where distribution and retail functions remain within the same entity, the service provider buys from wholesale electricity producers and contracts only for transmission access.

Competition can be introduced with or without unbundling and with or without changing the ownership structure of the utility sector.[9] It is important to point out that competition does not necessarily mean deregulation. In fact, while the type of regulation may change, it appears that the amount of formal regulation may increase rather than decrease with the introduction of a competitive market.[10].

[9] Examples: Norway did not privatize when it introduced competition into its electricity sector. The Public Utilities Regulatory Policy Act (PURPA) introduced wholesale competition into an already privatized electricity sector in the United States without unbundling. The UK unbundled, privatized and introduced competition almost simultaneously.

[10] Electric Power Research Institute 1998 *DSM and Energy Efficiency in Changing Electricity Businesses*, IEA/DSM Programme, Task IV Report.

2.2 ELECTRICITY INDUSTRY MODELS

For ease of analysis, this report uses four generic electricity industry structural models. These are based on the models developed by Task IV of the International Energy Agency's Demand-Side Management Program[11], and reflect discussions at the Task VI Experts meeting in Seoul (March 1998). As in Task IV, it is not meaningful to assess all possible combinations of electricity industry structures. Using a limited set of generic models enables the development of general and consistent comparisons and conclusions.

The four models are:

Model 1 - Vertically integrated, regulated monopoly

Model 2 - Unbundled monopoly

Model 3 - Unbundled, limited competition

Model 4 - Unbundled, full competition

It is important to note that these models represent a continuum of possibilities. It is likely that few countries will ever experience any of the structures exactly as described here, particularly Model 4, but rather will develop individual variations of these structures. Moreover, evolution to new structures may be neither sequential nor flow in only one direction. It is possible, for example, that a country that moves into Model 3 may later revert back to Model 2. However, the models act as useful tools for assessing the implications of changing electricity industry structures on energy efficiency and load management activities.

Finally, the particular social and cultural context of the region within which the electricity sector reforms are taking place will be a critical factor in designing the actual structure of the electricity industry, and the ultimate roles of government, the private sector and other stakeholders.

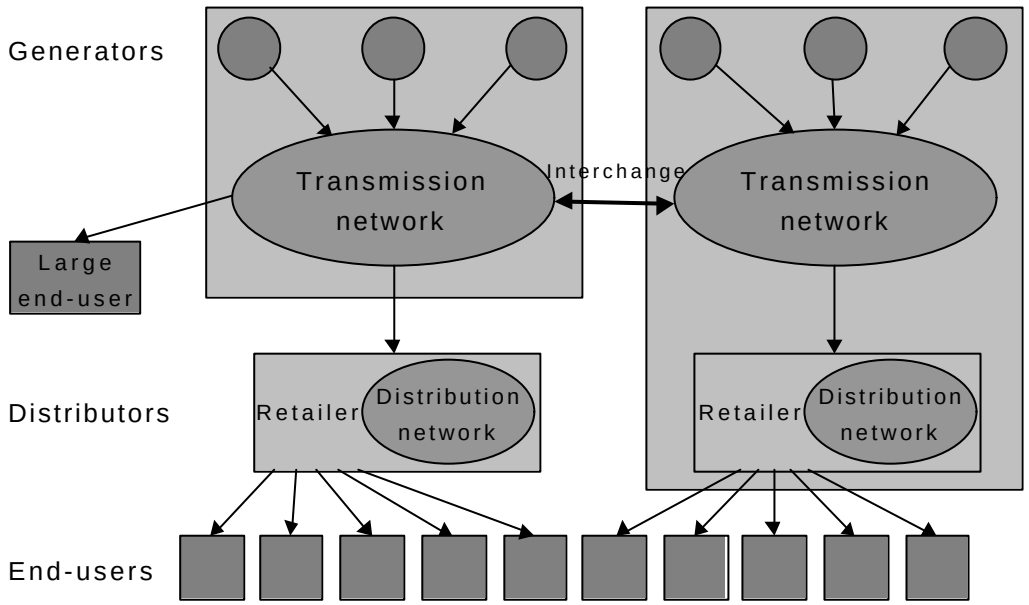
Diagrammatic illustrations of the four models are shown on the next four pages.

[11] Ibid.

Model 1 - Vertically Integrated, Regulated Monopoly

The electricity utility controls and undertakes all business functions: generation, transmission, distribution, wholesale and retail energy supply and services. There is no competition at any level. Utilities have the obligation to serve customers within their own region. Government regulates the utility to prevent monopoly abuse. All customers in the region must buy energy from that utility.

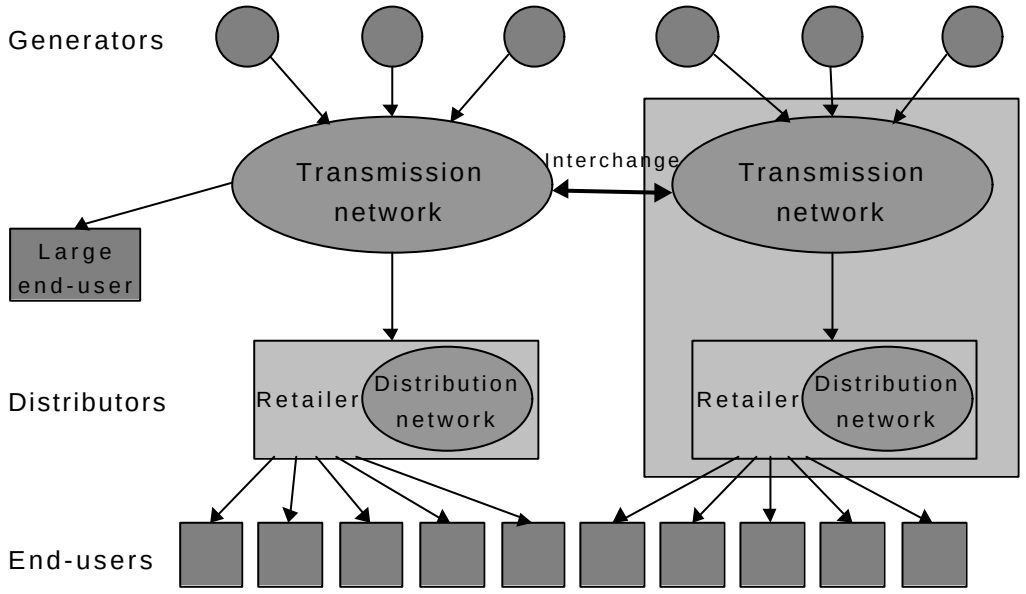
Model 1: Vertically Integrated, Regulated Monopoly



Model 2 - Unbundled Monopoly

Generation is separated from all other functions: several generation companies serve distribution companies and, possibly, major industries. Generators and distributors maintain monopoly status: the generation company has the exclusive right to supply customers within its franchise area, and the distribution companies have a monopoly to serve customers in their respective areas. Transmission is provided by generators, distributors, or a separate entity or entities. Government regulates the monopolies to prevent monopoly abuse. Competition may occur at the generation level, but there is no competition at the retail level. All customers in a region must buy energy from the retail utility which holds the franchise to their geographical area.

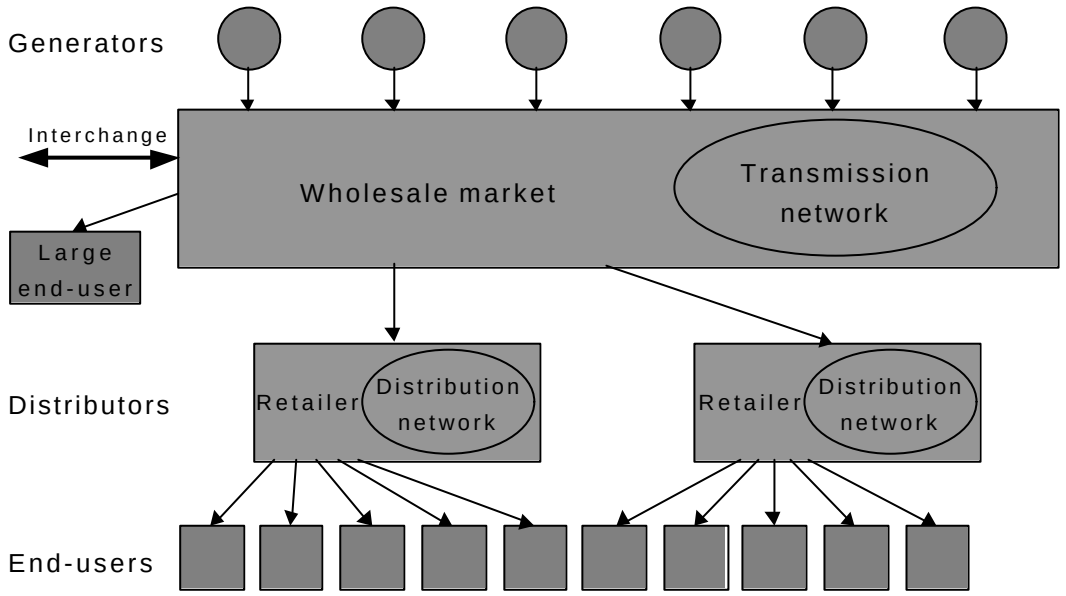
Model 2: Unbundled Monopoly



Model 3 - Unbundled, Limited Competition

Generation is separated from natural monopoly functions: many generation companies serve distribution companies and, possibly, major industries through a competitive wholesale market. Generators have open access to the transmission and distribution grid. Transmission is provided by generators, distribution companies, or a separate entity or entities. Government regulates the transmission and distribution system to prevent monopoly abuse. There is competition at the wholesale level: primarily among generation companies and there may be some competition through the use of self-generation by large customers. But with this one exception, there is no competition at the retail level.

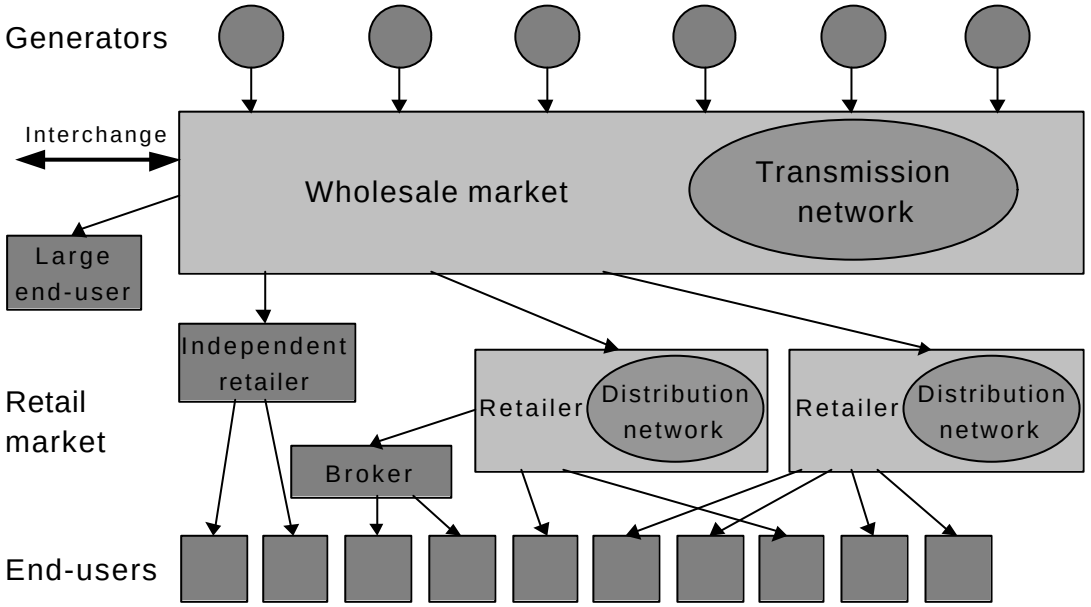
Model 3: Unbundled, Limited Competition



Model 4 - Unbundled, Full Competition

Generation, transmission and distribution functions are separated. There is competition among generators (generators have open access to the transmission and distribution grids). There is complete competition at the wholesale and retail level. At the retail level, two new organisations supply electricity to end-use customers. Independent retailers (who have no interest in the distribution 'wires' business) purchase electricity in bulk from the wholesale market and on sell to end-users. Brokers provide a similar service without ever owning the electricity. There is some oversight (regulation) of the wholesale and retail markets to ensure a more efficiently operating market and to prevent abuse of market power. In addition, government regulates (or maintains ownership of) the monopoly transmission and distribution systems.[12]

Model 4: Unbundled, Full Competition



[12] Some analysts have suggested that market failures, mergers and acquisitions could cause Model 4 to collapse into an unregulated monopoly or oligopoly structure. Though this is one possible outcome, it is the authors' opinion that such a structure would have such negative implications for the public interest as a whole it would not be stable.

2.3 IMPLICATIONS OF ELECTRICITY INDUSTRY REFORM FOR PROMOTING ENERGY EFFICIENCY AND LOAD MANAGEMENT

Electricity sector reforms affect energy efficiency and load management incentives among various market actors through multiple pathways. These include:

- changes in the role of energy efficiency/load management in meeting public interest goals and objectives and/or the addition of new goals to a country or state's list of priorities for the electricity sector;
- electricity sector reforms that affect barriers to energy efficiency – eliminating barriers, creating new barriers and/or changing the relative importance of barriers; and
- structural changes that affect the funding, implementing organization, roles of key players, basis for evaluation or general focus and direction of mechanisms.

This chapter focuses on changes in the role and priority given to energy efficiency under generic models of electricity industry structures. It should be noted that because of social and cultural differences, each country's electricity industry structure is likely to be different from the generic models. Because the interaction between various reforms is by nature very complex, it is not possible to predict exactly what will happen. The effects discussed below are a "best guess" of how individual reforms may effect energy efficiency and load management. The actual effects of restructuring on the role of energy efficiency and load management will be a result of some combination of the impacts listed below. Chapter 4 will discuss the second set of impacts – how different electricity industry structures affect barriers to energy efficiency. Chapter 5 will discuss the third set of factors – how mechanisms vary by structure.

2.3.1 Implications of Commercialization [Models 1,2,3,4]

Relative to a "no-reform" base case, commercializing a public utility improves the utility's incentives to implement energy efficiency measures up to the customer's meter. Because cost accounting is improved and government fiscal transfers to cover deficits are reduced, utilities pay greater attention to cost recovery (minimizing costs and increasing revenues). However, there is not any incentive for the utility to go beyond the meter (e.g., implement end-user energy efficiency programs). Integrated Resource Planning tends to encourage some energy efficiency beyond the meter in vertically integrated or independently regulated utilities if cost recovery is decoupled from profits. Otherwise a kilowatt-hour saved is viewed as lost revenue. Load management, however, is an exception since it does not necessarily reduce consumption but rather focuses on shifting the time of usage. Customers may find their electricity costs rising if commercialization leads to the removal of subsidies. This situation can make energy efficiency programs more attractive to the end-user.

A commercialized utility has an incentive to reduce sales (improve energy efficiency) whenever the marginal costs of supplying a kilowatt-hour are greater than the revenues received. Energy efficiency may also offer opportunities for improving the utility's financial balance sheet. On the other hand these incentives may be negated by simultaneous unbundling.

To the extent that subsidies are reduced and revenue collection improved, customers have stronger incentives to adopt energy efficiency measures because of higher bill savings from reducing consumption. This result would create new market opportunities for firms providing

energy efficiency products and services. Government-sponsored energy efficiency programs and load management might be implemented to dilute the burden of tariff increases.

In Models 1 and 2 where the utility is a "cooperative" or a company overseen by local government, consumers may have a strong influence on the utility's activities thereby exerting pressure to encourage greater use of energy efficiency and load management mechanisms.

2.3.2 Implications of Privatization [Models 1,2,3,4]

A private utility requires full cost recovery and a return on investment in order to be profitable. The need for cost recovery strengthens the price signal received by customers to use electricity efficiently. The profit motive could also make the utility more interested in reducing peak demand to the extent that the cost of doing so is less than the cost of adding new capacity and/or running high cost peaking plants. At the same time, when ownership is transferred from the public sector to the private sector, the discount rate used in making investment decisions is likely to increase. As a result, energy efficiency measures will yield a lower rate of return than they would under public ownership because costs are incurred in the near term, while benefits accrue over a period of years. The set of end-use energy efficiency measures attractive to the utility becomes smaller.

Similarly, transferring ownership from the public to the private sector may be accompanied by decreased attention by the utility to achieving social goals (e.g., resource conservation, universal service, and environmental improvement), unless these goals coincide with the utility's profit incentive. Independent regulation of the electricity industry is required when the sector is privatized to ensure these public interest goals are achieved. However, under common forms of economic regulation, electricity utility shareholders receive economic returns for capital investments in new equipment while they receive little or no return for expenses (such as increased administrative costs and services that are "expensed"). Depending upon the structure of the economic regulation, it can discourage a utility from promoting some types of customer energy efficiency activities unless conscious efforts are made to adjust regulatory policy consistent with public interest goals.

To the extent that prices increase and revenue collection improves, customers have stronger incentives to adopt energy efficiency measures because of higher bill savings from reducing consumption. This result creates new market opportunities for firms providing energy efficiency products and services. However, because effective energy efficiency measures reduce the amount of electricity consumed and thus the amount of revenue flowing to the utility, regulators often institute price setting strategies that decouple revenues from rate-of-return calculations. Government-sponsored energy efficiency programs and load management may also be implemented to dilute the burden of price increases. There may remain some scope for regulators to require distribution utilities to assess energy efficiency and load management as an alternative to grid reinforcement.

2.3.3 Implications of Unbundling [Models 2,3,4]

When a commercialized or private utility is unbundled into separate entities, the actual costs of providing generation, transmission, distribution, and retail services may not change, but each cost is assessed separately. The effect of this is to greatly reduce the incentives for the individual businesses to carry out any energy efficiency or load management. For example, the "wires" businesses (transmission and distribution) may be able to reduce costs by implementing energy efficiency and/or load management programs to reduce network constraints. However, the "wires" businesses may not have sufficient relationship with the retail customers to be able to implement customer programs[13]. Neither the generation business nor the retail business has any incentive to implement energy efficiency programs since these will reduce sales of electricity. While load management programs may not reduce sales, there is no incentive for generators or retailers to implement load management since the benefits will accrue entirely to the wires business. In contrast, in a vertically integrated utility, energy efficiency and load management programs can be justified on the basis that the benefits accrue within the single business.

In a vertically integrated business where the functions have been separated into individual entities, the central management of the integrated business, having an overall view of the unbundled separate entities, could overcome this barrier by establishing a subsidiary to promote energy efficiency and load management. The role of the central management is then to resolve conflicts between the separate entities.

One key example is the effect of unbundling on the treatment of demand-related costs that may encourage or discourage end-user initiated energy efficiency. In general, the more closely that retail electricity bills reflect the actual cost components of providing service, the more accurate the signals that customers receive to undertake energy efficiency measures. However, if prices are not unbundled and demand-related costs are rolled into fixed charges or energy charges, the customers' energy efficiency incentives are weakened (particularly if fixed charges constitute a larger share of total electricity bills).[14] Under this scenario, however, the retail supplier and combined distribution and retail supply companies may have an incentive to reduce loads in locations where the marginal costs of service are high due to network constraints, inefficient use of distribution assets, or other reasons.

In a competitive energy market, conventional Integrated Resource Planning is not practicable, but unregulated energy suppliers may wish to use similar planning techniques to assess future investment options and operations. This may be particularly true where demand-side bidding arrangements allow load management options to contribute to matching supply and demand.

To the extent that unbundling shifts customers' bills toward fixed charges, opportunities for ESCOs decrease. But if unbundling causes customers' bills to reflect separate energy and demand charges, market opportunities for ESCOs may be enhanced.

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[13] National Grid Management Council 1994. *Demand Management Opportunities in the Competitive Electricity Market*. Two volumes. NGMC, Canberra, Australia.

[14] "Energy charges" are volumetric (per kWh). "Demand charges" are based on a customer's peak or highest usage (per killowatt).

2.3.4 Implications of Competition [Models 3,4]

The net effect of introducing wholesale competition is likely to be negative on end-user incentives to adopt energy efficiency measures. Wholesale competition creates wholesale price signals based on short-term costs. If only short-term generation costs are passed through to end users, end users will have a weaker incentive to invest in energy efficiency measures: short-term energy costs are expected to be lower than past costs of generation energy and capacity. Moreover, short-term energy costs are expected to be more variable, making savings from energy efficiency more uncertain.

Introducing retail competition to a fully unbundled electricity sector generally increases the retail supplier's incentive to maximize kilowatt hour sales as well as to provide the lowest prices to retain and attract customers. Under this scenario, competitive electricity suppliers have little incentive to engage in any energy efficiency and load management activities that raise prices to non-captive customers. However, when price per kilowatt-hour among competitors is close, retailers may find it profitable to retain or attract customers by offering a package of services as a means of differentiating themselves from competing suppliers, even though energy efficiency and load management services may reduce sales. At this time, there is insufficient experience with stable (i.e., non-transitional) competitive markets to know whether energy efficiency and load management programs will be a significant marketing tool. However, in Norway, there is some indication of increased interest from retailers in promoting commercial DSM programs to differentiate their product from that of competitors in a market where there is little differentiation on the basis of price.

From the end users' perspective, overall prices may decline and therefore make investments in energy efficiency and load management less attractive economically. Though individual energy savings may be small, in the aggregate there may still be substantial benefits to society at large. However, if energy efficiency activities are divided among many small companies, a single company may not have a large enough clientele to economically justify the transaction costs involved in offering these services.

Additional energy suppliers may offer confusing claims regarding prices and special services they are marketing, further reducing interest in making energy efficiency improvements. On the other hand, retail competition may stimulate the emergence of ESCOs that market both electricity supply and energy services to serve non-captive customers who want to optimize their combination of end-use services and total electricity costs.

2.4 THE EUROPEAN UNION ELECTRICITY MARKET DIRECTIVE

In the 15 member states of the European Union (EU), electricity industry restructuring is strongly influenced by the EU Directive on 'Common rules for the internal market in electricity'[15]. The Directive, finally agreed in 1997, after many years of detailed negotiation, enters force in most member states in February 1999. It is designed to ensure that electricity may be freely traded within the open internal market of the EU, while recognizing the special characteristics of electricity and its use.

[15] Commission of the European Communities 1996. *European Union Directive 96/92/EC for Common Rules for the Internal Market in Electricity*.

The Directive requires that the construction and operation of new electricity generation plants should be open to competition. Member states may choose between:

- a tendering process for new capacity to meet national plans,
- or an authorization process which is non-discriminatory and leaves the capacity to market mechanisms.

Vertically integrated companies will be required to keep separate accounts for generation, transmission and distribution. In addition, electricity markets have to be opened to competition. Member states may again choose the method for achieving this, either:

- third party access, where the transmission system operator is required to allow the use of the system by other agents, with charges set either by regulation or negotiation on the basis of published tariffs, or
- a single buyer structure in which customers eligible to purchase in the competitive market and their suppliers contract in a triangular arrangement involving a defined single buyer.

The markets must be opened to competition at a minimum rate specified in the Directive. From 1999, in each member state, the share of the total market which is equivalent to customers with demands greater than 40 GWh/year must be open to competition, including all customers with demands exceeding 100 GWh/year. The 40 GWh/year figure is reduced to 20 GWh/year in 2000 and to 9 GWh/year in 2003. Electricity distribution companies are not necessarily 'eligible customers' except in so far as their own customers are eligible.

Member states may constrain liberalization only on the basis of agreed rules, notably where there is insufficient transmission capacity or where this would obstruct the performance of 'public service obligations' which may relate to reliability, security of supply, regularity, quality and price of supplies and environmental protection.

The broad implications of the Directive for each aspect of restructuring are as follows:

- Commercialization - electricity undertakings must be operated on a commercial basis;
- Privatization - there is no requirement for any specific form of ownership;
- Unbundling - different activities must be separately accounted; and
- Competition - must be established in generation (as a new plant is constructed) and in retail (to the extent outlined above).

In practice, in most EU countries, restructuring is expected to proceed more rapidly than required by the Directive.

2.5 RESTRUCTURING OUTSIDE OF EUROPE

United States: Electricity utilities in the United States are in the process of transitioning from a traditionally vertically integrated industry to a competitive market. Restructuring proposals are being addressed in Federal and State legislation and are being debated in state regulatory hearings.[16] Change is occurring through the publication by the Federal Energy Regulatory

[16] Energy Information Administration, US Department of Energy 1998. *The Changing Structure of the Electric Power Industry; Selected Issues, 1998.* Energy Information Administration, U.S. Department of Energy, Washington D.C.

Commission (FERC) of Orders 888 and 889 to encourage wholesale competition. Order 888 addresses the issues of open access to the transmission network and stranded costs. Order 889 requires utilities to establish electronic systems to share information about available transmission capacity. In addition, as of September 1, 1998, 48 states and the District of Columbia had started activities related to retail competition in one form or another. For example: 12 states had passed legislation establishing retail competition, and the public utility commissions of six other states had issued regulatory orders introducing retail competition. Furthermore, on their own initiative, or by legislative or regulatory orders, utilities in 10 states had started retail pilot programs to test the feasibility of retail competition. Legislative proposals on electricity industry restructuring had been introduced into the US House of Representatives and the US Senate, but no legislation had been passed.

Latin America: Chile was the first country to undertake major electricity utility restructuring (1981). Argentina was the next to undertake unbundling and privatization, followed by Peru and Bolivia. In Argentina, the government unbundled generation operations from transmission and distribution. Several regional transmission companies were also formed. Some states in Brazil are in the process of introducing a number of reforms including increased competition in the generation and rural sectors, and limited privatization. Rural electrification is a major issue throughout Latin America and concessions are being awarded for the service of electricity in rural areas in Argentina. (Argentina is the first country to introduce a structure that focuses on the use of renewables for these rural electricity concessions). Three states in Brazil are expected to move forward shortly with rural electrification programs using primarily solar photovoltaic systems.

Southeast Asia: Malaysia privatized its electricity utility in 1990 and, in the past few years has been moving to implement competition in the generation sector. The Philippines introduced competition into their generation sector and is moving to unbundle and privatize the electricity industry beginning in 1998. Thailand, India, China, and Korea introduced some level of competition into the generation sectors, and several Indian states are contemplating (or are in the process of) undertaking major restructuring.[17]

Pacific Region: Australia and New Zealand are both in the process of fully implementing electricity sector restructuring. In Australia, a competitive electricity market at the wholesale level is being progressively introduced in the southern and eastern states (initially New South Wales, Victoria and South Australia with Queensland and Tasmania to follow when interconnections to these States' systems are built). This "national"[18] competitive market is being developed from separate State-based wholesale competitive electricity markets which commenced in 1994 in Victoria and in 1996 in New South Wales.

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[17] Orissa and Haryana passed privatization restructuring legislation. Andhra Pradesh and Rajasthan have drafted privatization legislation and are anticipating to move aggressively on this. Karnataka, Assam, and Uttar Pradesh are either drafting legislation or contemplating restructuring changes. West Bengal, Tripura and Tamil Nadu are considering major reorganization but not necessarily privatization. Maharashtra is looking into restructuring due to financial and other problems associated with completing previous generation projects.

[18] Western Australia and the Northern Territory will never be part of the Australian “national” electricity market. It is impractical to link their electricity transmission systems to the other states because of the large distances to be covered with no load centres.

All wholesale competitive electricity markets in Australia use a spot market "pool") plus financial hedging contracts. An independent system operator has been established for the national market plus an independent electricity code administrator. Functional unbundling of generation, transmission, distribution "wires" and retailing into separate businesses is being implemented in all Australian States. Victoria is the only State so far to have privatized its formerly State government-owned electricity businesses but other States have announced that they will also do so. Following the introduction of the "national" competitive market in Australia, which commenced in late 1998, a retail competitive market will be developed.

In New Zealand, the utility functions have been unbundled.. Competition was introduced first into the retail sector and plans for more complete competition are underway. Later, the generation sector monopoly was split into competing businesses which are being privatized.

2.6 CONCLUSIONS

The incentives for energy efficiency and load management under commercialization or privatization can generally be maintained or strengthened through thoughtful regulatory and government support. The introduction of unbundling or competition substantially complicates the situation. However, even problems caused by unbundling are amenable to regulatory solutions. The most complex and difficult area is the introduction of competition because of the related pressures by many stakeholders for reduced governmental intervention. Where privatization, unbundling and competition are introduced simultaneously, it may be difficult for government to analyze the complex interactions and to anticipate the most likely outcomes.

Table 3, over the page, summarizes the incentives and disincentives for energy efficiency and load management under the four major electricity sector reforms. The table highlights some of the major features though there are likely to be many exceptions for a particular country. Also, there can be interactions when more than one reform is undertaken simultaneously, either magnifying certain effects or counteracting others. Finally, for some countries experiencing several reforms, it is unclear whether the impact of expected lower costs resulting from competition will be greater or smaller than the impact of increased electricity costs as price subsidies are removed and revenue collection is improved.

Table 3. Electricity Sector Reforms and Implications for Energy Efficiency and Load Management

Electricity Sector Reform	Incentives for Energy Efficiency and Load Management.	Disincentives to Energy Efficiency and Load Management.
Commercialization	Increased electricity costs, as price subsidies are removed and revenue collection improved Regulatory support for DSM that may include IRP	A kWh saved represents lost revenue; goal may be to maximize kWh sales, or to maximize profits, or some combination of the two Key market barriers remain
Privatization	Regulatory support for DSM that may include IRP	A kWh saved represents lost revenue; goal may be to maximize kWh sales, or to maximize profits, or some combination of the two Key market barriers remain Higher discount rates
Unbundling	Regulatory support for DSM Separate energy and demand charges	A kWh saved represents lost revenue; goal may be to maximize kWh sales, or to maximize profits, or some combination of the two Key market barriers remain No IRP
Competition	Regulatory/legislative support for DSM Energy efficiency and load management as a marketing tool ESCO industry development Domestic consumers' costs may remain high	A kWh saved represents lost revenue; goal may be to maximize kWh sales, or to maximize profits, or some combination of the two Key market barriers remain Lower and more variable short-term costs (especially for large customers)

CHAPTER 3 ELECTRICITY SECTOR GOALS AND OBJECTIVES

3.1 ELECTRICITY SECTOR GOALS AND OBJECTIVES

Part of the analysis of mechanisms for promoting energy efficiency and load management in a restructured electricity industry is to see how they affect the attainment of public interest goals and objectives (Table 4). The meaning of the concept "public interest" is elusive. The European Union Directive uses the term 'public service obligations' for a defined set of utility goals on account of which member states may restrict market liberalization. For the purposes of this report, public interest goals relate to meeting the basic electricity needs of the public at large (such as the need to have reliable electricity supply) as well as the needs associated with the health and safety of citizens (e.g., the provision of sufficient electricity for basic needs such as heating, cooling, and food preparation), and environmental and social goals that are viewed as part of the responsibility of the electricity sector in some states and countries. This discussion focuses particularly on electricity sector public interest goals that are supported or achieved through energy efficiency and load management activities.

Though energy efficiency is sometimes seen as a goal in itself, for the purpose of this report, energy efficiency is treated as a means to accomplishing many electricity system operations, balancing of demand and supply, and pricing objectives as well as environmental, economic, health and safety, and quality of life goals for the citizens at large. When assessing the implications of changes in electricity industry structures, it is important to keep in mind the goals addressed by energy efficiency and load management activities in order to evaluate whether they are not being achieved, or whether they are being accomplished in some other way under a new industry form.

It is also useful to remember that the electricity sector often includes apparently conflicting goals and objectives (e.g., "provide reasonably priced electricity" and "promote environmental goals") where energy efficiency can contribute to the achievement of both. At the same time, changes in electricity industry structure can cause government policy focus to shift: e.g., the availability of reasonably priced electricity for most customer classes may be expected to be achieved through competitive markets while "the promotion of environmental goals" might increase in importance for governmental initiatives in market-driven structures. In this example, it is government's change in focus and attention to particular goals and as well as a change in the dynamic between goals that could affect energy efficiency and load management programs, not stated changes in the goals themselves.

In traditional electricity industry structures, the responsibility for addressing public interest goals and objectives was often shared by government and the monopoly utility company. In a competitive market where government plays a much smaller role, private sector companies may be unwilling to assume public interest responsibilities. In this example, the theoretical assumptions of a perfect market may not be valid due to market barriers, failures, and imperfections, resulting in the need for some form of government intervention into the market to ensure public interest goals are achieved.

Many of the public interest goals and objectives in Table 4 are interrelated. Because the Experts wanted the list to be inclusive rather than limited, all of the important goals and

objectives are listed without collapsing them into broader categories. In many cases, the table includes notes about how the goals and objectives are related to one another. Furthermore, goals and objectives that are connected to one another are kept close together in the table.

In many cases, there is an attempt to estimate the relative importance of the goals for energy efficiency providers and society in a competitive market. However, because competition in the electricity industry is still in its infancy in many countries, it is premature to present any definitive conclusions on the overall ability to meet these goals and objectives in a competitive system. Finally, it is recognized that few countries will consider all of these goals to be valid in their situation. Practitioners should identify the goals relevant to their particular country or state and assess how energy efficiency activities support the achievement of those goals as a first step in understanding the effects of industry restructuring on energy efficiency activities.

Table 4 lists the general categories of public interest goals and how energy efficiency and load management help to meet these goals. The third column summarizes how the goal might be affected by different electricity industry structures (see Chapter 2):

- vertically integrated, regulated monopoly (Model 1);
- unbundled monopoly (Model 2);
- unbundled, limited competition(Model 3); and
- unbundled, full competition (Model 4).

"Independent" indicates that the goals are always relevant and not affected by industry reforms. "Dependent" indicates that the relevance of the goals changes, depending on the industry structure: e.g., promoting competition in the marketplace is more relevant for Model 4 than Model 1.

Table 4. Public Interest Goals and Objectives for the Electricity Industry Which Can be Promoted by Energy Efficiency and Load Management

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
1. Balance supply and demand[20]	Short-term balancing (e.g., flattening peak demand) and long-term balancing (e.g., deferring the construction of new power plants).	This may be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. Structure dependent.
2. Maintain reliable electricity supply[21]	Lowering peak demand, as well as shifting demand to times when electricity is more available and/or less expensive.	Reliable electricity supply may be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, this is an important goal for the operator of the wires (T/D operator who will usually be regulated). Structure independent.
3. Diversify energy sources[22]	One of several energy resources that end users and countries can use.	It is unclear whether fuel diversity will be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, access to an inexpensive source of energy in a neighboring country may make diversification more difficult; on the other hand, countries will have many sources of energy from which to select and not have to rely on just one energy provider. In a competitive market, this goal is not important for an energy provider. Structure dependent.

[19] Industry structure dependency refers to whether the goals and objectives are: (1) dependent on the particular structure of the electricity industry in place; (2) independent of the industry structure (i.e., the goals and objectives are important for all structures); or (3) particularly sensitive during the transition period, e.g., going from Model 3 (unbundled, limited competition) to Model 4 (unbundled, full competition).

[20] Includes both short-term balancing and long-term balancing (e.g., avoided capacity problems).

[21] Three different meanings of "reliable electricity supply": (1) customers want a steady source of electricity that they can rely on; (2) customers want a steady source of high quality electricity that they can rely on; and (3) society wants electricity that it can "control" (e.g., domestic resources rather than imported electricity).

[22] Depends on national fuel availability.

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
4. Promote energy independence[23]	A resource that helps to provide energy independence.	It is unclear whether this will be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, access to an inexpensive source of energy in a neighboring country may make that country dependent on a foreign energy provider; on the other hand, countries may have many sources of energy from which to select and not rely on just one energy provider. In a competitive market, this goal is not important for an energy provider. Structure independent. However, if the shift in electricity industry structures is accompanied by a shift in regional trading policies, this goal becomes structure dependent.
5. Provide a stable electricity business environment (utility financial viability)	Could play a role in improving financial stability of energy providers (e.g., additional source of revenue).	Failures (bankruptcies) may be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, regulators may be allowed to re-assign contracts to maintain supplies to consumers in the event of financial problems, as is currently done. In a competitive market, this goal is important for an energy provider. Structure dependent.
6. Maintain power quality for customers	Reducing peak demand and disruptive voltage fluctuations.	In a competitive market, this goal is important for an energy provider, particularly for their large customers. Structure dependent.
7. Provide reasonably priced electricity	Reducing prices at times of peak demand and other times (i.e., time-of-use pricing), as well as reducing the overall bill.	In a competitive market, this goal is important for an energy provider at both the retail and wholesale levels. Structure dependent.

[23] Security of electricity supply; depends on national fuel availability.

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
8. Provide relatively stable retail prices	Lowering peak demand, as well as shifting demand to times when electricity is more available and/or less expensive.	This may be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, focused on short-term trading, prices are expected to be more volatile. This is not important to most energy providers for their small customers.[24] Structure dependent.
9. Provide universal service	Lowering the total cost of the services provided by electricity.	In a competitive market, this goal is not an important goal for an energy provider. This goal is for the most part structure independent though achieving the goal is more difficult in competitive electricity industry structures.
10. Provide equity in electricity prices[25]	Can reduce energy consumption and costs for specific customers.	In a competitive market, this goal is not important for energy service providers. An energy service provider at the retail level may generally target those customers who are less expensive to serve which could exacerbate the differences in costs between customers. Structure dependent.
11. Promote economic development	Can promote economic development (jobs, businesses, etc.) both related to energy efficiency and load management products and reduce the amount of money required to pay for energy services as opposed to other economic investments.	In a competitive market, this goal is not important for an energy provider. Structure dependent.

[24] Though some energy providers may differentiate their product (especially for large customers) by designing one that stabilizes short-term fluctuations.

[25] May be more expensive to serve some customers than others (e.g., rural versus urban).

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
12. Promote use of local resources	Can often be provided at the local level by local expertise using local resources.	In a competitive market, this goal is not important for an energy provider; exception: energy providers may want to advertise their use of local resources to attract new customers or to justify higher prices for their energy resources (product differentiation). Structure dependent.
13. Promote environmental goals[26]	Benign impact on the environment, especially when compared to other energy sources (e.g., fossil-based energy).	In a competitive market, this goal may not be important for an energy provider; exceptions, for example: (1) energy providers may want to advertise their use of local or cleaner resources to attract new customers or to justify higher prices for their energy resources (product differentiation), and (2) mandated renewable energy portfolio standards. Structure dependent.
14. Promote greater use of renewable resources	To the extent that renewable resources are selected because of their environmental benefits, energy- efficiency measures are a natural complement to meet the end-use needs of consumers in a cost-effective and environmentally positive manner. Where renewable generating resources are just being built, negawatts supplied through energy efficiency can be used as a substitute. In off-grid or mini-grid systems, efficient lighting and appliances are critical to designing an affordable and efficient generating and distribution system powered by renewables.	In a competitive market, this goal is not important for an energy provider; exceptions, for example: (1) energy providers may want to advertise their use of local resources to attract new customers or to justify higher prices for their energy resources (product differentiation), (2) mandated energy efficiency and renewable energy standard. Important in transition period; (3) carbon taxes on energy consumption, (4) tendering schemes and agreements placed on large consumers, etc. Especially important in transition period. Structure dependent.

[26] Includes: (a) efficient use of natural resources, (b) reduction of CO_2 and other greenhouse gases, and (c) reduction of negative environmental impacts of power generation, transmission and use.

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
15. Promote sustainable development (both economically and environmentally)	Energy efficiency is a key element in any sustainable development program.	In a competitive market, this goal is not important for an energy provider; exceptions, for example: (1) energy providers may want to advertise their use of local resources to attract new customers or to justify higher prices for their energy resources (product differentiation), and (2) mandated energy efficiency and renewable energy standards. Structure dependent.
16. Provide transparent prices (wholesale and retail)	The cost of load management and energy efficiency may be more visible to end users and may motivate them to invest in energy efficiency and load management.	In a competitive market, this goal is important for an energy provider (especially for large customers). It is particularly important in the transition period. Structure dependent.
17. Promote competition in the marketplace	Energy efficiency services and devices may be used to differentiate an energy service provider's product. They can also be a key element in requests for proposals to serve the energy needs of specific groups of customers. Negawatts can be bid against supply in wholesale markets.	In a competitive market, this goal is important for an energy provider. Structure dependent.
18. Promote open access to transmission	May be limited.	This may not be universally accepted, especially for those countries that desire to have open access to transmission in their country, but not have their transmission system accessible to other countries. This may be less of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. In a competitive market, this goal will be important for an energy provider. Structure dependent.
19. Promote customer satisfaction with the electricity system	May play a critical role in keeping customers satisfied, if load management is promoted by energy providers for satisfying customers' needs.	In a competitive market, this goal is important for an energy provider (particularly for their larger customers but may not be as important for smaller ones). Structure independent.

Goal	Role of Energy Efficiency and Load Management	Industry Structure Dependency[19]
20. Promote consumer democracy	Energy efficiency can substitute for some portion of electricity supply making consumers more independent and offering a greater range of choices.	In a competitive market, this goal is not important for energy providers. Structure independent.
21. Enhance the quality of life of the population	May play a critical role in enhancing the quality of life by reducing the amount of electricity (and the cost) required to provide for consumer needs.	In a competitive market, this goal is not important for energy providers. Structure independent.

In general, some countries are reducing direct government participation in the operation and management of the electricity system through privatization, unbundling, and competition. In some cases, these governments are refocusing their attention on market power and consumer protection issues. At the same time, all countries are increasingly placing a higher priority on the goal of protecting the environment, in response to climate change and other environmental issues. These two major trends may be diametrically opposed to one another, or may complement one another, depending on the industry structure that emerges, the responsiveness of private industry to public policy goals and objectives, and the role of government in ensuring public policy goals and objectives are met.

A government's electricity sector goals and objectives are key to public policy support for DSM. Depending upon what objectives are being emphasized, government (legislators, members of parliament, regulators and ministers) will focus more or less attention on DSM as a tool for meeting public interest goals. It is worth while for practitioners to spend some time considering how DSM mechanisms might act as tools to achieve their particular country, province or state goals in order to craft a feasible and successful set of DSM policy strategies.

This change in government focus from everyday utility operational goals to social and environmental policy goals can provide a strategic benefit for energy efficiency and load management programs (to the extent that they are seen as key tools for meeting social and environmental goals). At the same time, the movement by government away from direct involvement in operational matters in competitive electricity industry structures may reduce government's opportunities and leverage for encouraging energy efficiency and load management for public policy goals as well as a means for achieving other societal goals mentioned above. These are the types of changes that contribute to the need to create new and adjust existing mechanisms.

Public policy goals that are not of particular interest to energy service providers in a competitive market structure will not be met unless they are explicitly included in any restructuring agenda. These include goals related to:

- open and competitive markets,
- energy independence,
- consumer protection,
- environmental stewardship,
- quality of life and universal service,
- customer satisfaction for small, domestic customers

Mechanisms designed to achieve these types of public policy goals will not happen automatically; they must be purposefully designed and implemented into the new structure from the outset if the public's interests are to be protected.

3.2 CLIMATE CHANGE

Because of concerns about the growing threat of global climate change from increasing emissions of greenhouse gases, more than 166 countries (as of May 13, 1997) have become Parties to the United Nations Framework Convention on Climate Change (FCCC). The FCCC was entered into force on March 21, 1994, and the Parties to the FCCC drafted the Kyoto Protocol for continuing the implementation of the FCCC in December 1997. The Protocol requires developed countries overall to reduce their emissions by about 5% below 1990 levels by the 2008-2012 time period. Many countries are expected to rely on energy efficiency and load management to help meet their CO_2 reductions.

European countries took the lead among the developed countries in pressing for substantial emissions reductions obligations at Kyoto. In general, they have more substantial emissions reduction targets for 2010 than other countries with targets (essentially the developed countries), despite already having significantly lower per capita emissions than those countries (with the exception of Japan).

The European Union countries agreed at Kyoto to a joint obligation of an 8% reduction in greenhouse gas emissions (from 1990) by 2010. In subsequent negotiations within the EU, national obligations have been differentiated within this overall 'bubble', so that obligations range from a 28% reduction for Luxembourg to a 27% increase for Portugal.

The principle of "subsidiarity" (that decisions should be taken at the appropriate level closest to the citizen) means that many of the policy initiatives necessary to deliver the Kyoto obligations of EU countries will be taken at national or sub-national level. Nevertheless, because of the need for harmonization in the EU internal market, some EU actions are needed. It is generally agreed that substantial improvements in energy efficiency will be a part of the strategy for all EU countries.

The European Commission has recently issued a communication 'Energy efficiency in the European Community - Towards a Strategy for the Rational Use of Energy'[27]. This notes as one of the key barriers to energy efficiency the "continued practice of selling energy in the form of kilowatt-hours instead of energy services" and that this is an "argument in favor of the

[27] Commission of the European Communities 1998. *Energy Efficiency in the European Community - Towards a Strategy for the Rational Use of Energy* COM/98/246.

development of energy service companies and the use of integrated resource planning". The Commission has published a draft Directive on Rational Planning Techniques[28] which it considers is important in the context of market liberalization, but the draft has yet to receive sufficient national support to become legislation.

Other countries are still in the process of crafting policies to implement the Kyoto UN Framework on Climate Change. In the United States, there is much debate about whether or not the US Senate will ratify the agreement. Nonetheless, many individual state utility regulatory commissions, non-governmental organizations, and other private and governmental institutions are developing strategies for reducing CO_2 emissions whether or not the agreement is ratified. Similar activities (below the "official" federal level) are taking place in Asia, Australia, Latin America and other regions of the world.

3.3 OTHER ENVIRONMENTAL AND SOCIAL ISSUES

In addition to climate change, many countries are pursuing energy efficiency and load management to address other environmental problems (e.g., toxic air, land and water emissions, resource management) as well as to pursue sustainable development and quality of life goals. Energy efficiency remains an important tool in reducing emissions of pollutants other than greenhouse gases. In most countries the electricity sector is the dominant emitter of sulfur dioxide and a large contributor to NO_x, which are jointly the key precursors of acid deposition. While acid deposition policies have frequently focused on the use of 'end-of-pipe' pollution abatement, efficiency of end use has been and remains an important strategy. Similarly, energy efficiency policies can contribute to the reduction of other social and environmental problems largely associated with the electricity sector, notably radioactive emissions, major accident risks, and the proliferation threat of nuclear power installations.

Particularly in some European countries, there is increasingly strong support for sustainable development - a broader concept than just environmental improvement, implying meeting the economic and social needs of the present generation without prejudicing those of future generations. While the specific measures required to implement the concept are difficult to define precisely, there is general acceptance that they involve significantly reducing energy use and emissions. There is also a strong sense (drawing on the Agenda 21 agreement from the Rio conference) that a sustainable economy will involve local economic initiatives, rather than having the key economic levers in the hands of remote corporations. Energy efficiency programs have all the attributes to be compatible with almost any conception of sustainable development. They:

- are generally economically attractive;
- can reduce resource use;
- reduce emissions of most major pollutants; and
- can be implemented by empowering local communities.

[28] Commission of the European Communities 1995. *Proposal for a Directive on Rational Planning Techniques*. COM/95/682.

Economic sustainability is a key consideration for most governments though it may be defined differently in different cultures. Because of the central role electricity plays in a nation's economy (being both the most capital intensive sector of the economy and a key element in economic development and growth), electricity sector liberalization and economic sustainability are closely intertwined. The concept of economic sustainability encompasses many different factors and can be seen as a goal or as a means to other goals. Electricity sector reform can be viewed as resulting from a movement toward economic sustainability or as a tool that can help or hinder the achievement of economic sustainability. The answer lies in the cultural and political context within which electricity sector liberalization is occurring.

CHAPTER 4 BARRIERS

4.1 BARRIERS TO PROMOTING ENERGY EFFICIENCY AND LOAD MANAGEMENT

The potential benefits from energy efficiency measures may not be fully realized because of various barriers. Energy efficiency and load management mechanisms are designed both to assist in the achievement of public interest goals and also to overcome barriers to those goals. The analysis of mechanisms must include then an analysis of barriers at two levels:

- the policy level – barriers to achieving public interest goals through energy efficiency and load management (reflecting a societal perspective); and
- the program level – barriers to the implementation of certain energy efficiency and load management programs (primarily reflecting an end-user perspective).

The policy barriers can influence program barriers, and mechanisms that address policy barriers may weaken some of the program barriers. In contrast, program barriers have relatively little influence on policy barriers, and mechanisms that address program barriers will likely have little impact on policy barriers. There will be cases when it is unclear whether a barrier is a policy barrier or program barrier. The barriers are listed in Table 5, and described in detail in Appendix A. The barriers are also referred to later in this report during the discussion of mechanisms.

Barriers are defined more broadly for the purposes of this report than might be used by other analysts. For this purpose, a barrier is any factor that limits the promotion of energy efficiency in society. Moreover, the definition of a barrier used here includes barriers to implementation of either policy goals or programs. This report uses this broad definition of barriers in all the review and discussions of mechanisms.

Many discussions of barriers refer to the role of "energy providers." This report defines an energy provider as: an organization that sells gas, electricity and other fuels and/or provides energy services (e.g., energy performance contracting, energy audits).

Table 5. Barriers to the Promotion of Energy Efficiency (EE) and Load Management [29]

Barrier Type	Barriers
General Barrier	Lack of government attention to energy efficiency and load management
Policy Barriers	1. Excess capacity
	2. Short-term perspective
	3. Split (misplaced) incentives to energy providers
	4. Pricing a. Non-transparent pricing b. Non-cost-reflective pricing

[29] For additional detail, see Appendix A.

Barrier Type	Barriers
Policy Barriers (continued)	5. Import tariffs and duties
	6. Lack of awareness by policy makers (of EE opportunities)
	7. Imperfect information (restricted access to customer information)
	8. Inadequate competition (market power problems)
	9. Customer instability (problem for energy providers)
	10. Lack of adequate paradigm (for evaluating the value of EE)
	11. Separation of energy policy process (from environment & social policy)
	12. Little market transformation experience (by end-users or others)
	13. Lack of available expertise (in EE during transition periods)
	14. Utility price setting process a. Cost recovery barriers b. Decoupling of profits from sales
Program Barriers	1. Low cost of energy to end users
	2. Lack of information to end users: a. Lack of energy consumption data b. Lack of energy provider information
	3. Information/search costs (to end users & other actors)
	4. End users do not invest in EE because of habits or custom
	5. Lack of end-user and other market actor's experience impacts: a. Lack of experience with proven cost-effective measures b. Performance uncertainties (may perceive EE to be unreliable) c. Reluctance to adopt new technologies d. Fear of disruption in routine
	6. Financial barriers a. Limited investment capital available for EE b. High initial cost
	7. Product/service unavailability
	8. Inseparability of product features
	9. Organizational (institutional) barriers a. Low priority of energy efficiency b. Views of upper management c. Multiple decision makers
	10. Split (misplaced) incentives

4.2 IMPLICATIONS OF ELECTRICITY INDUSTRY REFORM ON BARRIERS

This section includes a discussion of how barriers to energy efficiency and load management are affected by electricity sector reforms. As mentioned in the previous chapter, it is important to remember that for simplicity the characteristics are being discussed as though they occur separately from each other and are based on a best guess of how barriers are affected by

electricity sector reforms. In the real world, actual electricity industry structures and the effects of reforms are much more complex than indicated here.

Many of the program barriers are inherent in all electricity industry structures. Some are more relevant for a particular structure than others, but all are found to some degree in all structures. Many of the barriers like 'excess capacity' and 'import tariffs' have been present since before competition was an issue. For example, 'utility price setting process' is most associated with traditional electricity industry structures (Models 1, 2 and 3). Some like 'customer instability,' 'inadequate competition,' and 'lack of an adequate paradigm' are quite new and related primarily to Model 4 in which the critical change is that all users have a choice of supplier. And some like 'lack of awareness' and 'imperfect information' are exacerbated by competition.

General Policy Barrier: An overarching policy barrier that affects all electricity industry structures but particularly Model 4 is 'lack of regulatory or legislative attention and interest in energy efficiency issues'. Lack of government interest is a major problem in any structure, but is most important in Model 4. In this model, the role of the utility changes and if programs are to happen, government (or an agent of government) has to take on some of the roles that may have been formerly performed by the monopoly utility.

Political will is therefore critical. Although energy efficiency and load management are invariably seen as good ideas to be promoted, they may not always be sufficiently important in the political agenda for action to be a priority. The barrier is not simply convincing political leaders of the merits of the required policies. Political priorities are set under pressures from a range of other actors, including business and wider society.

The role of energy efficiency in the restructuring process may therefore be determined by its prominence in wider social debates. Relatively small reductions in costs for energy consumers have a low visibility and therefore may not provide the basis for political prioritization. The prospects for energy efficiency and/or load management are better if restructuring occurs in a framework where there are other pressures for policy action. Traditionally these have arisen from geo-political concerns about energy security, but increasingly, in many countries, climate change and the resulting Kyoto targets may also be critical.

The following discussion illuminates some of the ways in which policy barriers are affected by electricity sector liberalization.

4.2.1 Implications for Commercialization [Models 1,2,3,4]

Program barriers are a greater concern to a recently commercialized utility where improved cost accounting and greater attention is focused on minimizing costs and increasing revenues. To the extent that this more detailed cost accounting is new to employees of recently commercialized utilities, they may lack much of the cost, consumption and other types of information and expertise necessary to craft successful energy efficiency and load management programs.

4.2.2 Implications for Privatization [Models 1,2,3,4]

When privatization is introduced program barriers, as a group, tend to dominate. Those program barriers that tend to increase in importance with privatization include: 'organizational barriers' (because of increased focus on profit and sales volumes); 'low priority of energy';

and 'views of upper management'. The privatized companies prioritize financial objectives over public service obligations, so that social and environmental goals are only relevant to the extent they are enforced by regulatory action and/or consumer pressure. Regulation by an independent regulatory body is often introduced along with privatization. Any barriers to energy efficiency and load management created in the structures of price regulation are particularly important. The role of the Government in setting social, environmental and energy efficiency objectives for regulation and the participation by consumer representatives and environmental organizations in the regulatory process (where that is allowed) becomes increasingly important. Chapter 5 describes regulatory support mechanisms relevant to different industry structures.

4.2.3 Implications for Unbundling [Models 2,3,4]

The policy barriers that are magnified with utility unbundling are most commonly: 'split incentives', and 'multiple decision makers'. Because separate companies are involved in the generation and retail electricity business (split incentives), organizational barriers such as 'low priority of energy efficiency', and 'lack of interest by upper management' will tend to reduce energy efficiency's perceived value. On the other hand, where there is over capacity in an unbundled market, it is possible that a specialist retailer (ESCO) will have as much or more interest in supplying energy efficiency and load management than a generator, especially where there is upstream competition. The extent to which specialist retailers might be interested in becoming ESCOs is an open question and probably depends on incentives and the regulatory regime.

Retail services (such as metering and meter reading, billing, and other types of customer services) may also be separated from the natural monopoly services such as the 'wires' business (transmission/distribution services). In many regulatory regimes, the level of profit allowed on electricity transmission and distribution is linked to the amount of electricity which flows through the wires. This gives wires businesses which are also retailers an incentive not to undertake energy efficiency. In this case unbundling retailing from the wires business removes a regulatory barrier to energy efficiency.

It should also be noted that profit (revenue minus costs) can also be increased through cost reduction. Costs can be reduced by electricity businesses through implementing energy efficiency and DSM programs, especially DSM projects which enable wires businesses to reduce peak loads by avoiding or postponing network enhancement.

4.2.4 Implications of Competition [Models 3,4]

Competition increases the effects of such economically-related barriers as: 'excess capacity', 'low cost of energy', 'limited investment capital', 'high initial cost', 'short-term perspective', 'customer instability', and 'pricing barriers'. Any activities that increase risk (or are perceived as increasing risk) or negatively affect profits are likely to be rejected.

The introduction of competition tends to lead to cost-reflective pricing, thereby removing artificially low marginal prices which are a barrier. Prices related to peak loads, in particular, may increase in many industries, making peak-shaving load management more attractive. Moreover, competition may allow the entry of new actors other than traditional utilities. These may provide new opportunities to reduce barriers. For example, there may be a role for specialist energy service companies (ESCOs) to sell packages including both electricity and

energy services, thereby reducing barriers related to customer expertise, information and finance. In addition, non-profit organizations, such as municipalities, social housing providers and environmental NGOs, may wish to enter the market to provide energy efficiency services for non-commercial reasons, thereby addressing barriers such as 'lack of an adequate paradigm' and 'short-term perspectives'.

On the negative side, however, competition may introduce entirely new barriers such as the complexity of dealing with competing retailers and deliberate misinformation (worse information barriers). The introduction of competition absorbs very large amounts of time for government, regulators and energy companies, limiting the resources available for energy efficiency. Competition increases some key barriers, but no form of restructuring of the electricity supply industry removes the main program barriers - the market imperfections on the customer side of the meter.

4.3 CONCLUSIONS

In general, no form of restructuring will remove all (or even most) of the barriers to energy efficiency, although it may change them. While electricity industry reforms may help to reduce some barriers to energy efficiency, they also leave untouched other barriers to implementation of end-use improvements (such as inadequate information and capital, and environmental externalities). They may also increase the magnitude of some barriers such as split-incentives. To the extent that the presence of these barriers justified government intervention in the pre-reform situation, they still do.

Policy barriers that are related to market structure may change significantly with restructuring (especially unbundling and competition). In Model 4, the utility no longer plays all of the roles it has assumed in traditional structures, and so some barriers become more significant. Program barriers will remain and some may be increased by commercialization and competition, regardless of who is responsible for the programs. In all cases, the legal, policy and regulatory framework is critical as this affects the incentives to energy suppliers. To the extent that privatization is introduced into any electricity industry structure, this will magnify the importance of many of the program barriers. The combination of variables (commercialization, privatization, unbundling, and competition) within any particular structure results in a complex interaction so that there may be barriers and incentives unique to that particular situation. The case for intervention remains for any structure if energy efficiency is an important policy goal or tool, but the nature of the intervention (i.e., the appropriate mechanisms) will change.

Table 6, over the page, summarizes the barriers that tend to increase in importance under certain industry reforms. There can be interactions when more than one reform is undertaken simultaneously, either magnifying certain barriers or counteracting others. This table clearly indicates that barriers to the promotion of energy efficiency and load management will remain in all electricity industry structures: i.e., market mechanisms by themselves will not be able to remove these barriers.

Table 6. Summary of Barriers that Tend to Increase in Importance Under Electricity Industry Reforms

Electricity Industry Reform	Barriers
Commercialization	All Program Barriers (1 through 10)
Privatization	All Program Barriers, especially 9. Organizational Barriers 9a. Low priority of energy efficiency 9b. Views of upper management Policy Barrier 14. Utility Price Setting Process
Unbundling	Program Barrier 9. Organizational Barriers 9a. Low priority of energy efficiency 9b. Views of upper management 9c. Multiple decision makers Program Barrier 10. Split Incentives
Competition	Lack of Government Attention to Energy Efficiency and Load Management Most Policy Barriers, especially: 1. Excess Capacity 2. Short-term Perspective 3. Split Incentives to Energy Providers 7. Imperfect Information 8. Imperfect Competition 9. Customer Instability Program Barriers: 1. Low-Cost of Energy to End Users 2. Lack of Information to End Users 3. Information/Search Costs 5. Lack of Available Expertise & Experience 6. Financial Barriers

CHAPTER 5 MECHANISMS

5.1 OVERVIEW OF MECHANISMS

The mechanisms analyzed in this report were provided by Experts in carrying out the work of Task VI. Examples of existing mechanisms implemented in the various countries participating in Task VI are described in the first Task VI report[30].

A conceptual framework was designed for analyzing the mechanisms. There are two primary categories of mechanisms:

- mechanisms which only governments (or related agencies) have the legal powers to put into practice, and which set up the regulations and structures in which markets (either competitive or non-competitive) operate; and
- other mechanisms outside the fiscal and regulatory systems, which either the Government or any other body may choose to use to affect the decisions of actors in the energy market.

Mechanisms are established in one of two ways:

- through legislation (e.g., tax law, special funds, universal service requirements, licensing, appliance standards); and through regulation or administrative actions by government bodies (e.g., electricity revenue adjustment mechanisms [ERAM], special tariffs, integrated resource planning [IRP], technology procurement, and/or public information programs); or
- through voluntary activities that either are the result of economic conditions, individual goals and objectives, and/or a reaction to public policies designed to stimulate public action (e.g., negotiated agreements, education, training and certification).

For the purpose of this analysis, mechanisms have been divided into four sub-categories:

- Legislative and Regulatory Mechanisms are sub-divided into two sub-categories: 1) Fiscal Mechanisms; and 2) Non-Fiscal, Market-shaping Mechanisms;
- Actor-Oriented Mechanisms add two additional sub-categories: 3) General Actor-Oriented Mechanisms; and 4) Targeted Actor-Oriented Mechanisms.

However, not every type of mechanism fits neatly into one category (e.g., Technology Procurement could be government, general or targeted). Table 7, over the page, indicates how specific types of mechanisms are distributed among the four sub-categories. For descriptions of the mechanisms see Appendix B.

The first category, Legislative and Regulatory Mechanisms, includes mechanisms that can only be implemented by government. Some of those are fiscal (like taxes, special funding and tariffs). 'Non-fiscal' technical, legal and regulatory support mechanisms tend to shape the market – the rules and conditions that govern the regulated utility and/or the market players (license conditions, IRP, etc.).

In the second category, G*eneral* Actor-oriented Mechanisms are designed to incentivize participants and/or encourage particular behavior (e.g., public information, ESCO

[30] Crossley, D, Dyhr-Mikkelsen, K, Maloney, M 1998 *Existing Mechanisms for Promoting DSM and Energy Efficiency in Selected Countries*, IEA/DSM Programme, Task VI Research Report No 1.

development) but are not targeted at any particular market segment or end-user category. Conversely, the *Targeted* Actor-oriented Mechanisms are targeted at specific markets or end users (e.g., rural, low-income).

Table 7. Existing Mechanisms for Promoting Energy Efficiency and Load Management[31] (All Electricity Industry Structures)

LEGISLATIVE/REGULATORY	
Funding and Government Financial Incentives	Taxes (carbon and energy)
	Tax Exemptions/Credits
	System Benefits Charge [Energy Efficiency Load Management Funds and R&D Funds]
	Funding of Government Energy Efficiency Organizations
	Cost Recovery via Tariffs
	Utility Subsidies, Grants, Loans, & Rebates
	Government Subsidies, Grants, Loans & Rebates
	Special Prices & Tariffs (e.g., Interruptible)
Market Shaping Mechanisms	Integrated Resource Planning
	Performance-based Regulation
	Billing Regulations
	Competitive Sourcing of Demand-Side Resources
	Demand-side Bidding
	Appliance and Building Standards
	License Conditions for Energy Suppliers
	License Conditions for ESCOs

ACTOR-ORIENTED	
General	Market Transformation
	ESCO Industry Development
	Information Provision
	Technology Procurement
	Education, Training and Certification
	Branding
Targeted	Investment Funding
	Rural Electrification
	Green Pricing
	Green Marketing
	Voluntary Purchasing Guidelines
	Voluntary/Negotiated Agreements

[31] For additional detail, see Appendix B.

5.2 HOW MECHANISMS VARY BY STRUCTURE

There are a number of ways that mechanisms for promoting energy efficiency and load management are affected by electricity sector reforms. This section discusses the structural changes that affect the funding, implementing organization, roles of key players, basis for evaluation, or general focus and direction of mechanisms.

5.2.1 Legislative/Regulatory Mechanisms

Funding and Government Financial Incentives

Taxes, Tax Exemptions and Credits provide pre-specified incentives or penalties for specific energy-related activities. These mechanisms may include CO_2 or energy taxes (such as those in Norway and Denmark); tax incentives for renewable energy and energy efficiency measures (e.g. Japan, Netherlands and France); and organizations that finance energy savings (such as PAEE in Spain); reduction of taxes for energy-efficient equipment; tax credits and accelerated depreciation; energy efficiency/load management commercialization and R&D funds (e.g., a wires surcharge or system benefits charge); and funding of governmental energy efficiency organizations. Most of these mechanisms are not substantially affected by reforms in the electricity sector. They are applicable under all four of the models but tend to increase in importance under Models 3 and 4 (unbundled, with increasing levels of competition), as other mechanisms become less effective or more difficult to implement.

System Benefits Charge (or 'wires' charge)[32] is an example of a recent mechanism designed specifically to fund energy efficiency and renewables commercialization, and R&D efforts in unbundled markets. Examples of this type of fund include Denmark's Electricity Savings Fund, the UK Energy Savings Trust, and system benefits funds being used in some states in the United States.

Funding of Governmental Energy Efficiency Organizations – There are a number of energy efficiency organizations funded by the government. Some are funded through a system benefits charge. Others are funded from more traditional general funds or other government sources. Some of these organizations have been around for quite a long time and may be involved in renewable resources as well as energy efficiency and load management activities. They include France's ADEME, Netherlands' NOVEM, Finland's MOTIVA, and some state organizations like SEDA in Australia. Though government-funded energy efficiency organizations have historically played an important role in a number of countries under traditional electricity industry structures, they become even more important under Models 3 and 4. The reduction in utility energy efficiency activities[33] and the need for the government to

[32] A system benefits charge ('wires' charge) is a legislated tax or levy on electricity businesses. Frequently it is imposed only on the monopoly transmission and distribution 'wires' businesses. It is used to fund energy efficiency, universal service, low-income and minority programs, renewables, and research and development (R&D). This can also be a regulatory mechanism outside the normal tax system.

[33] Studies completed by a host of different agencies document that energy efficiency activities tend to be drastically reduced in competitive markets. (e.g. US/AID Report of the Office of Energy, Environment, and Technology. *Case Studies of the Effects of Power Sector Reform on Energy Efficiency*. Report No. 98-03, Arlington, Virginia, March 1998

ensure that energy efficiency activities continue to be provided in competitive market structures makes these funding mechanisms of critical importance for Model 4.

Government Financed Incentives

These mechanisms offer incentives financed by government to actors who choose to undertake load management and energy efficiency activities. These mechanisms include cost recovery and special tariffs; subsidies, grants and rebates; low-interest loans, lower interest rates, and loan guarantees; and special prices and tariffs. For example, these mechanisms have been undertaken in Spain, Netherlands, Korea, and Japan.

Special Funds and Cost Recovery Mechanisms are affected by electricity sector reforms, particularly the movement to more competitive electricity industry structures. In the first three models, *utility cost recovery mechanisms* of some type become critical elements in the effective implementation of utility sponsored energy efficiency activities. In addition, *special prices and tariffs* (e.g., interruptible tariffs, direct load control, load adjustment contracts and time-of-use tariffs) are valuable tools a utility can use in managing their loads and balancing load with supply.

In an unbundled competitive structure (Model 4), *utility cost recovery mechanisms* for energy efficiency programs are only important insofar as the regulated utility continues to offer such programs to their captive customers.[34] Cost recovery mechanisms need to be designed carefully in order to perform effectively. An effective cost recovery mechanism for load management and energy efficiency incorporates utility incentives for realistic but aggressive performance goals.[35] If energy efficiency and load management programs are not isolated from the price regulation process, there will be heavy incentives to cut these programs while leaving intact other programs with greater utility management support. Moreover, if the regulator emphasizes indexing prices (rather than revenue requirements or revenue requirements per customer), the sales reductions arising from energy efficiency will disadvantage utility shareholders even more, providing further incentives to reduce spending on energy efficiency.

In the case of *load management*, it is assumed in competitive market scenarios that this will be handled through accurate time-of-use price signals rather than through special utility programs. This may or may not turn out to be true in actual practice. If not, additional mechanisms may be required to incentivize load management under competitive market conditions. However, where there is no time-of-day pricing because of metering transaction costs or other reasons, these programs may still be needed

Subsidies, Grants and Rebates are commonly part of utility implemented energy efficiency activities and are supported by cross-subsidies within utility price structures. These are the types of utility activities most likely to be first eliminated when moving into competitive markets.[36] Utility subsidies, grants and rebates are unlikely to be important mechanisms in

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[34] This differs with the details of the industry structure which may or may not designate a regulated "default" provider.

[35] Jan Hamrin, William Marcus, Fred Morse, Carl Weinberg, *Affected with the Public Interest – Electric Utility Restructuring in an Era of Competition,* the National Association of Regulatory Utility Commissioners, Washington, D.C. 1994. See especially pp 149-151 and Appendix B.

[36] Energy Information Administration, United States Department of Energy *Demand-Side Management Programs: Utilities Shift Focus and Reduce Spending*.

unbundled competitive electricity markets unless a special fund is created for this purpose that allows the State or federal government to provide these types of incentives, or unless suppliers are required to provide them under the terms of their licenses.

Low-Interest Loans, Lower Interest Rates, and Loan Guarantees may be either utility or governmentally funded and implemented. They have been effectively used in the first three models in Spain and the US, and would be expected to be important in Model 4 though more likely to be government-funded or funded through a system benefits charge in Model 4 because of the utility desire for cost-cutting in competitive markets.

5.2.2 Market-Shaping Mechanisms

Market-shaping mechanisms are those mechanisms imposed upon the market by a government entity to influence how the market will function. Market-shaping mechanisms include: integrated resource planning (including generation tenders and generation permits); regulatory support (including performance-based regulation) and energy efficiency laws; codes and standards; competitive sourcing of demand-side resources; and licensing conditions.

Integrated Resource Planning (IRP*)* and all the related processes for tendering were only recently (in the 1980s) instituted as market-shaping mechanisms into electricity industries structured as Models 1, 2 or 3. Though a formal IRP system is largely a US concern, many countries have justified energy efficiency and load management programs on the grounds that they are a more cost-effective investment than new supply (Japan is one example). IRP has been most notably used in the US but also in Korea, Greece and Denmark. Unbundled competitive structures (e.g., Model 4) where market prices are supposed to determine when and what generation supply might be needed tends to undermine the use of IRP since unbundling separates generation from retail customer tradeoffs and competition eliminates most comprehensive planning efforts. On the other hand, the administrators of some renewable and energy efficiency funds may use a type of integrated resource planning to determine the type and focus of energy efficiency activities that would provide greatest benefit to the public. IRP could also be used by resource siting agencies and by independent transmission and distribution operators in assessing tradeoffs associated with transmission line upgrades and extensions.

Regulatory Support is important in all electricity industry structures that include privatization (and thus more formal regulation). Many countries are moving from government-owned and operated utility structures to a privatized structure that for the first times requires development of some type of independent regulatory oversight. All of the generic structural models discussed in this report have the potential to include regulation-based mechanisms that are often focused on:

- recovery of costs of energy efficiency and load management programs;
- providing direction (e.g., requiring IRP, low-income weatherization, and other types of energy efficiency programs); and
- providing incentives for successful energy efficiency program performance.

Where wires and retail services are bundled, the regulation of the monopoly element affects retail energy efficiency incentives. Integrated resource planning, performance-based regulation, competitive sourcing of demand-side resources, licensing conditions for energy service providers and ESCOS, and in some cases administration of a system benefits charge are primarily implemented through the regulatory process. This means that though retail price regulation may not be a regulatory function under Model 4, regulatory support for shaping the market, consumer protection, and regulation of other public interest functions of the utility is critical for the effective provision of energy efficiency services.

Performance-based regulation (PBR) is a form of regulation being instituted in countries where independent regulatory bodies are new. It is also viewed as a way of reducing the level of regulation of electricity utilities, in countries that have a history of traditional price regulation (like the US) as they move into a competitive structure (Model 4). PBR can also be applied in the first three models, depending upon the circumstances, in locations that are just introducing privatization and regulation for the first time. The degree to which it is an effective tool in Models 1,2,3 depends upon how it is designed and implemented. Since PBR is fairly new, there are few definitive answers concerning its effective use under any electricity industry structure.

Billing Regulations are the types of rules and restrictions placed on retail service providers participating in competitive markets. They include such things as requiring the use of time of use prices and/or that certain aspects of the bill (such as energy, billing, meter reading, transmission, and distribution charges) must be listed separately. Billing regulations might also require certain types of disclosure statements (such as the resource mix of the electricity being purchased).

Competitive Sourcing of Demand-side Resources may be used in any electricity industry structure since it essentially depends on the utility (whether unbundled, commercialised, privatised, or not) offering to purchase energy efficiency and load management as a resource that is below the utility's avoided cost. The competitive aspect of this mechanism occurs when the offers (bids) are evaluated by the utility. (In the United States, this mechanism is called "Demand Bidding" but it should not be confused with the term "Demand-side Bidding" as used in Europe and Australia - see below.)

Demand-side Bidding (as the term is used in Europe and Australia) involves customers in a competitive electricity market bidding into a power pool price levels above which they commit to reduce their load by a specified amounts. It can be an effective in electricity industry structures with limited wholesale competition as well as structures that include both wholesale and retail competition. Since it is related to competition rather than unbundling or ownership, it could be used in Model 1 also if competition is allowed in the wholesale side. This mechanism is in the process of being developed in a number of countries. In some countries, retail competition will be introduced without establishing a power pool. In these countries, equitable market access for all generators and economic load dispatching is likely to be carried out by an Independent Systems Operator. Depending on the precise way in which the competitive market is established, it may be possible for customers to make demand-side bids to the Independent System Operator.

Appliance and Building Standards are mechanisms that can be used in all electricity industry structures. However, because there may be fewer ways of influencing the market under Model 4, and because the regulatory arena may be less influential in Model 4 than in Models 2 and 3, codes and standards will play a more important role than in other structures. Finland, France, Spain and Korea all use some form of building and/or appliance standards. These types of mechanisms shape the products and services available in the market over the long-term which is particularly important in Model 4 where short-term kWh savings may become a less important evaluation criteria than long-term market transformation.

License Conditions for retail energy suppliers and ESCOs are market-shaping, government mandated rules and regulations that are extremely important mechanisms under Model 4. To the extent that there are no other retail energy suppliers other than the traditional utility in Models 1, 2 and 3, retail energy supplier licensing is only a Model 4 mechanism. However, there may be cases where ESCO licensing could be useful under Model 3 or in some special circumstances where competition in the delivery of energy efficiency services is being encouraged. License conditions are being considered in several US states.

5.2.3 General Actor-Oriented Mechanisms

General Actor-Oriented Mechanisms are mechanisms that may be implemented by either government or non-governmental entities. These actor-oriented general mechanisms tend to support private operators and include such things as: education, training and certification; branding; codes of practice; ESCO development; market transforming organizations; and information services. Support and funding for these activities may come from government and/or private sources.

ESCO Industry Development and Market Transformation[37] are two mechanisms that can be used in any market structure but increase in importance in competitive markets. They have both actor-oriented and market-shaping characteristics that make them particularly useful for Models 3 and 4. These mechanisms are being used in Finland, France and the UK. As with some general actor-oriented mechanisms they could also be listed under "market-shaping government mechanisms" if they are funded and/or implemented by government.

Information Provision is a critical part of any energy efficiency and load management strategy in all electricity industry structures. However this becomes an exceedingly important tool under Models 3 and 4 where imperfect information is a primary market barrier. Because consumer information is absolutely critical to making competitive markets work, and because information may be much less readily shared in competitive markets, information services are an indispensable element in Model 4. Some or all of these activities are often financed and possibly implemented by government. Many countries have developed federal information provision mechanisms like France, Netherlands, Sweden, Norway, and the UK.

[37] See a more detailed discussion of market transformation later in this Chapter.

Technology Procurement is another mechanism that could be considered either a market-shaping or actor-oriented mechanism. It can be implemented under a government mandate or as a voluntary activity. It can be used under all electricity industry structures though, as for other market-transformation mechanisms, it could become more important for Models 3 and 4 as mentioned above. Examples of technology procurement programs can be found in Sweden and Finland.

Education, Training and Certification; Branding; and Codes of Practice are all particularly important tools in competitive markets (Model 4) and where new products are being offered to retail customers. These are both actor-oriented and market-shaping mechanisms. They could be used under any electricity industry structure depending upon the particular application. However, they are critically important tools for models where there is retail competition (e.g. Model 4) because of their consumer protection function and their potential to build consumer confidence in the marketplace. Codes of Practice are similar to Licensing Requirements but are voluntary programs administered by trade organizations or other private sector entities. These are being used in Sweden and the UK. If the Codes of Practice are mandated by law, they would be included under the market-shaping governmental mechanisms listed above. Branding may be implemented by either a government agency or a non-governmental organization. In Australia, branding is administered through a state government agency (SEDA) while in the US, it is administered through a non-profit organization. If implemented by government, it might be considered a market-shaping mechanism, if implemented by a non-government organization it becomes a general actor-oriented mechanism.

5.2.4 Targeted Actor-Oriented Mechanisms

Targeted actor-oriented mechanisms are targeted toward special markets or classes of consumers (e.g., low-income families, consumers in rural areas). These types of programs are targeted at special groups of people who may be disenfranchised (such as the poor, minorities and people located in remote areas) and who governments feel they have a special responsibility to protect; and special segments of the market unlikely to respond to regular incentive programs (e.g., owners of rental property) due to split incentives or market imperfections).

Investment Funding involves a specialized fund established to encourage the commercialization of energy efficiency products. The funding may be used to reduce interest rates, or to provide seed funding for entrepreneurial organizations. These types of programs have been used in Japan and the Netherlands under traditional electricity industry structures and might be used in more competitive structures through the targeted use of system benefits charge monies.

Rural Electrification and Other Special Markets are mechanisms targeted toward special markets or classes of consumers like low-income families, rural areas, owners of multi-family housing, etc. and are applicable under all electricity industry structures. However, the ability to design effective special market mechanisms becomes more difficult in competitive structures (Model 4) if those special markets or classes of consumers have greater difficulty paying for the services than do other consumers, are a bigger credit risk, and more expensive to serve if the anticipated market price is below the cost of service. Special fees like system benefits

fees, are important because they can be used to make service to these special markets and consumers attractive to the private sector.

Green Marketing and Green Pricing are both mechanisms that shape the market and build consumer confidence where the service is more expensive but a fair market price is acceptable to enough consumers to make the effort worthwhile (e.g., the residential green market for renewable based electricity). Green pricing can be used in Models 1, 2, and 3. When combined with a special market focus, green marketing may be used in Model 4. For example, green pricing has been used in Spain and the US under traditional structures (Models 1, 2, and 3) while green marketing is being used in Australia and the US under competitive structures (Model 4).

Voluntary Purchasing Guidelines are often used to encourage agencies and contractors to purchase energy efficiency products and services. They are appropriate under any electricity industry structures and have been used in one form or another by most countries. Because of the importance of information in competitive structures (Model 4), one can expect purchasing guidelines for specific types of markets to be included as part the information activities of both government and non-governmental entities.

Voluntary/Negotiated Agreements are typically negotiated between government and individual consumers, or between government and trade associations. These agreements have been used very successfully under traditional electricity industry structures (Models 1 and 2), for example in Finland, Netherlands and Sweden. To the extent they are tied to environmental goals like CO_2 reduction, they are applicable under any type of electricity industry structure. How successful they might be as a mechanism under competitive structures without the environmental tie is unclear.

5.3 MARKET TRANSFORMATION CONCEPTS

Many of the mechanisms described in this report are designed to alter the way energy efficiency is promoted, moving from rebates and regulations to strategic market interventions designed to result in more efficient products and services. These market interventions are commonly referred to as market transformation (MT) initiatives.[38] While many definitions of market transformation exist,[39] the following definition is used for this report:

> "Market transformation is a reduction in market barriers resulting from market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced or changed."[40]

Accordingly, an MT initiative is perceived as a strategic intervention, designed to permanently change the structure of the market and/or behavior of market actors by removing market barriers, resulting in an increase in the adoption of energy-efficient products, services and/or

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[38] In this report, "market transformation initiatives" refer to market interventions (mechanisms, programs, projects), while "market transformation" refers to the result of those interventions.

[39] See SRC (1996), Weisbrod et al. (1994), and Xenergy and Easton (1995), for a review of definitions.

[40] Eto, J., R. Prahl, and J. Schlegel. 1996. A Scoping Study on Energy efficiency Market Transformation by California Utility DSM Programs. LBNL-39058. Lawrence Berkeley National Laboratory, Berkeley, CA

practices[41]. While there is considerable variation in the types of MT initiatives that can be implemented, four general types of MT initiatives are commonly recognized:

- the introduction of a *new* technology, service or behavior into the market;
- the advancement of an *existing* technology, service or behavior, so that it becomes more widespread;
- the removal or decreased use of an inefficient technology, service or behavior;
- the acceleration of the rate of technological improvement and/or cost reduction.

MT initiatives are typically directed to the key players in the marketplace, such as manufacturers, distributors, retailers, trade allies, and consumers. The specific approaches that can contribute to MT range from traditional forms, such as information programs and rebates, to commercialization incentives, technology demonstrations, and market infrastructure developments.

Although changing markets for energy-efficient products has been a goal for many organizations and companies for years, the use of the term market transformation in the energy literature is of fairly recent origin.[42] Recently, interest in MT has increased for the following reasons:

- to increase the effectiveness of utility-sponsored energy efficiency and load management programs: e.g., by examining market structures more closely, looking for ways to intervene in markets more broadly, and investigating alternative points of intervention;
- to reduce reliance on incentive mechanisms: e.g., by strategic interventions in the market place with other market actors;
- to take advantage of regional and national efforts and markets;
- to increase focus on key market barriers other than cost;
- to complement and/or replace conventional utility programs that were trying to reduce costs and use market forces to achieve widespread distribution and acceptance of efficient equipment;
- to create permanent changes in the market.

5.4 THE EVALUATION OF MECHANISMS

Countries and states experiencing (or planning) the reform of their electricity sector would benefit from allocating resources for evaluating the near-term and long-term impacts of electricity sector reform (particularly as it affects the promotion of energy efficiency and load management) before changes are actually undertaken. Evaluation of energy efficiency and load management mechanisms is important at any time and especially during the transition to new electricity sector structures. Over time, the existing mechanisms will need to be improved, retired, or replaced by new mechanisms. Anticipating the near- and long-term

[41] Schlegel, J. 1996. "Evaluating Market Transformation Initiatives: Issues, Challenges, and Experience to Date," presented at the NARUC-EPA Workshop on DSM Market Transformation, Tampa, FL.

[42] See Reed and Hall (1997) for a historical review and Schlegel (1996).

impacts of the changes will enable decision makers to better serve the DSM needs of their constituents.

Specifically, evaluation is critical to:

- supporting the planning and design of mechanisms;
- providing ongoing corrective and constructive guidance regarding the implementation of mechanisms;
- providing interim, approximate indicators of the effectiveness of specific mechanisms;
- assessing the overall level of performance and success of the mechanism, both medium- and long-term;
- informing decisions regarding the level of performance incentives provided to administrators for mechanisms;
- providing support for changing the nature or level of intervention, and justification for continued public funding for the mechanisms.

In the near term, countries and states experiencing (or planning) the reform of the electricity sector should design and implement a process for evaluating the near-term and long-term impacts of electricity sector reform, particularly as it affects the promotion of energy efficiency and load management. Policy makers can expect the following when evaluating the effectiveness of the mechanisms described in this report.

1. The impacts of these mechanisms are very difficult to measure, and the final results may not be known for years.
2. The results of evaluations of these mechanisms will be diverse and may not be consistent because of differences in:
    - ♦ the focus of evaluation (e.g., load impacts, penetration, market share, market indicators (effects), and market barriers);
    - ♦ the level of evaluation (sector, program, segment, customer, end use, and measure);
    - ♦ the scale of evaluation (e.g., utility service territory, regional, national, international);
    - ♦ data collection and analysis methodologies; and
    - ♦ the timing of the evaluation (e.g., 6 months after the implementation of the mechanism, or 3 years later).
3. The evaluation of these mechanisms is an ambitious undertaking, presenting formidable challenges to evaluators. As a result, there is great uncertainty, and for some mechanisms there will be evaluation issues not capable of being resolved through a cost-effective evaluation effort.
4. The performance or success of a mechanism needs to be defined broadly using several different metrics:
    - ♦ ultimate outcomes (energy and demand savings, product sales, or market penetration);
    - ♦ indicators of effects (of lasting effects or reductions in market barriers); or
    - ♦ effective and efficient performance of planned activities (good-faith implementation).

5. For many of these mechanisms, evaluations may need to be conducted more frequently than traditional evaluations of resource acquisition programs (e.g., every 6 months) in order to capture the market effects that change frequently.

Nonetheless, evaluation and assessment of the DSM tools that have been used in your particular political and cultural context in the past will provide a tremendously valuable foundation of information with which to craft strategies for the future.

5.5 CONCLUSIONS

In traditional electricity industry structures (Models 1, 2 and 3), most mechanisms were implemented by government or the utility, depending upon the culture and tradition of the region. There are many types of mechanisms that have been used successfully in these structures and can continue to be used successfully as the electricity sector is modified within these structures. But in competitive markets, the form of the utility is radically altered so greater responsibility falls on government to:

- continue or expand the funding and financial incentive mechanisms;
- undertake the development of market-shaping mechanisms;
- initiate, finance and encourage actor-oriented mechanisms; and
- develop new mechanisms to take account of increasingly complex markets with more actors and groups with special needs.

From this analysis it appears that there is not only a need to develop new mechanisms but also a need to further evaluate and refine "newer" mechanisms that have come into use in the last few years or are just now in the process of being implemented. For example, performance-based regulation is not really new but it has not really been refined for optimal use in encouraging energy efficiency and load management. There are also relatively recent market transformation concepts and mechanisms that would benefit from further work and refinement. Moreover, effective evaluation of these types of mechanisms, particularly for use with competitive structures (Model 4), has been less developed and tested and needs substantial work.

When unbundling occurs, the relative importance of many of the mechanisms will remain unchanged. The mechanisms that will become less useful or relevant will be: cost recovery and tariffs; utility subsidies, grants, loans and rebates; integrated resource planning; and performance-based regulation. The mechanism that will become more useful or relevant will be: funding of government energy efficiency organizations; government subsidies, grants, loans, and rebates; and special prices and tariffs. The system benefits charge is likely to be most useful and relevant.

When commercialization/privatization occurs, the impacts will be more uncertain, and many mechanisms will remain unchanged. Only two mechanisms will become less useful or relevant: rural electrification and voluntary/negotiated agreements. Several mechanisms will become more useful or relevant: system benefits charge; funding of government energy efficiency organization; government subsidies, grants, loans, and rebates; special prices and tariffs; integrated resource planning; billing regulations; competitive sourcing of demand-side resources; license conditions for energy suppliers; and the development of an ESCO industry. Performance-based regulation is likely to be most useful and relevant.

When competition occurs, the relative importance of most of the mechanisms will change, with most of them becoming more useful and relevant. A few mechanisms will become less useful or relevant: utility subsidies, grants, loans and rebates; integrated resource planning; rural electrification; and cost recovery for promoting energy efficiency. The mechanisms that will likely be most useful and relevant will be: system benefits charge, funding of government/energy efficiency organizations; market transformation organizations; information provision; special prices and tariffs; competitive sourcing of demand-side resources, demand-side bidding; license conditions for energy suppliers; development of the ESCO industry; and green pricing.

Table 8, over the page, summarizes the general importance of the various types of mechanisms under three market variables: 1) Commercialization/Privatization; 2) Unbundling; and 3) Competition.

In Table 8, mechanisms are classified as:

↑	more useful and/or relevant	↓	less useful and/or relevant
↑↑	much more useful and/or relevant	↓↓	much less useful and/or relevant
X	no change		

Table 8. The Relative Importance of Mechanisms Under Various Aspects of Restructuring.

Mechanism Type	Mechanisms	Effects of Various Aspects of Restructuring		
		Unbundling	Commercialization/ Privatization	Competition
Funding and Governmental Financial Incentives	Taxes (carbon and energy)	X	X	X
	Tax Exemptions/Credits	X	X	X
	System Benefits Charge	↑↑	↑	↑↑
	Funding of Government Energy Efficiency Organizations	↑	↑	↑↑
	Cost Recovery via Tariffs	↓	Depends	↓(EE) ↑(Load mgt)
	Utility Subsidies, Grants, Loans & Rebates	↓	Depends	↓↓
	Government Subsidies, Grants, Loans & Rebates	↑	↑	↑
	Special Prices & Tariffs (e.g. Interruptible)	↑	↑	↑↑
Market-Shaping Mechanisms	Integrated Resource Planning (regulator led)	↓	↑	↓↓
	Performance-based Regulation	↓	↑↑	↑(wires)
	Billing Regulations	X	↑	↑
	Competitive Sourcing of Demand-Side Resources	X	↑	↑↑
	Demand-side Bidding	X	X	↑↑
	Appliance and Building Standards	X	X	X
	License Conditions for Energy Suppliers	X	↑	↑↑
	License Conditions for ESCOs	X	X	↑
General Actor-Oriented	Market Transformation	X	X	↑↑
	ESCO Industry Development	X	↑	↑↑
	Information Provision	X	X	↑↑
	Technology Procurement	X	X	↑
	Education, Training and Certification	X	X	↑
	Branding	X	X	↑
Targeted Actor-Oriented	Investment Funding	X	X	↑
	Rural Electrification	X	↓	↓
	Green Pricing	X	X	↓↓
	Green Marketing	↓↓	↓↓	↑↑
	Voluntary Purchasing Guidelines	X	X	X
	Voluntary/Negotiated Agreements	X	↓	↑

CHAPTER 6 TRANSITIONS

6.1 THE PROBLEM

Virtually every country's electricity sector is in transition. Though four generic electricity industry strucural models were used as examples in this report, most countries are in a transition from the way their electricity sector has operated over the past several decades to a new structure, the design of which may not yet be clearly articulated. The primary difficulty with periods of transition is the uncertainty they engender. Even where the final goal and industry structure are clear, the steps for getting from here to there may be uncertain. Since energy efficiency may not be viewed as a critical element of the electricity business by many utility managers, there is the tendency to cut back on "non-essential" programs during periods of change with the intention of dealing with them once the new system is put in place. Unfortunately, the momentum for energy efficiency and load management may be lost before anyone notices.

Another problem is that focusing on energy efficiency mechanisms that might be assumed to work in a restructured electricity industry may overlook the fact that there is no way to get from "here to there." The transition is the bridge that allows programs to continue functioning and connects present actions with long-term goals and promises. The necessity of finding those bridges that keep energy efficiency activities in place, even during the transition, forces decision-makers to test the practicality of their recommendations and redesign mechanisms so they are able to bridge the gap.

A very human problem arises when independent regulation is introduced for the first time concurrent with other major changes. New regulators with little previous experience in regulating the electricity sector may become overwhelmed by the complexity of the job. Ensuring proper incentive mechanisms for energy efficiency and load management may seem like the least of their concerns. Support networks[43] may be one of the more important transitional activities.

Utilities often move into a transition mode in response to the initiation of discussions about their structure being changed. The transition period begins in anticipation of change before official government action (such as legislation or regulatory decisions) have actually taken place. As a result, public officials concerned about retaining energy efficiency activities in their country or state should be prepared to move quickly to retain existing programs while new mechanisms are being proposed and discussed. Government attention to the maintenance of public interest activities is important from the time the first discussions of change begin. This Chapter summarizes some of the most likely issues encountered during transitions and suggests strategies and mechanisms for dealing with those issues.

Finally, the transition is the time of maximum political leverage. During this period there is much give and take between stakeholder groups maneuvering to obtain whatever benefits possible for their constituents. If energy efficiency is made an explicit part of the restructuring

[43] E.g. forming an association of state and federal regulators and/or meeting with regulators from other countries to exchange ideas and experiences.

package, it is in a much stronger position of playing a significant role in the new structure than if it is seen as an add-on for later discussions.

6.2 TRANSITION SCENARIOS

It is important to note that there is no 'natural progression' through the various possible structures for the electricity industry. Even where policy makers think they know exactly to what end-point they are moving, circumstances may cause unanticipated changes in direction. Though some countries have experienced almost a century of stability in their electricity sector, the future does not promise a rapid return to such stability. A whole range of transitions are possible, hence the concept of re-regulation.

6.2.1 Moving from a Government Operated Utility to a Commercialized or Privatized Utility

Whether moving to a more cost accounting-based government operated structure (commercialization) or a privatized utility structure, this transition period tends to focus on accountability. Because there are many years of experience with both types of structures, a transition to either a commercialized or privatized utility structure may be accomplished quite smoothly. Most existing DSM mechanisms described in this report work well under either structure and have years of experience and dozens of examples to support their use. Load management mechanisms will tend to remain in place and, in fact, may be more important during this type of transition due to their direct relationship to the economic operation of the utility.

When *privatizing* a utility, new people will be brought into top management positions. Those individuals will try to mold the utility according to their vision of a successful private sector company. To the extent that they have little experience or interest in energy efficiency, these activities may initially be de-emphasized. However, with the introduction of independent regulation that often accompanies privatization, another team of individuals is introduced who will also try to mold the utility from the public interest perspective. Sometimes the visions of these two sets of players will be in conflict, other times they will be in parallel.

Because the regulators determine the level of profits a privatized utility may receive, top utility management tends to defer to the regulators on public interest programs like energy efficiency as long as cost-recovery mechanisms are put in place. Therefore, attention to cost-recovery mechanisms is important early in the transition to encourage the retention and expansion of utility energy efficiency and load management activities. As a result, a privatized monopoly electricity company may become even more involved with energy efficiency and load management activities than before they were privatized. It is generally in the public's interest to maintain any energy efficiency and load management programs, trained staff, and momentum during the transition period since such activities are likely to increase under the new regulated, privatized structure and it would be inefficient to incur the costs associated with rebuilding programs that had been in existence previously.

6.2.2 Moving to Unbundled and Competitive Market Structures

To date, few electricity sectors have moved to unbundled electricity functions without also moving to competitive markets. Therefore, consistent with the conditions found today, this report will treat these two changes as being conducted simultaneously.

The transition to unbundled and competitive market structures is probably the most difficult with which to deal. Because there is only a relatively short-term experience with such structures, changes of this nature result in the greatest level of uncertainty and anxiety. Moreover, few if any competitive structures have reached what might be considered their stable end-point. Most are still in some form of transition. Structures with partial competition (like the wholesale competition introduced in the US in the 1980s) tend to occur as a step-wise transition to a more unbundled, competitive structure.

What makes the transition to competition even more difficult is that the ideal – the fully competitive, unbundled electricity sector – may not be achievable due to market failures of various types. Therefore, those energy efficiency activities that might be envisioned under a "perfectly competitive market" may not come to fruition due to the same market failures that may prevent a full competitive market from being fully realized.

What this means is that the transition to more market-driven structures is a critical time for energy policy. Because of the high degree of uncertainty, economic risk, and disruption of established activities, it is extremely important that mechanisms are put in place early in the transition to support public policy goals and to anticipate market failures of various types. The market failures most commonly anticipated are:

- lack of adequate information of all types, eg
  - ♦ information for consumers to make informed decisions;
  - ♦ information about electricity consumers that can serve as a basis for rational business decisions;
  - ♦ expertise and experience for non-utility players necessary for effective product and service development in new competitive markets;
- consolidation of market power resulting in a lack of competition.

Because of the uncertainty and economic risk inherent in competitive markets, the incumbent utility firms will begin cutting costs as soon as competition appears likely. Energy efficiency activities are often some of the first to be put on the cutting block. Not only are the savings from energy efficiency likely to be lost by these cuts, but as importantly, the expertise, institutional capabilities and momentum will be lost requiring duplication of efforts and costs to recreate them later. During the early transition period utility energy efficiency activities should be maintained until new mechanisms and institutions are implemented to replace the old ones.

Fiscal mechanisms (i.e. tax mechanisms) and market transformation mechanisms are specific types of mechanisms that may be effective under both old and new structures. They can remain in place and even be increased during a transition to market-based structures since they are only minimally affected by structural changes. Market-shaping mechanisms, and mechanisms that create or fund new organizations to support energy efficiency, are crucially

important and should be put in place early in the transition period to guide the emerging markets. Since the most commonly anticipated market failures are imperfect consumer information, abuse of market power, and unfair competition this implies that information mechanisms, consumer protection, and market oversight must become a key focus for government activities if electricity sector liberalization is to be successful. Moving quickly to establish the "rules of the game" allows these mechanisms to act in a manner that is preventative rather than primarily punitive.

For countries where utilities operate at the state or provincial level rather than at the federal level, the transition period to competitive structures is even more complex since often each state will implement programs slightly differently and on a different time frame from the others[44]. Under this situation, changes in one state or province will affect the operation of the utility in neighboring regions even if they are not changing their utility sector at that time. It is useful to establish some type of working group with representatives from the neighboring regions to discuss the changes that are taking place, coordinate mutually beneficial activities and exchange information about energy efficiency and other public interest related activities. Such a group will expand the opportunities for learning from the experience of others and can help avoid unintended negative consequences in non-restructuring regions.

6.3 SOCIAL/CULTURAL CONTEXT OF CHANGE

There is a social/cultural context for changes in the electricity sector and in the relationship between the electricity sector, government and the society at large. In the old framework, the actors have typically worked out their roles and tended to accept the public interest goals and objectives supported by government intervention. During a period of transition a power struggle may ensue over who controls energy decision making and the role of government in the new structure. Though there is always a tension between government/public interest efforts and private market forces, this tension is likely to peak during times of change. Government, private sector and other stakeholders will maneuver to gain influence. This is a particular problem when moving to competitive market structures where some will argue public interest goals and government intervention should be greatly diminished in favor of market forces.

Once roles and the rules of the game are clearly defined, the level of tension is likely to be reduced. However, particularly in Model 4, there may be an on-going battle over reducing government intervention in the electricity sector. The extent of these tensions depends upon the social and cultural context of the region where these reforms are taking place.

6.4 CONCLUSIONS

Periods of transition are critical to maintaining momentum for existing public policy activities as well as providing opportunities for creating the foundation upon which energy efficiency activities can be developed in the future. Unfortunately, policy developers may focus on the anticipated outcomes in the future without seeing the critical role of the transition period in meeting those future goals. In all cases existing activities should be maintained while future options are being examined. Fiscal mechanisms, and market transformation mechanisms are

[44] This is also true for countries that are restructuring their utilities and are closely interconnected with each other.

only minimally affected by structural changes making them particularly effective during periods of transition. Moreover, the beginning of the transition period is often the time of maximum government influence. If energy efficiency and other public interest activities are not integrated as key elements of the ultimate structure from the beginning, it will be much more difficult to add them later. In addition, some activities and mechanisms undertaken during the transition period may be recognized from the start as not being appropriate for use under the mature structure but are necessary to act as a bridge from where you have been to where you plan to go.

When moving to more competitive markets in particular, consideration should be given to the fact that adjustments will be required in the future to accommodate the realities of the marketplace. This can be recognized by retaining opportunities for government control and intervention as the market evolves and for instituting oversight activities that include evaluation and recommendations for change as and when needed. The recognition of the need for flexibility is part of a successful transition strategy.

CHAPTER 7 SUMMARY AND CONCLUSIONS

7.1 SUMMARY

In this report, we have identified different generic electricity industry structural models, described policy and program barriers to the promotion of energy efficiency and load management, and provided a list of mechanisms that could be used to promote energy efficiency and load management in each of the four models. At this time, it is difficult to make definitive statements about the effectiveness of these mechanisms for promoting energy efficiency and load management for the following reasons:

- the "field experience" of several of these industry structures is limited, particularly for Models 3 and 4 (one might argue that Model 4 does not yet exist in a mature form);
- resources for the promotion of energy efficiency and load management in competitive structures have, in most cases, been limited, especially compared to the potential energy savings that exists and compared to the funding of these activities in the past; and
- transforming markets to promote energy efficiency is a long-term process that requires patience and time.

However, this Chapter summarizes present thinking about the policy implications of encouraging DSM in changing electricity markets.

7.1.1 Public Policy Goals and Objectives

Some countries and states are reducing direct government participation in the operation and management of the electricity system through privatization, unbundling, and competition. As a result, there is a need for these governments to refocus their attention on market power and consumer protection issues. At the same time, all countries are increasingly placing a higher priority on the goal of protecting the environment, in response to climate change and other environmental issues. These two major trends may be diametrically opposed to one another, or may complement one another, depending on the industry structure that emerges, the responsiveness of private industry to public policy goals and objectives, and the will and desire of government to ensure public policy goals and objectives are met.

This change in government focus from everyday utility operational goals to social and environmental policy goals can provide a strategic benefit for DSM programs (to the extent that energy efficiency and load management are seen as key tools for meeting social and environmental goals). At the same time, the movement by government away from direct involvement in electricity sector operations in competitive type structures may reduce government's opportunities and leverage for encouraging DSM for public policy goals as well as a means for achieving other societal goals mentioned earlier. These are the types of changes that contribute to the need to create new and adjust existing DSM mechanisms.

Public policy goals that are not of particular interest to energy service providers in a competitive market structure will not be met unless they are explicitly included in any restructuring agenda. These include goals related to:

- open and competitive markets;
- energy independence;

- accurate and useful information;
- consumer protection;
- environmental stewardship;
- quality of life;
- universal service.

Mechanisms designed to achieve these types of public policy goals will not happen automatically; they must be purposefully designed and implemented into the new structure from the outset if the public's interests are to be protected.

7.1.2 Electricity Industry Models

For ease of analysis, this report uses four generic electricity industry structural models that simply represent options on a continuum but are useful in simplifying analysis:

Model 1 - Vertically integrated, regulated monopoly

Model 2 - Unbundled monopoly

Model 3 - Unbundled, limited competition

Model 4 - Unbundled, full competition

The incentives for energy efficiency and load management under commercialization or privatization can generally be maintained or strengthened through thoughtful regulatory and government support. The introduction of unbundling or competition substantially complicates the situation. However, even problems caused by unbundling are amenable to regulatory and policy solutions. The most complex and difficult area is the introduction of competition because of the related pressures for reduced governmental intervention. Where privatization, unbundling and competition are introduced simultaneously, it may be difficult for government to analyze the complex interactions and to anticipate the most likely outcomes.

7.1.3 Barriers

In general, no form of restructuring will remove all (or even most) of the barriers to energy efficiency, although it may change them. While electricity reforms may help to reduce some barriers to energy efficiency, they also leave untouched other barriers to implementation of end-use improvements (such as inadequate information and capital, and environmental externalities). They may also increase the magnitude of some barriers, such as split ,incentives. To the extent that the presence of these barriers justified government intervention in the pre-reform situation, they still do.

Policy barriers that are related to market structure may change significantly with restructuring (especially unbundling and competition). In Model 4, the utility no longer plays all of the roles it has assumed in traditional structures, and so some barriers become more significant. Program barriers will remain and some may be increased by commercialization and competition, regardless of who is responsible for the programs. In all cases, the policy/regulatory framework is critical. To the extent that privatization is introduced into any electricity industry structure, this will magnify the importance of many of the program barriers in addition to the policy barriers related to that structure. The combination of variables (commercialization, privatization, unbundling, and competition) within any particular structure

results in a complex interaction of barriers and incentives unique to that particular situation. The case for intervention remains for all electricity industry structures if energy efficiency is an important policy tool to achieving various public interest goals as well as a goal in itself, but the nature of the intervention (i.e., the appropriate mechanisms) will change.

7.1.4 Mechanisms

In traditional electricity industry structures (Models 1, 2 and 3), most mechanisms were implemented by government or the utility, depending upon the culture and tradition of the region. There are many types of mechanisms that have been used successfully in these structures and can continue to be used successfully as the electricity sector is modified within these structures. But in competitive markets, the form of the utility is radically altered so greater responsibility falls on government to:

- continue or expand the funding and financial incentive mechanisms;
- undertake the development of market-shaping mechanisms;
- initiate, finance and encourage actor-oriented mechanisms; and
- develop new mechanisms to take account of increasingly complex markets with more actors and groups with special needs.

From this analysis it appears that there is not so much a need to develop new mechanisms as there is to further evaluate and refine "newer" mechanisms that have come into use in the last few years or are just now in the process of being implemented. For example, performance-based regulation is not really new but it has not been refined for optimal use in encouraging energy efficiency and load management. There are also relatively recent market transformation concepts and mechanisms that would benefit from further work and refinement. Moreover, effective evaluation of these types of mechanisms, particularly for use with competitive structures (Model 4), has been less developed and tested and needs substantial work.

7.1.5 Transitions

Periods of transition are critical to maintaining momentum for existing public policy activities as well as providing opportunities for creating the foundation upon which energy efficiency activities can be developed in the future. Unfortunately, policy developers may focus on the anticipated outcomes in the future without seeing the critical role of the transition period in meeting those future goals. In all cases existing energy efficiency and load management activities should be maintained while future options are being examined. Fiscal mechanisms, and market transformation mechanisms are only minimally affected by structural changes, making them particularly effective during periods of transition. Moreover, the beginning of the transition period is often the time of maximum government influence. If energy efficiency and other public interest activities are not integrated as key elements of the ultimate structure from the beginning of its development, it will be much more difficult to add them later. In addition, some activities and mechanisms undertaken during the transition period may be recognized from the start as not being appropriate for use under the mature structure but may be necessary as a bridge from where you have been to where you plan to go.

When moving to more competitive markets in particular, consideration needs to be given to the fact that adjustments will be required in the future to accommodate the realities of the marketplace. This can be recognized by retaining opportunities for government control and

intervention as the market evolves and for instituting oversight activities that include evaluation and recommendations for change as and when needed. The recognition of the need for flexibility is part of a successful transition strategy.

7.2 CONCLUSIONS

The changes that are occurring in the electricity industry are in many countries, revolutionary rather than evolutionary. As a result, public policy implications of restructuring requires a whole new way of thinking about the electricity sector. Because energy efficiency and load management strategies can be a tool for achieving a broad range of public interest goals (as well as being a goal in themselves), how DSM mechanisms are developed and handled under new competitive electricity sector structures is critically important.

The traditional electricity sector structures have existed almost unchanged in some places for one hundred years. These new structures will not develop fully formed overnight. Nonetheless, the general policy form and direction does tend to be set early on in the process requiring decision-makers and DSM practitioners to set the stage for events as they may develop over time. As a result some decision-makers fear choosing any direction for fear of choosing wrongly. However, there is some policy and program guidance that can be helpful even in the very early stages.

First of all, for countries or states moving to any of the electricity sector structures other than Model 4, there is first-hand experience in a variety of settings with a long list of successful DSM mechanisms that should be transferable and useful in many similar structures. Though a commercialized, privatized, or unbundled structure may be new to you, others have dealt with these issues before you and there is a well-documented database of information which will allow you to learn from other countries' successes and mistakes.

For those countries and states moving to a competitive structure of some type, there are some things that are known even at the onset. For example, we know that competitive markets are good at:

- allocating similar resources;
- efficient short-term transactions; and
- incremental improvements.

And we know that competitive markets are not good at:

- explicit tradeoffs between the present and the future;
- valuing externalities;
- equity issues;
- information barriers; and
- non-transparent benefits.

We know there are predictable market failures, such as those listed below, that will affect the ability to successfully deliver energy efficiency and load management.

- Markets require good consumer information in order for consumers to make informed decisions but good information becomes a valuable commodity making it more difficult to obtain in competitive markets.
- There are large environmental impacts from the use of electricity but they are varied and diffuse.
- These varied and diffuse environmental impacts result in short-term price signals masking long-term benefits.
- The market power of incumbent firms can be a problem for the sharing of customer information, and for obtaining capital for new firms to work in the competitive market.

In conclusion, we know that DSM mechanisms that provide accurate and useful information will be particularly important for competitive electricity markets. As a result, general information provision mechanisms should be given a high priority and be explored further. Consumer protection activities are closely related to general information needs and include such things as branding and codes of practice, training programs and license conditions, all of which become critical in competitive markets.

Financial incentive mechanisms to both collect funds as well as mechanisms to act as a source of funds to support entrepreneurial organizations and new ESCO industry development will be needed. Such mechanisms might include:

- a wires charge for energy efficiency;
- tax exemptions and incentives for energy efficiency and load management;
- creation of entrepreneurial organizations;
- ESCO development schemes;
- financing of energy-efficient purchases;
- formation of energy industry associations.

New market shaping mechanisms that capture the value of DSM from some of its diverse uses will help to overcome some of the problems of split incentives. These include:

- demand management alternatives to network augmentation;
- capping network revenues;
- demand side bidding in competitive markets;
- green pricing for energy efficiency;
- incentives for loss reduction and distributed generation.

Targeted actor-oriented mechanisms like federal or state procurement of energy efficiency services and voluntary purchasing guidelines and agreements become valuable tools in competitive markets.

A challenging future lies before us. However, as policy decision-makers or DSM practitioners, we have a good base of knowledge and tools that have served us well in the past upon which to build future electricity industry structures that will integrate DSM for meeting our current and future public interest needs.

COMMENTS BY PARTICIPANTS

NORWEGIAN EXPERTS' COMMENTS

24 May 1999

Terje Stamer Wahl – Norwegian Energy and Water Administration

General Remark

Governments are in a position to "frame" the market, regardless of the market being deregulated or not. Thus, deregulation in itself should not reduce governments ability to achieve overall policy objectives and goals. Government interventions in a competitive, deregulated market should, however, be based on incentive-based mechanisms that can easily be implemented in the market. To us, the price mechanism is the most vital and important tool for having the market reacting adequately.

Governments should take care of environmental aspects (externalities) through imposing environmental taxes in the market. Subsequently, the market will react and adapt to such powerfull signal by implementing DSM-mechanisms. In the report, the "power" of government- imposed taxes is not sufficiently emphasized.

Next, governments will have continued influence on the supply side through issuing licences/concessions for new generating plants also in an otherwise deregulated market. At least this is true for Norway, where most new generating units have to obtain government concessions.

Section 4.3

In table 6, lack of information to end-users is listed as a barrier in a competitive industry. But competition (and commercialization) could also be seen as ways of revealing energy as a market good, in line with all other goods and services that have to be purchased. Thus, deregulation may result in energy, as a service, getting more focus by being a product that consumers have to purchase in the market. Consequently, consumers have incentives to acquire information in order to act economically.

Section 5.1

We have earlier commented on the categorisation of mechanisms, which to us could have been more logical. It's important to categorise along consistent dimensions like "actor", "type of activity" or "target group".

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APPENDIX A: BARRIERS TO THE PROMOTION OF ENERGY EFFICIENCY AND LOAD MANAGEMENT IN A RESTRUCTURED ELECTRICITY INDUSTRY

As part of this analysis, we examined barriers to promoting energy efficiency and load management in a restructured electricity industry.

The barriers presented below are at two levels: (1) the policy level (primarily reflecting a societal perspective), and (2) the program level (primarily reflecting an end-user perspective). The policy barriers can influence program barriers, and mechanisms that address policy barriers may weaken some of the program barriers. In contrast, program barriers have relatively little influence on policy barriers, and mechanisms that address program barriers will likely have little impact on policy barriers. There will be cases when it is unclear whether a barrier is a policy barrier or program barrier.

Many of the barriers listed below are interrelated. Because this list is designed to be inclusive, rather than limited, all of the important barriers are listed without collapsing them into broader categories. Where appropriate, we note how the barriers are related to one another. Furthermore, we have tried to keep barriers that are connected to one another close together.

This report defines barriers more broadly than other analysts may. For the purposes of this report, a barrier is any factor that limits the promotion of energy efficiency in society, and a barrier is a barrier to implementation of either policy or programs. "Market barriers" are those barriers that call into question the assumptions of a perfect market (e.g., lack of available information is a market barrier). More formally, a market barrier is any characteristic of the market for an energy-related product, service or practice that helps to explain the gap between the actual level of investment in, or practice of, energy efficiency and an increased level that would appear to be cost beneficial. However, in this report, the broad definition of barriers is used for the review and discussions of mechanisms.

Many of the discussions on barriers refer to the role of "energy providers." In this report, energy providers are organizations that sell gas, electricity and other fuels and/or provide energy services (e.g., energy performance contracting, energy audits, etc.).

In many cases, we have attempted to estimate the relative importance of the barriers in a competitive market. Because competition in the electricity industry is still in its infancy in many countries, it is premature to present any definitive conclusions on the saliency of these barriers in a competitive market.

POLICY BARRIERS

An overarching policy barrier that affects all electricity industry structures is "the lack of regulatory or legislative attention and interest in energy efficiency issues." In Model 4, the role of the utility changes and if programs are to happen, government (or an agent of government) has to take on some of the roles that may have been formerly performed by the monopoly utility

1. Excess Capacity

Comment: Excess capacity may be more of a problem in isolated electricity systems than in countries with strong connections/trading with neighbors. Where there is excess capacity, it may be more difficult for energy providers to "sell" DSM. Where there is a lack of excess capacity, DSM may be more attractive for energy providers at the retail level; at the wholesale level, DSM may also be attractive for both the short- and long-term balancing of supply and demand. In a competitive market, this barrier may not be important for energy providers that do not own generation facilities but may be important for those that do own generation facilities.

2. Short-term Perspective

Comment: In a competitive market, short-term goals and approaches (e.g., short-term pricing) may be emphasized by most (if not all) energy providers. The emphasis in the market will be on immediate savings and shorter pay backs, compared to energy efficiency and load management (offsetting the cost of generation) and market transformation which emphasize long-term savings. The emphasis on short-term goals and approaches often presents a problem at the societal level where longer-term goals and objectives (and pay backs) are important, and energy is not viewed as just a commodity. Related to: split incentives. Market barrier.

3. Split (Misplaced) Incentives

Comment: Energy providers may not be motivated to promote DSM although other organizations may want to do this (i.e., self-interest of energy providers versus public interest). In a competitive market, this barrier may be exacerbated or may be resolved, depending on the ingenuity of energy providers and regulators. Related to: short-term goals. Market barrier.

4. Pricing

4a. Non-transparent Pricing

Comment: End users and other market actors need to see what they are paying for, in order to assist their decision to invest in DSM. In a competitive market, this barrier may become even more important. Related to: non-cost-reflective pricing. Market barrier.

4b. Non-cost-reflective Pricing

Comment: Generally, pricing does not include environmental costs nor reflect the marginal cost of energy production, supply, and distribution. This is even more difficult when environmental impacts are varied and diffuse. In a competitive market, there may be pressure for cost-reflective pricing, but most likely non-cost-reflective pricing will continue, unless mandated by a regulatory authority. Related to: non-transparent pricing. Market barrier.

5. Import Tariffs and Duties

Comment: In a competitive market, import tariffs and duties on energy efficiency products and expertise may disappear, or continue, depending on a country's policies. Market barrier.

6. Lack of Awareness

Comment: In a competitive market, the lack of awareness of energy efficiency issues by policy makers may increase as energy providers and customers focus on the price of energy. An exception is that some energy providers may inform/educate end users and other market actors about energy efficiency, as a business opportunity (product differentiation). Related to: non-cost-reflective pricing, non-transparent pricing, split incentives.

7. Imperfect Information

Comment: Access to customer information is restricted by major energy providers. In a competitive market, this barrier may continue to be important, unless regulatory action is taken. Related to: inadequate competition. Market barrier.

8. Inadequate Competition

Comment: Too much market power held by an energy provider may result in little promotion of energy efficiency. In a competitive market, it is expected that market power will diminish as more competitors enter the marketplace, raising the possibility of more players promoting energy efficiency (even with lower prices). However, it is not evident, so far, that this will occur as energy companies merge with one another. Related to: imperfect information. Market barrier.

9. Customer Instability

Comment: The loyalty of customers is uncertain as they may frequently switch energy providers, particularly if price is the major motivation. This is a problem for energy providers, but not for society. In a competitive market, this instability may increase, unless restrictions are placed on contract length, high fees are set for switching suppliers, etc. Energy providers may try to promote energy efficiency to retain customers, or they may not wish to install measures in homes and facilities for fear of losing that investment if the customer switches to another energy provider(stranded benefits).

10. Lack of Adequate Paradigm

Comment: This refers to the lack of an adequate paradigm to evaluate the value of energy efficiency under new market structures. An example of different paradigms: emphasis on improving energy efficiency from a technical viewpoint, in comparison to providing customers with services on an energy-efficient basis. In general, public interest goals, such as market transformation, may not be addressed under current paradigms. In a competitive market, this barrier may diminish as energy providers provide services to customers that meet their needs. Another example: the traditional planning mind-set tends to associate greater credibility with highly centralized electricity production centers and does not favor investments in energy efficiency measures. In a competitive market, this barrier may diminish if more decentralized electricity production is pursued, and the role of energy efficiency and load management becomes more important. Market barrier.

11. Separation of Energy Policy Process

Comment: This refers to the separation of the energy policy process from environmental and social policy processes. Different organizations are usually responsible for developing energy, environmental and social policies. In a competitive market, this barrier is likely to continue or be exacerbated with changes in the energy sector not being "tracked" in the environmental and social sectors, unless a regulatory body intervenes. Related to: fewer places for policy intervention.

12. Little Market Transformation Experience

Comment: End users and stakeholders have little experience with market-driven systems and "upstream" market mechanisms in promoting energy efficiency. For example, market transformation initiatives may target multiple stakeholders, such as manufacturers, distributors and retailers. In a competitive market, this barrier will be significant early on, but will diminish as competition proceeds over time, as more attention is paid to energy efficiency services, including market transformation initiatives.

13. Lack of Available Expertise

Comment: There may be a lack of available expertise to work on energy efficiency during transition to a competitive market. In the transition to a competitive market, it is feared that the energy efficiency experience and expertise will be lost as priorities focus on providing low-cost electricity rather than energy efficiency services. In a competitive market, this barrier may be significant early on, but may diminish as competition proceeds over time and more attention is paid to energy efficiency services.

14. Utility Price Setting Process

14a. Cost Recovery Barriers

Comment: This refers to the institutional and legal barriers that impede setting prices at levels which allow utilities to recover the costs of DSM programs. The costs of these program could be treated as an operating expense, allowing the full expenditure to be recovered during the financial year in which it is incurred. The cost of DSM programs could also be treated as an asset in utility price regulation, in which case the cost of a program is paid over time with an associated rate of return. In a "limited" competitive market, these barriers may diminish if competition proceeds over time and price setting is based on the performance of energy providers. In a fully competitive market, energy efficiency improvements (products and services) could be funded (partially or wholly) by the beneficiaries of these improvements and/or by a "public goods" charge. Related to: decoupling of profits from sales

14b. Decoupling of Profits from Sales

Comment: There is a need to decouple profits from increased sales for promoting energy efficiency and load management. This barrier could be a major barrier during the transition period to a competitive market. In a competitive market, this barrier may diminish if competition proceeds over time and price setting is based on the performance of energy providers. Related to: cost recovery.

PROGRAM BARRIERS

1. Low Cost of Energy

Comment: The cost of energy to end users is relatively low compared to production and operating costs. As a result, end users are not aware of energy efficiency opportunities. This is especially true for residential customers, particularly low-income households. In a competitive market, this barrier may increase in importance if the price of energy decreases as expected.

2. Lack of Information

2a. Lack of Energy Consumption Data

Comment: Many end users do not have information on their energy consumption. Examples: lack of apartment metering, and lack of monthly utility bills. As a result, end users are not aware of energy efficiency opportunities. This is especially true for residential customers, particularly low-income households. In a competitive market, this barrier may be resolved if energy providers offer time-of-use meters and more detailed and frequent utility bills. Market barrier.

2b. Lack of Energy Provider Information

Comment: Many end users do not have information on energy providers. This is especially true for residential customers, particularly low-income households. In a competitive market, this barrier may increase if more energy providers enter the market. Or the barrier could decrease if energy providers provide more information, or if a neutral organization provides information on energy providers. Market barrier.

3. Information/Search Costs

Comment: End users and other market actors do not have sufficient time to investigate all possibilities for investing in energy efficiency (hassle/transaction costs). As a result, end users and other market actors are not aware of all energy efficiency opportunities. This is especially true for residential customers, particularly low-income households. In a competitive market, this barrier may decrease if energy providers offer concise information and "one-stop" shopping. However, this barrier may increase if many energy providers offer many different kinds of services to end users. Related to: lack of information. Market barrier.

4. End Users do not Invest in Energy Efficiency Because of Bounded Rationality

Comment: Many end users use "rules of thumb" (i.e., matters of habit or custom) when deciding about energy efficiency products and services, in response to the potentially high search and information processing costs associated with trying to make every decision based on first principles (e.g., net present value). This is especially true for residential customers, particularly low-income households. In a competitive market, this barrier may decrease if energy providers offer concise information and "one-stop" shopping. However, this barrier may increase if many energy providers offer many different kinds of services to end users. Related to: lack of information and search costs. Market barrier.

5. Lack of Experience Impacts

5a. Lack of Experience with Proven Cost-effective Energy-Saving Measures

Comment: End users and other market actors do not have experience with proven cost-effective energy-saving measures. As a result, end users and other market actors are not aware of energy efficiency opportunities. In a competitive market, it is unclear how much experience customers will have with energy efficiency and load management. In addition, if previous utility contacts have changed jobs and new players with little experience in energy efficiency have entered the market, customers may face a situation where expertise in energy efficiency is very limited.

5b. Performance Uncertainties

Comment: End users and other market actors perceive energy efficiency technologies to be unreliable, particularly if they have not installed the measure. In a competitive market, performance uncertainties may increase if new entrants with little experience in energy efficiency and load management offer these services to end users. Related to: reluctance to implement new technologies.

5c. Reluctance to Adopt New Technologies

Comment: End users and other market actors are reluctant to adopt new, innovative technologies. In a competitive market, energy providers may offer the latest (most energy-efficient) technologies with little field experience; only "innovators" will adopt these technologies in the beginning. Related to: performance uncertainties, disruption in routine.

5d. Disruption in Routine

Comment: End users fear a possible disruption in routine caused by the implementation of energy efficiency measures, particularly if they have never installed the measure. Implementation of some energy efficiency measures may require end users to vacate part of their premises or stop production until the measures have been installed. In a competitive market, this barrier is likely to remain. Related to: performance uncertainties, reluctance to implement new technologies, disruption in routine.

6. Financial Barriers

6a. Limited Investment Capital

Comment: The amount of investment capital available for financing energy efficiency measures is limited. This is especially true for residential customers, particularly low-income households. In a competitive market, financing may become more available if energy providers offer financing assistance or conduct energy performance contracting. Related to: high initial cost, product unavailability. Market barrier.

6b. High Initial Cost

Comment: Many energy efficiency technologies have a high initial cost. The cost of energy efficiency technologies is often attributed to low demand for technologies; if demand were higher, then supplies would be more abundant and costs would go down ("economy of scale"). In a competitive market, the market for energy efficiency products may increase if energy providers "sell" energy services, end users demand more energy- efficiency products, and market procurement efforts are initiated. Otherwise, the relative cost of energy efficiency

technologies will remain high, especially if the price of energy decreases. Related to: limited financing, product unavailability.

7. Product/Service Unavailability

Comment: In many countries, the availability of energy efficiency technologies and expertise is limited because: (a) the technology is still at the development stage; (b) the technology is not manufactured locally and nobody is prepared to import the technology from another country; or (c) the technology is being actively suppressed by vested interests. In a competitive market, the availability of energy efficiency products and expertise may increase if energy providers "sell" energy services, end users demand more energy efficiency products, market procurement efforts are initiated, and more financing becomes available. On the other hand, the availability of energy efficiency products and expertise may decrease or remain the same, if research and development funds decrease, import taxes are high, or vested interests continue to suppress the technology. Related to: high initial cost, limited financing.

8. Inseparability of Product Features

Comment: Energy efficiency features are often combined (bundled) with other features of products, making it difficult for end users to choose certain features they want. In a competitive market, energy providers wanting to differentiate themselves from their competitors may continue to bundle features. However, the unbundling of energy efficiency from other features may also occur if energy providers try to give customers more choices and to distinguish themselves from other energy providers.

9. Organizational (Institutional) Barriers

9a. Low Priority of Energy Efficiency

Comment: It is difficult for organizations to invest in energy efficiency when energy efficiency measures have relatively low priority compared to other concerns within the organization (i.e., competition between energy efficiency and non-energy issues)

9b. Views of Upper Management

Comment: It is difficult for organizations to invest in energy efficiency when upper management is not interested in energy efficiency, has a short-term view of the world, is generally skeptical about the performance and merits of energy- efficiency measures, and considers energy efficiency investments to be "discretionary" rather than "core" business activities.

9c. Multiple Decision Makers

Comment: It is difficult for organizations to invest in energy efficiency when many decision makers are involved, increasing the transaction costs.

In a competitive market, these barriers (9a-9c) may increase in importance if: (1) organizations want to cut all costs and are less willing to make investments in products and services that are not core business activities; and (2) the price of energy is expected to decrease, making the "energy problem" less of a business problem. These barriers may decrease in importance if: (1) energy providers market energy efficiency services to large organizations, and (2) energy is now more actively discussed among upper management.

10. Split (Misplaced) Incentives

Comment: Investment in energy efficiency is unlikely to occur when split (misplaced) incentives exist: e.g., owners of buildings are not willing to make investments in energy efficiency if tenants are the ones who receive the benefits. In a competitive market, this barrier may be exacerbated or may be resolved, depending on the ingenuity of energy providers and regulators. Market barrier.

APPENDIX B: EXISTING MECHANISMS FOR PROMOTING LOAD MANAGEMENT AND ENERGY EFFICIENCY

Appliance and Building Standards	Appliance and building standards may be mandatory or voluntary and may affect one or more sectors (e.g., residential, commercial, and industrial). The standards may be state, regional, national, or international. The standards promote energy efficiency by requiring appliances and buildings to achieve a certain threshold of energy efficiency.
Branding	Branding is an information and consumer protection mechanism based on specific definitions and criteria that products must meet in order to use a specific name or logo. The program may be either government or non-government based. A branding program may include certification/verification processes to assure consumers of product quality and performance. Examples include the US/EPA Energy Star program for energy-efficient products (federal government), the Australian SEDA Green Power project (state government) and the US Green-e project (NGO).
Billing Regulations	Typically, regulatory authorities or legislatures enact legislation requiring the disclosure of specific information on energy bills provided to customers.
Competitive Sourcing of Demand-side Resources	A utility offers to purchase energy efficiency and load management, as a resource that is below the utility's avoided cost. The competitive aspect of this mechanism occurs when the offers (bids) are evaluated by the utility. (In the United States, this mechanism is called "Demand Bidding" but it should not be confused with the term "Demand-side Bidding" as used in Europe and Australia - see below.)
Cost Recovery via Tariffs	To encourage utility companies to promote energy efficiency, utility companies are allowed to increase prices to offset lost revenue from reduced energy sales as a result of energy efficiency and load management programs.
Demand-Side Bidding	Demand-side Bidding (as the term is used in Europe and Australia) involves customers in a competitive electricity market bidding into a power pool price levels above which they commit to reduce their load by a specified amounts. This mechanism is in the process of being developed in a number of countries.
Education, Training and Certification	Typically, education and training are provided by government agencies and nonprofit organizations to promote energy efficiency – to the general public, or to select market segments (e.g., architects and engineers). In certain cases, training professionals may be certified by a professional organization.

ESCO Industry Development	Government may encourage the development of an energy service company industry by funding demonstration projects, removing barriers to energy performance contracting in government organizations, etc. In recent years, ESCOs not only provide energy efficiency services but also sell or broker electricity.
Funding of Government Energy Efficiency Organizations	Funding of government organizations is typically legislatively mandated. The funding can come from a national budget, general fund, or system benefit charge and is used is used to fund energy efficiency, universal service, low-income and minority programs, renewables, and research and development (R&D). Under more competitive markets, entrepreneurial organizations may be created.
Government Subsidies, Grants, Loans and Rebates	Subsidies include grants, rebates, low-interest loans, and loan guarantees that governments may use to reduce the first cost of energy-efficient products and services.
Green Marketing	Marketing environmentally preferable products (e.g., renewable-based electricity) in a competitive retail market.
Green Pricing	The development of a special tariff for renewable-based electricity sold as an option to customers of the monopoly utility. This differs from Green Marketing in that there is no competition among companies offering renewable-based electricity only a choice of regular electricity or the special green pricing product.
Information Provision	Information may be provided by government agencies, nonprofit organizations, energy providers, etc. The information may be directed to the general public, or targeted to select market segments. Many types of information are available, including workshops, brochures, utility bill inserts, reports, consulting services, labeling of appliances and buildings, redesign of energy bills, seminars, exhibits, competitions, awards, guidelines, demonstration projects, and radio, television and newspaper advertising.
Integrated Resource Planning	Integrated resource planning (IRP) is a public planning process and framework within which the costs and benefits of both demand- and supply-side resources are evaluated to develop the least-total-cost mix of resource options. Key characteristics of IRP include a long-term forecast of electricity needs; a comprehensive evaluation of all resource options, both supply- and demand-side; and public review of the process.
Investment Funding	Special funds are established for encouraging the commercialization of energy efficiency products (often targeted to manufacturers). The funding may be used to reduce interest rates, or to provide seed funding for entrepreneurial organizations.

License Conditions for Energy Suppliers and ESCOS	In response to the increased emergence of energy suppliers and energy service companies, regulators may require certain conditions (e.g., to reduce greenhouse gas emissions, develop energy efficiency and loan management plans) to be met before an energy supplier or energy service company is licensed to work in a certain service area.
Market Transformation	Market transformation is a reduction in market barriers resulting from market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced, or changed. Market transformation is sometimes seen as a goal in itself, as well as a strategy to achieve particular goals. For the latter, market transformation mechanisms can be targeted to manufacturers ("upstream"), distributors and retailers ("midstream"), and/or consumers ("downstream").
Performance-based Regulation	Performance-based regulation (PBR) is a form of regulation that evaluates the performance of regulated utilities on one or more indicators (e.g., cost of service, customer satisfaction, etc.). It differs from traditional economic regulation in that rather than setting prices per se, it establishes performance criteria to be used in determining the utility's net return.
Rural Electrification	The provision of electricity to rural areas not previously connected to the grid. Funding may be provided for electrifying rural areas in order to promote economic development and to improve the quality of life of rural communities. The use of energy-efficient lighting and appliances may be combined with local electricity generation (such as using renewables) for individual households, communities or mini-grid systems.
Special Prices &Tariffs	Utility companies and other energy providers may offer special prices for attracting or retaining customers. Time-of-use prices, green pricing, seasonal tariffs, and interruptible tariffs are common types of special prices and tariffs.
System Benefits Charge	A system benefits charge (wires charge) is a legislated tax or levy on electricity businesses. Frequently it is imposed only on the monopoly transmission and distribution 'wires' businesses. It is used to fund energy efficiency, universal service, low-income and minority programs, renewables, and research and development (R&D).
Tax Exemptions/ Credits	Tax exemptions are typically legislatively mandated and are used to promote energy efficiency by exempting energy efficiency products from selected taxes (e.g., sales tax, value added tax, etc.). Tax credits are typically legislatively mandated and are used to promote energy efficiency, e.g., by offering homeowners and businesses a credit on their income tax if they install energy efficiency measures, or set against profit taxes for businesses.

Taxes	Carbon and energy taxes are typically legislatively mandated and are used to promote energy efficiency and environmentally benign sources of energy by taxing energy consumption and environmentally harmful energy sources (e.g., fossil fuels).
Technology Procurement	Technology procurement is typically implemented by government, or large corporations, to acquire energy-efficient products, often in bulk quantities and at prices lower than at the retail level. Generally, the transaction is between the customer and the manufacturer. Technology procurement includes market identification, setting up buyers' groups, specification of new technologies, and support for procurement process.
Utility Subsidies, Grants, Loans and Rebates	Subsidies include grants, rebates, low-interest loans, and loan guarantees that utility companies, manufacturers, distributors and retailers may use to reduce the first cost of energy products and services.
Voluntary Purchasing	Voluntary purchasing guidelines provide information (guidelines) on the energy efficiency of products for agencies and contractors to use when purchasing equipment. A list of suppliers of such products often accompanies the guidelines.
Voluntary/ Negotiated Agreements	These agreements are typically negotiated between government and individual consumers (e.g., industrial companies), or between government and trade associations. Energy efficiency targets are set and the consumers or trade associations must meet those targets by a specified date.