Developing Mechanisms for Promoting Demand-side Management and Energy Efficiency in Changing Electricity Businesses

Research Report No 3
Task VI of the International Energy Agency Demand-Side Management Programme

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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 Organisation 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 nine Tasks have been initiated, four 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 organised.

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

Task VII International Collaboration on Market Transformation

Task VIII Demand Side Bidding in a Competitive Electricity Market

Task IX The Role of Municipalities and Energy Efficiency in a Liberalised System

* Completed Tasks

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FOREWORD

This report is a result of work which was completed within Task VI of the International Energy Agency Demand-Side Management Programme. The title of Task VI was "Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses." The objective of Task VI was 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 was organised 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 consisted of:

- Energy Futures Australia Pty Ltd, based in Sydney, Australia (Operating Agent and responsible for mechanism development and for this report);
- SRC International ApS, based in Copenhagen, Denmark (contractor responsible for a 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).

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

Information for this report was collected and the document reviewed by Experts from the organisations listed in Table 1 over the page.

The Principal Investigator for, and main author of, this report is David Crossley of Energy Futures Australia Pty Ltd. David was supported by Michelle Maloney and Greg Watt both of whom were employed by Energy Futures Australia at various times during this project. Chapter 3, on public policy implications, was written by Jan Hamrin of the Center for Resource Solutions, USA and Ed Vine from Lawrence Berkeley National Laboratory, USA. Jan and Ed also wrote part of Chapter 4. However, any errors and omissions are the sole responsibility of the Principal Investigator.

Table 1. Experts Participating in Task VI

Name	Organisation	Country
Konstantin Anastasopoulos	Public Power Corporation	Greece
Sophie Attali	International Conseil Energie	France
Jérôme Bottin	Electricité de France	France
Randall Bowie	European Commission DGXVII	EU
Marcel Didden	Katholieke Universiteit Leuven	Belgium
Nick Eyre	Energy Saving Trust	United Kingdom
Lesley Fox	Electricité de France	France
Seppo Kärkkäinen	VTT Energy	Finland
Sung-Woo Kim	Korea Energy Management Corporation	Korea
Jesús Maria Martín-Giraldo	Union Electrica Fenosa	Spain
Gujji Muthuswamy	CitiPower	Australia
Hironori Nishihara	NEDO	Japan
Egil Öfverholm	Statens Energimyndighet	Sweden
Eero Pere	Finnish Electricity Association (SENER)	Finland
Pentti Puhakka	Ministry of Trade and Industry	Finland
Harry Schaap	Electricity Supply Association of Australia	Australia
Kwan-Hong Shin	Korea Energy Management Corporation	Korea
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Mitsuharu Sugano	Tokyo Electric Power Company	Japan
Jean-Pierre Tabet	Agence de l'Environment et de la Maîtrise de l'Énergie	France
Ole Thorbek	Danish Energy Agency	Denmark
Jan van den Berg	SEP	Netherlands
Terje Stamer Wahl	Norwegian Water Resources and Energy Directorate	Norway

Part 1: Report

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 has developed 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 present the final results of Task VI. This involves:

- describing how the mechanisms were developed;
- detailing the mechanism descriptions which were used to characterise the developed mechanisms;
- analysing the public policy implications of the developed mechanisms;
- presenting the finalised mechanism descriptions.

The report is divided into two parts. Part 1 contains the methodological and analytical material. Part 2 comprises the mechanisms descriptions for the 25 mechanisms which were developed in Task VI.

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

1.2 MOTIVATION FOR TASK VI

The motivation for this study came from the experiences in 1993 and 1994of a small group of DSM practitioners from electricity businesses in Australia. At that time, the process of developing a competitive electricity market in southern and eastern Australia was just beginning. The group of practitioners were asked to write a report about how DSM and energy efficiency might fit into the market. In researching material for this report, the group discovered a complete lack of any documented material on previous experience in this area. The report which the group eventually produced[2] was therefore written almost entirely from the group's own experiences.

At the same time that the report was being written, Australia joined the International Energy Agency Demand-side Management Programme. At that time, most countries participating in the IEA DSM Programme were at earlier stages in restructuring their electricity industries than was Australia. During discussions between participants, it became obvious that DSM

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

practitioners in these countries would face similar problems to those experienced by the Australian practitioners. Therefore, it was decided to initiate Task VI to develop a database of information which could be used by decision makers wanting to promote the application and use of DSM and energy efficiency in restructured electricity industries and competitive electricity markets.

Task VI commenced in April 1997 for a three year period. The majority of the countries participating in the IEA DSM Programme decided to participate in Task VI.

1.3 PREVIOUS WORK IN TASK VI

The initial work in Task VI comprised the identification and characterisation of existing mechanisms for promoting DSM and energy efficiency in the countries participating in Task VI. Country Experts provided details of these mechanisms which were recorded in a database accessible through a secure site in the Internet. Eventually, details of over 100 existing mechanisms were recorded in the database. This work was reported in the first Task VI Research Report[3].

The purpose of studying existing mechanisms was to identify concepts and ideas for mechanisms which could be further developed in Task VI. These could be:

- mechanisms which were already existing but not well developed;
- existing mechanisms which required modification to be more effective in restructured electricity industries; or
- new mechanisms which were required as a consequence of electricity industry restructuring.

In the event, the majority of the 25 mechanism which were chosen for development in Task VI had been implemented in one form or another. Some were, in fact, "old" mechanisms which, with some modification, would work equally well in restructured electricity industries. The only really "new" mechanism was *M11 Demand-side bidding in competitive markets* which only operates in electricity industry structures which include a competitive electricity market.

To ensure that the process of identifying mechanisms for further development was comprehensive, it was decided to commission two consultancy studies of existing mechanisms in countries which were not participating in Task VI. One of these studies looked at mechanisms in the United States[4], and the other was concerned with mechanisms in selected developing countries[5].

A separate stream of work in Task VI was concerned with the public policy implications of mechanisms for promoting DSM and energy efficiency. The second Task VI Research Report[6] analysed how the effectiveness of existing mechanisms in promoting DSM and energy

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3 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.

4: Aspen Systems Corporation 1998 *Status of Commercial Mechanisms for Energy Efficiency in Use or Contemplated by US Utilities,* IEA DSM Programme, Task VI Working Paper No 1

5 SRC International Pty Ltd 1998 *Activities in the Development of Mechanisms for Promoting DSM and Energy Efficiency in Non-IEA Countries,* IEA DSM Programme, Task VI Working Paper No 2.

6 Crossley, D, Hamrin, J, Vine, E, Eyre, N 1999 *Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses,* IEA DSM Programme, Task VI Research Report No 2.

efficiency is influenced by different structural models for the electricity industry. Effectiveness was judged by reviewing the barriers to energy efficiency, and analysing the implications of different electricity sector structural models on the mechanisms. The findings from this report were also used to identify mechanisms for further development.

1.4 DEFINITION OF A MECHANISM

To clarify the following discussion, the same distinction is made between mechanisms and programs as was used in the previous two research reports for Task VI.

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

In contrast, DSM and energy efficiency *programs* are specific actions taken by utilities and others, with the aim of influencing energy-using behaviour. Programs are targeted at energy end-users, as distinct from mechanisms which are targeted at the developers and implementers of programs.

The examples in Table 2 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.

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.

1.5 ORGANISATION OF REPORT

- Chapter 2 described the process by which mechanisms were developed in Task VI.
- Chapter 3 examines the public policy implications of the developed mechanisms and draws some conclusions about their likely effectiveness.
- Chapter 4 presents some general conclusions drawn from the work carried out in Task VI.

CHAPTER 2 DEVELOPING THE MECHANISMS

2.1 INTRODUCTION

Following the identification and description of existing mechanisms in participating countries, the process followed in Task VI for developing mechanisms comprised four stages:

- **identification** of concepts and ideas for mechanisms to be developed further;
- **development** of mechanism descriptions;
- **review and revision** of the draft mechanism descriptions;
- **evaluation** of the developed mechanisms.

2.2 IDENTIFICATION

In identifying concepts and ideas for mechanisms to be developed further, the Task VI Experts reviewed all the existing mechanisms in the database and developed a set of generic mechanism types into which all the existing mechanisms could be categorised. Each of these generic types were then examined to determine whether they were suitable for further development. Factors taken into account in making this determination included:

- whether the mechanism addressed more than one barrier to DSM and energy efficiency;
- whether the mechanism would be effective in restructured electricity industries;
- whether the mechanism would require modification to become effective in restructured electricity industries;
- whether the mechanism had already been extensively developed and implemented.

During this process, the Task VI Experts decided not to develop the following mechanisms because there is already a great deal of information about them:

- subsidies for DSM and energy efficiency provided by governments or electricity businesses;
- codes and standards (eg building codes and minimum energy performance standards);
- licences, permits and trading schemes for greenhouse gas emissions.

The Task VI Experts also undertook a brainstorming workshop to identify any "new" mechanisms which could be developed to promote DSM and energy efficiency in restructured electricity industries. Despite considerable effort put into this activity, very few "new" mechanisms were identified.

Following the completion of both the identification process and the subsequent review process, the Experts had identified 25 mechanisms for further development. These mechanisms are listed in Table 3, over the page.

Table 3. Mechanisms Developed During Task VI

Control Mechanisms	
C1	Mandatory sourcing of energy efficiency
C2	Energy efficiency licence conditions for electricity businesses
C3	Integrated resource planning
C4	DSM and energy efficiency as alternatives to network expansion
C5	Revenue regulation
Funding Mechanisms	
F1	Public benefits charge for energy efficiency
F2	Financing of energy efficiency by electricity businesses
Support Mechanisms	
S1	Sustainable energy training schemes for practitioners
S2	Energy centres
S3	Creating entrepreneurial energy organisations
S4	Developing the ESCO industry
S5	Promotion of energy efficiency by industry associations
S6	Aggregating electricity purchasers to achieve energy efficiency
S7	Voluntary agreements for energy efficiency
Market Mechanisms	
M1	Taxes on energy
M2	Tax exemptions and incentives for energy efficiency
M3	Providing consumption information on customers' electricity bills
M4	Communicating pricing and other information for energy efficiency
M5	Energy performance labelling
M6	Developing an energy efficiency brand
M7	Cooperative procurement of energy efficient appliances and equipment
M8	Energy performance contracting
M9	Competitive sourcing of energy services
M10	Competitive sourcing of demand-side resources
M11	Demand-side bidding in competitive markets

2.3 DEVELOPMENT

2.3.1 Mechanism Descriptions

Mechanisms were developed by preparing a comprehensive mechanism description for each mechanism. Mechanism descriptions for all 25 developed mechanisms are presented in Part 2 of this report.

Each mechanism description includes:

- an outline of the mechanism;
- identification of the barriers to DSM and energy efficiency addressed by the mechanism;
- effects of electricity industry restructuring on the mechanism;
- potential outcomes from the mechanism;
- previous experience with related mechanisms;
- driving forces behind mechanism development;
- important conditions for effective implementation of the mechanism;
- funding requirements for the mechanism;
- effects of the mechanism on electricity businesses;
- the institutional and policy framework for the mechanism;
- identified problems with the mechanism;
- public policy implications of the mechanism;
- evaluation of the effectiveness of the mechanism;
- sources of information about the mechanism.

2.3.2 Classification of Mechanisms

The Task VI Experts decided to classify the developed mechanisms into a small number of categories. The purpose of the classification is to group together similar mechanisms to make it easier to find, collate and make sense of the information in the mechanism descriptions.

Mechanism for promoting DSM and energy efficiency can be classified in a variety of ways, depending on the 'dimension' chosen. A *multiple dimension* classification involves several issues (eg actors, type of market and government structure) being analysed simultaneously in the classification system. In contrast, a *one-dimensional* classification uses one issue as a starting point for classifying mechanisms.

The Task VI Experts initially experimented with several multiple dimension classification systems for classifying the developed mechanisms. One of these multiple dimension systems was used in the second Task VI Research Report[7]. However, for simplicity, it was finally decided to employ a single dimension classification system which uses the method of operation

[7] Crossley, D, Hamrin, J, Vine, E, Eyre, N 1999 *Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses*, IEA DSM Programme, Task VI Research Report No 2.

of the mechanism (ie what the mechanism does) to classify the developed mechanisms into four categories:

- **Control Mechanisms** – direct energy businesses to change behaviour;
- **Funding Mechanisms** – provide funding for other mechanisms;
- **Support Mechanisms** – provide support for behavioural changes by end-users and energy businesses;
- **Market Mechanisms** – use market forces to encourage behavioural changes by end-users and electricity businesses.

2.4 REVIEW AND REVISION

The mechanism descriptions for the developed mechanisms were subjected to several rounds of review and revision by the Task VI Experts. This process resulted in significant changes to the mechanism descriptions and also identified several additional mechanisms for development.

The mechanism descriptions were also subject to review by a range of relevant practitioners through a series of Practitioners Workshops. The purpose of the Practitioners Workshops was to present preliminary summaries of the mechanisms developed in Task VI for comment by a range of practitioners who may be involved in using the mechanisms. The Practitioners Workshops were designed to provide a "reality check" on the practicality of the developed mechanisms.

Practitioners Workshops were held as follows:

- on 21 May 1999 in Sydney, Australia;
- on 28 May 1999 in Sophia Antipolis in the south of France;
- on 27 August 1999 in Fukuoka, Japan.

The practitioners invited to the workshops include:

- government policy makers;
- industry regulators;
- electricity business managers;
- analysts and commentators on the electricity industry.

2.5 EVALUATION

Evaluation criteria were developed to assess the likely effectiveness of each mechanism in promoting DSM and energy efficiency.

In developing the evaluation criteria, it was not possible to use a simple quantitative indicator, such as the amount of energy saved through implementing the mechanism, to assess the actual effectiveness of each mechanism. The levels of such quantitative indicators vary depending on the context within which each mechanism is applied and exactly how it is implemented. Further, there is no quantitative date for "new" mechanisms and it proved difficult to obtain quantitative data for mechanisms which have been implemented already. Therefore, it was decided to use the following set of evaluation criteria to characterise the likely effectiveness of each of the mechanisms.

1. Previously demonstrated effectiveness

- Has the mechanism already demonstrated DSM and energy efficiency outcomes in previous applications?

2. Ability to address recognised barriers to DSM and energy efficiency

- What barriers does the mechanism overcome?
- Will it overcome barriers associated with market-driven situations?

3. Effects of electricity industry restructuring on the mechanism

- What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

4. Transferability

- Can the mechanism work in more than one national/regional context?
- What is the potential for transferability between different national/regional contexts?

5. Flexibility within the social/political environment

- Is the mechanism flexible, and able to continue achieving its goals during political or industry-based changes?

6. Potential for market transformation

- Will the mechanism lead to infrastructural or organisational changes which ease the promotion of DSM and energy efficiency?

7. Cost effectiveness

- What level of financial and human resources would be required to implement the mechanism?
- Does the mechanism have a low cost (program costs and cost per kilowatt-hour saved)?
- Is the free-rider effect minimised? (ie the mechanism does not subsidise those who would have implemented energy efficiency initiatives anyway)
- Is the free driver effect maximised? (ie the mechanism stimulates energy efficiency in several ways, some of which are cost free)

8. Social and environmental impacts of the mechanism

- Are the social consequences of implementation benign? (ie the mechanism does not penalise low income groups, small users at the expense of large, etc)
- Are the overall environmental consequences of implementation positive?

2.6 CONCLUSION

The main products from Task VI are:

- three *Task VI Research Reports*;
- two *Task VI Working Papers*;
- a database of over 100 existing mechanisms for promoting DSM and energy efficiency;
- a database of 25 developed mechanisms for promoting DSM and energy efficiency.

These products constitute a comprehensive catalogue of information on incorporating DSM and energy efficiency into restructured electricity industries. The products will be of immediate practical use to government policy makers, industry regulators, electricity business managers, and analysts and commentators on the electricity industry.

CHAPTER 3 PUBLIC POLICY ANALYSIS

3.1 INTRODUCTION

In the second Task VI Research Report[8], we identified public policy goals and objectives which could be achieved by electricity industry restructuring; developed four different generic electric industry structural models; and described policy and program barriers to the promotion of DSM and energy efficiency. In this chapter, we examine the public policy implications of the 25 mechanisms that were developed in Task VI, using a similar approach to that used in Task VI Research Report No 2.

3.1.1 Public Policy Goals and Objectives

Some countries and states are reducing direct government participation in the operation and management of the electricity system through unbundling, commercialisation/ privatisation, and competition. As a consequence, these governments are refocussing 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 ecological sustainability issues. These two major trends may be diametrically opposed to one another, or may complement one another, depending on the electricity industry structure that emerges, the responsiveness of private electricity businesses to public policy goals and objectives, and the will and desire of government to ensure that public policy goals and objectives are met.

This change in government focus from everyday operational goals to social and environmental policy goals can provide a strategic benefit for DSM programs, to the extent that DSM and energy efficiency are seen as key tools for meeting social and environmental goals. However, the movement by government away from direct involvement in electricity sector operations may reduce government's opportunities and leverage in promoting DSM and energy efficiency. These are the types of changes that require the modification of existing mechanisms and the creation of new mechanisms for promoting DSM and energy efficiency.

Public policy goals that are not of particular interest to electricity businesses in a competitive type market structure will not be met unless they are explicitly included in any restructuring agenda.

Examples of goals which may not be met include:

- establishment of open and competitive markets;
- achievement of energy independence;
- provision of accurate and useful information;
- delivery of consumer protection;
- implementation of environmental stewardship;
- achievement of increased quality of life;

[8] Crossley, D, Hamrin, J, Vine, E, Eyre, N 1999 *Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses*, IEA DSM Programme, Task VI Research Report No 2.

- delivery of universal service to all electricity 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.

3.1.2 Electricity Industry Structure

In the second Task VI Research Report[9], four aspects of electricity industry restructuring were identified:

- **unbundling** - vertically integrated utilities are separated into legally and functionally distinct companies each providing one only of the following functions: generation, transmission, distribution and retailing;
- **commercialisation** - introducing commercial objectives into the management and operation of a state-owned (public) electricity business;
- **privatisation -** transferring publicly-owned electricity sector assets into private ownership;
- **competition** - although the network 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).

In addition, four generic structural models for the electricity industry were developed. These models represent points 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 DSM and energy efficiency under commercialisation or privatisation 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 privatisation, unbundling and competition are introduced simultaneously, it may be difficult for government to analyse the complex interactions and to anticipate the most likely outcomes.

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9 Crossley, D, Hamrin, J, Vine, E, Eyre, N 1999 *Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses*, IEA DSM Programme, Task VI Research Report No 2.

3.1.3 Barriers

In general, no form of electricity industry restructuring will remove all (or even most) of the barriers to DSM and energy efficiency, although it may change them[10]. While electricity industry restructuring may help to reduce some barriers to DSM and energy efficiency, it also leaves untouched other barriers to implementation of end-use improvements (such as inadequate information and capital, and environmental externalities). Restructuring 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, such intervention is still warranted.

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 commercialisation and competition, regardless of which organisation is responsible for implementing the programs.

In all cases, the policy/regulatory framework is critical. To the extent that privatisation is introduced into any of the electricity industry structures, 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 (unbundling, commercialisation, privatisation and competition) within any particular structure results in a complex interaction of barriers and incentives unique to that particular situation. If energy efficiency is an important policy tool to achieving various public interest goals (as well as a goal in itself), the case for intervention remains for all of electricity industry structures. However, the nature of the intervention (ie the appropriate mechanisms to use) will change.

3.1.4 Mechanisms

In the first three models of electricity industry structure, most mechanisms were implemented by government or the electricity business, 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 further modified within these structures. But in competitive industry structures, the form of the electricity business is radically altered. In this structure, greater responsibility falls on government to:

- continue or expand funding mechanisms and those market mechanisms which include financial incentives;
- initiate, finance and encourage support mechanisms;
- undertake the further development of market mechanisms.

In general, 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 really been refined for optimal use in encouraging DSM and energy efficiency. There are also relatively recent market transformation concepts and mechanisms that would benefit from further work and refinement. Moreover, effective

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[10] See Appendix A for a description of program and policy barriers to DSM and energy efficiency.

evaluation of these types of mechanisms particularly for use with competitive electricity industry structures (Model 4) has been less developed and tested and needs substantial work.

3.1.5 Transitions

Periods of transition are critical for maintaining a momentum for existing public policy activities as well as for providing opportunities for creating the foundation upon which energy efficiency activities can be developed in the future. Unfortunately, policy developers may focus on anticipated future outcomes without seeing the critical role of the transition period in meeting those future goals.

In all cases, existing DSM activities should be maintained while future options are being examined. Funding, taxation and market transformation mechanisms are only minimally affected by changes in industry structure, making these mechanisms 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 model 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 recognised from the start as not being appropriate for use when the new industry structure has matured, but may be necessary as a bridge from where you have been to where you plan to go.

In particular, when moving to more competitive markets, it must be recognised that adjustments will be required in the future to accommodate the realities of the marketplace. This can be recognised by retaining opportunities for government control and intervention as the market evolves and by 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.

3.2 POLICY ANALYSIS OF MECHANISMS

3.2.1 Effects of Electricity Industry Restructuring

Table 4 summarises the usefulness and/or relevance of each of the 25 mechanisms developed in Task VI under three aspects of electricity industry restructuring:

- unbundling;
- commercialisation/privatisation; and
- competition.

It is interesting to note that the relative importance of two mechanisms does not change in response to any of the aspects of electricity industry restructuring. These mechanisms are: *M1 Taxes on energy;* and *M2 Tax exemptions and incentives for energy efficiency*

Unbundling

When unbundling occurs, the relative importance of many of the mechanisms remains unchanged.

Two mechanisms become less useful or relevant: *C3 Integrated resource planning*; and *S6 Aggregating electricity purchases to achieve energy efficiency*.

Eleven mechanism become more useful or relevant: *C1 Mandated sourcing of energy efficiency; C4 DSM and energy efficiency as alternatives to network expansion; C5 Revenue regulation; S2 Energy centres; S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; S5 Promotion of energy efficiency by industry associations; S7 Voluntary agreements for energy efficiency; M4 Communicating pricing and other information for energy efficiency; M5 Energy performance labelling*; and *M6 Developing an energy efficiency brand*.

The mechanism *F1 Public benefits charge for energy efficiency* is the most useful and relevant.

Commercialisation/Privatisation

When commercialisation/privatisation occurs, only one mechanisms becomes less useful or relevant: *C3 Integrated resource planning*.

Eighteen mechanisms become more useful or relevant: *C1 Mandatory sourcing of energy efficiency; C2 Energy efficiency licence conditions for electricity businesses; C4 DSM and energy efficiency as alternatives to network expansion; F2 Financing of energy efficiency by electricity businesses; S2 Energy centres; S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; S5 Promotion of energy efficiency by industry associations; S6 Aggregating electricity purchases to achieve energy efficiency; S7 Voluntary agreements for energy efficiency; M3 Providing consumption information on customers' electricity bills; M4 Communicating pricing and other information for energy efficiency; M5 Energy performance labelling; M6 Developing an energy efficiency brand; M7 Cooperative procurement of energy efficient appliances and equipment; M8 Energy performance contracting; M9 Competitive sourcing of energy services; M10 Competitive sourcing of demand-side resources*; and *M11 Demand-side bidding in competitive markets.*

As with unbundling, the mechanism *F1 Public benefits charge for energy efficiency* is the most useful and relevant.

Competition

When competition occurs, the relative importance of most of the mechanisms changes, with most of them becoming more useful and relevant.

One mechanism becomes less useful or relevant: *C3 Integrated resource planning*.

Three mechanisms remain unchanged: *C5 Revenue regulation*, *M1 Taxes on energy*; and *M2 Tax exemptions and incentives for energy efficiency*.

The remaining mechanisms become more, or much more, useful or relevant.

Table 4. Usefulness and/or Relevance of Developed Mechanisms under Various Aspects of Restructuring

MECHANISMS		EFFECTS OF VARIOUS ASPECTS OF RESTRUCTURING ON MECHANISMS		
		Unbundling	**Commercialisation/ Privatisation**	**Competition**
Control Mechanisms				
C1	Mandatory sourcing of energy efficiency	↑	↑	↑↑
C2	Energy efficiency licence conditions for electricity businesses	X	↑	↑↑
C3	Integrated resource planning	↓↓	↓	↓
C4	DSM and energy efficiency as alternatives to network expansion	↑	↑	↑↑
C5	Revenue regulation	↑	X	X
Funding Mechanisms				
F1	Public benefits charge for energy efficiency	↑↑	↑↑	↑↑
F2	Financing of energy efficiency by electricity businesses	X	↑	↑
Support Mechanisms				
S1	Sustainable energy training schemes for practitioners	X	X	↑
S2	Energy centres	↑	↑	↑↑
S3	Creating entrepreneurial energy organisations	↑	↑	↑↑
S4	Developing the ESCO industry	↑	↑	↑↑
S5	Promotion of energy efficiency by industry associations	↑	↑	↑
S6	Aggregating electricity purchasers to achieve energy efficiency	↓	↑	↑↑
S7	Voluntary agreements for energy efficiency	↑	↑	↑↑

Table 4 (continued)

MECHANISMS		EFFECTS OF VARIOUS ASPECTS OF RESTRUCTURING ON MECHANISMS		
		Unbundling	Commercialisation/ Privatisation	Competition
Market Mechanisms				
M1	Taxes on energy	X	X	X
M2	Tax exemptions and incentives for energy efficiency	X	X	X
M3	Providing consumption information on customers' electricity bills	X	↑	↑↑
M4	Communicating pricing and other information for energy efficiency	↑	↑	↑↑
M5	Energy performance labelling	↑	↑	↑
M6	Developing an energy efficiency brand	↑	↑	↑↑
M7	Cooperative procurement of energy efficient appliances and equipment	X	↑	↑
M8	Energy performance contracting	X	↑	↑
M9	Competitive sourcing of energy services	X	↑	↑↑
M10	Competitive sourcing of demand-side resources	X	↑	↑↑
M11	Demand-side bidding in competitive markets	X	↑	↑↑

Key to Effects on Mechanism	
↓↓	Mechanism is much less useful and/or relevant
↓	Mechanism is less useful and/or relevant
X	No change
↑	Mechanism is more useful and/or relevant
↑↑	Mechanism is much more useful and/or relevant

3.2.2 Barriers Addressed by Developed Mechanisms

As noted earlier in this report, one of the criteria for selecting mechanisms for development in Task VI was their ability to address one or more barriers to DSM and energy efficiency. In Tables 5 and 6, we indicate which policy and program barriers could potentially be addressed by the mechanisms in this report[11].

Policy Barriers

Key findings from Table 5 include the following:

- One policy barrier is not addressed by the mechanisms: *5 Import tariffs and duties*.
- All other policy barrier are addressed by at least one mechanism. However, it is more prudent to select a portfolio of mechanisms, rather than rely on one mechanism, to address specific policy barriers.
- Most mechanism address the "lack of awareness" of energy efficiency by policy makers, either explicitly or more indirectly by affecting consumers' awareness (and, hopefully, getting the attention of policy makers).
- Many of these mechanisms appear to be particularly responsive as they address multiple policy barriers. Furthermore, 11 mechanisms address seven or more policy barriers: *C1 Mandatory sourcing of energy efficiency; C3 Integrated resource planning; C4 DSM and energy efficiency as alternatives to network expansion; S4 Developing the ESCO industry; S6 Aggregating electricity purchases to achieve energy efficiency; M5 Energy performance labelling; M6 Developing an energy efficiency brand; M7 Cooperative procurement of energy-efficient appliances and equipment; M8 Energy performance contracting; M10 Competitive sourcing of demand-side resources*; and *M11 Demand-side bidding in competitive markets.*
- If these mechanisms are implemented, expertise in energy-efficiency technologies and services will increase, and there will be a greater focus on market transformation.

11 See Appendix A for a description of program and policy barriers to DSM and energy efficiency.

Table 5. Policy Barriers Addressed by Developed Mechanisms

MECHANISMS		POLICY BARRIERS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Control Mechanisms															
C1	Mandatory sourcing of energy efficiency			-			-	-	-	-	-	-		-	-
C2	Energy efficiency licence conditions for electricity businesses			-			-				-	-		-	
C3	Integrated resource planning		-				-				-	-	-	-	-
C4	DSM and energy efficiency as alternatives to network expansion	-	-				-	-			-	-	-	-	
C5	Revenue regulation	-		-											-
Funding Mechanisms															
F1	Public benefits charge for energy efficiency						-				-	-	-	-	
F2	Financing of energy efficiency by electricity businesses			-			-			-				-	
Support Mechanisms															
S1	Sustainable energy training schemes for practitioners						-	-					-	-	
S2	Energy centres						-	-					-	-	
S3	Creating entrepreneurial energy organisations						-	-					-	-	
S4	Developing the ESCO industry						-	-	-	-	-		-	-	
S5	Promotion of energy efficiency by industry associations		-				-	-						-	
S6	Aggregating electricity purchases to achieve energy efficiency		-				-	-	-	-	-		-	-	
S7	Voluntary agreements for energy efficiency		-				-	-					-	-	

Table 5 (continued)

MECHANISMS		POLICY BARRIERS													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Market Mechanisms															
M1	Taxes on energy		-		-			-			-	-			
M2	Tax exemptions and incentives for energy efficiency		-				-	-			-	-			
M3	Providing consumption information on customers' electricity bills		-	-				-							
M4	Communicating pricing and other information for energy efficiency				-		-	-		-				-	
M5	Energy performance labelling		-				-	-			-	-	-	-	
M6	Developing an energy efficiency brand		-				-	-	-	-	-		-	-	
M7	Cooperative procurement of energy-efficient appliances and equipment		-				-	-		-		-	-	-	
M8	Energy performance contracting		-				-	-	-	-	-		-	-	
M9	Competitive sourcing of energy services						-	-	-		-		-	-	
M10	Competitive sourcing of demand-side resources			-			-	-	-		-		-	-	
M11	Demand-side bidding in competitive markets				-		-	-	-		-		-	-	

Key to Policy Barriers
1. Excess capacity
2. Short-term perspective
3. Split (misplaced) incentives to energy providers
4. Pricing
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

Program Barriers

Key findings from Table 6 include the following:

- Two program barriers are not addressed by the mechanisms: *1 Low cost of energy to end users*; and *10 Split (misplaced) incentives*.
- As noted in Table 5, it is more prudent to select a portfolio of mechanisms, rather than rely on one mechanism, to address specific program barriers.
- Most mechanism address the "lack of information" and "information/search costs" either directly (eg by having ESCOs or energy centres provide all the information) or indirectly (eg through cooperative procurement of energy-efficient appliances).
- Many of these mechanisms appear to be particularly responsive as they address multiple program barriers. Furthermore, 10 mechanisms address five or more program barriers: *S2 Energy centres; S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; S7 Voluntary agreements for energy efficiency; M4 Communicating pricing and other information for energy efficiency; M5 Energy performance labeling; M6 Developing an energy efficiency brand; M7 Cooperative procurement of energy-efficient appliances and equipment; M8 Energy performance contracting*; and *M9 Competitive sourcing of energy services*.

Table 6. Program Barriers Addressed by Developed Mechanisms

MECHANISMS		PROGRAM BARRIERS									
		1	2	3	4	5	6	7	8	9	10
Control Mechanisms											
C1	Mandatory sourcing of energy efficiency							-			
C2	Energy efficiency licence conditions for electricity businesses		-					-			
C3	Integrated resource planning		-								
C4	DSM and energy efficiency as alternatives to network expansion		-					-			
C5	Revenue regulation										
Funding Mechanisms											
F1	Public benefits charge for energy efficiency		-			-		-			
F2	Financing of energy efficiency by electricity businesses		-			-	-	-			
Support Mechanisms											
S1	Sustainable energy training schemes for practitioners		-	-		-		-			
S2	Energy centres		-	-	-	-		-			
S3	Creating entrepreneurial energy organisations		-	-	-	-		-			
S4	Developing the ESCO industry		-	-	-	-	-	-	-	-	
S5	Promotion of energy efficiency by industry associations		-	-		-		-			
S6	Aggregating electricity purchases to achieve energy efficiency		-	-		-		-			
S7	Voluntary agreements for energy efficiency		-	-		-		-		-	

Table 6 (continued)

MECHANISMS		PROGRAM BARRIERS									
		1	2	3	4	5	6	7	8	9	10
Market Mechanisms											
M1	Taxes on energy										
M2	Tax exemptions and incentives for energy efficiency						-				
M3	Providing consumption information on customers' electricity bills		-	-	-						
M4	Communicating pricing and other information for energy efficiency		-	-	-	-	-	-			
M5	Energy performance labelling		-	-	-	-		-			
M6	Developing an energy efficiency brand		-	-	-	-		-			
M7	Cooperative procurement of energy-efficient appliances and equipment		-	-		-	-	-			
M8	Energy performance contracting		-	-	-	-	-	-			
M9	Competitive sourcing of energy services		-	-	-	-		-			
M10	Competitive sourcing of demand-side resources		-			-		-			
M11	Demand-side bidding in competitive markets		-			-		-			

Key to Program Barriers
1. Low cost of energy to end users
2. Lack of information to end users
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
6. Financial barriers
7. Product/service unavailability
8. Inseparability of product features
9. Organisational (institutional) barriers
10. Split (misplaced) incentives

3.3 CONCLUSIONS

The 25 mechanisms developed in Task VI vary in their usefulness and/or relevance under the three aspects of electricity industry structure, unbundling, commercialisation/privatisation and competition. However, the majority of the developed mechanisms are either unchanged or more useful or relevant under all three aspects. Under competition, the majority of the developed mechanisms are more, or much more, useful or relevant. Therefore, the developed mechanisms are likely to become more effective in promoting DSM and energy efficiency as restructuring of an electricity industry proceeds.

In relation to policy and program barriers, some of the mechanisms developed in Task VI appear to be more responsive in addressing one type of barrier as compared with the other. However, the majority of developed mechanisms address several program and policy barriers. This also suggests that the developed mechanisms will be effective in promoting DSM and energy efficiency in restructured electricity industries.

CHAPTER 4 CONCLUSIONS

4.1 EFFECTIVENESS OF THE DEVELOPED MECHANISMS

The public policy analysis of the developed mechanisms included in Chapter 3 of this report has attempted to provide some indication of their likely effectiveness in promoting DSM and energy efficiency. However, it is difficult to make definitive statements about the effectiveness of these mechanisms for the following reasons:

- the "field experience" in relation to restructured electricity industries 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 DSM energy efficiency in competitive electricity industry structures have, in most cases, been limited, especially compared to the potential energy savings that exist and compared to the funding of these activities in traditional electricity industry structures; and
- transforming markets to promote energy efficiency is a long-term process that requires patience and time.

4.2 COMPETITIVE ELECTRICITY MARKETS

For those countries and states moving to a competitive electricity industry structure, there are some things that are known even at the outset. From the second Task VI Research Report[12], we know that competitive markets are good at:

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

We also 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.

There are also predictable market failures, such as those listed below, which will affect the ability to successfully deliver DSM and energy efficiency outcomes.

- 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.

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[12] Crossley, D, Hamrin, J, Vine, E, Eyre, N 1999 *Public Policy Implications of Mechanisms for Promoting Energy Efficiency and Load Management in Changing Electricity Businesses*, IEA DSM Programme, Task VI Research Report No 2.

- 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.

4.3 POSSIBLE GROUPINGS OF MECHANISMS

In concluding this report, and IEA DSM Programme Task VI, it is possible to provide suggestions for groupings of mechanisms which may work to achieve similar results, particularly in competitive electricity industry structures. However, it should be noted that these groupings are simply suggestions. Before decisions are made about which mechanisms to implement, a detailed analysis should be completed, both of the goals and objectives required to be achieved, and of the particular situation in which the mechanisms will be implemented.

4.3.1 Information Provision Mechanisms

Mechanisms that provide accurate and useful information will be particularly important for competitive electricity markets. Therefore, general information provision mechanisms should be given a high priority. Consumer protection activities are also closely related to general information requirements. Mechanisms in this category include:

- *S1 Sustainable energy training schemes for practitioners;*
- *S2 Energy centres;*
- *S5 Promotion of energy efficiency by industry associations;*
- *S6 Aggregating electricity purchasers to achieve energy efficiency;*
- *S7 Voluntary agreements for energy efficiency;*
- *M3 Providing consumption information on customers' electricity bills;*
- *M4 Communicating pricing and other information for energy efficiency;*
- *M5 Energy performance labelling;*
- *M6 Developing an energy efficiency brand.*

4.3.2 Funding and Action Mechanisms

Financial incentive mechanisms to collect funds to promote DSM and energy efficiency work well together with mechanisms which lead to action in implementing DSM and energy efficiency initiatives. Such mechanisms might include:

- *F1 Public benefits charge for energy efficiency;*
- *F2 Financing of energy efficiency by electricity businesses;*
- *S3 Creating entrepreneurial energy organisations;*
- *S4 Developing the ESCO industry;*
- *M2 Tax exemptions and incentives for energy efficiency.*

4.3.3 Market-Shaping Mechanisms

New market-shaping mechanisms that capture the value gained from implementing DSM and energy efficiency initiatives will particularly help to overcome some of the problems of split incentives, where the organisation which implements DSM and energy efficiency may not gain any benefit from doing so. Mechanisms in this category include:

- *C4 DSM and energy efficiency as alternatives to network expansion;*
- *C5 Revenue regulation;*
- *M11 Demand-side bidding in competitive markets.*

4.3.4 Market Transformation Mechanisms

Market transformation mechanisms that are designed to alter the way in which DSM and energy efficiency energy efficiency is sourced or procured are critically important for competitive markets. These include mechanisms moving from regulations and financial incentives to strategic market interventions designed to result in more efficient products and services:

C1 Mandatory sourcing of energy efficiency;

C2 Energy efficiency licence conditions for electricity businesses;

S4 Developing the ESCO industry;

S7 Voluntary agreements for energy efficiency;

M2 Tax exemptions and incentives for energy efficiency;

M7 Cooperative procurement of energy efficient appliances and equipment;

M8 Energy performance contracting;

M9 Competitive sourcing of energy services;

M10 Competitive sourcing of demand-side resources.

4.4 CONCLUSION

A challenging future lies before us. However, the aim of IEA DSM Programme Task VI is to provide policy decision-makers or DSM practitioners with a good base of knowledge and tools to enable the integration of DSM and energy efficiency into future electric industry structures.

The major contribution by IEA DSM Programme Task VI is the 25 mechanisms for promoting DSM and energy efficiency which have been developed during the Task. These mechanisms are detailed in the mechanism descriptions which follow in Part 2 of this report.

The work completed in Task VI will provide benefits to the following audiences:

- for **policy makers and regulators**—information about the applicability and likely effectiveness of mechanisms which could be utilised to achieve particular public policy goals;
- for **electricity businesses**—information about mechanisms which could be used to develop new competitive and profitable DSM and energy efficiency products and services;
- for **analysts and commentators**—information about a range of mechanisms which could be considered in particular situations.

COMMENTS BY PARTICIPANTS

FINAL FRENCH EXPERTS' COMMENTS

April 26th, 2000

Jean-Pierre Tabet – ADEME

Sophie Attali - ICE

These comments are supported by the Norwegian Expert

This report *Developing Mechanisms for Promoting Demand-side Management and Energy Efficiency in Changing Electricity Businesses* is an indispensable but complex and ambitious exercise in the current rapidly evolving context. Laws and regulations for the electricity market and its operators are changing fast; the few results obtained in some countries are still difficult to assess; experience is hard to transfer because of different institutional framework and different structures in the electricity generation, distribution and retail systems between countries; uncertainty remains concerning the medium term future: this general context weakens DSM and energy efficiency practices since competition is and will be based on the price per kilowatt-hour, at least until the market stabilises.

Despite this difficult context, and thanks to the Operating Agent and national Experts, the work achieved within Task VI is highly valuable, probably the most complete study available to day on this subject. The Operating Agent and his team of consultants lead the study, organising regular experts meetings (seven in total) and discussions in a convivial atmosphere, circulating material among national Experts, developing a consistent and helpful web site.

But there is no work which can be carried out without regrets. Let's be clear that these regrets apply to our collective work, and therefore to us also!

Concerning the Approach and the Pace Chosen for this International Work

On such a complex issue as promoting DSM in changing electricity businesses, we can feel today, while looking at the final report and remembering the debates within the Experts group, that the methodological approach chosen – i.e. the systematic search for consensus – is a limited one, which cannot render account of the complexity and the variety of viewpoints one can find in a group gathering 13 countries. Obviously, national Experts (who already sometimes speak for their institutions rather than as "country representatives") have different positions. In order to reach a common expression, we felt Task VI final statements are sometimes levelled down, in order to satisfy everyone, and/or reflect positions which does not integrate some of the contributions argued by national Experts.

A possible solution could have been, for certain specific issues, to propose divergent positions, and indicate in the reports which positions were favoured by which countries and why. This suggestion could probably also be applied to some other Tasks of the IEA DSM Programme.

We also felt difficulties concerning the "broken" pace of Task VI, alternating periods of emptiness and period of sudden activities. We could not propose a solution for this problem mainly linked to the gathering of various countries, but we wish to underline this point whose responsibility is shared by the Operating Agent (often asking for comments in a very short delay after having circulated material) and the national Experts themselves (who sometimes showed little interest between meetings).

Concerning Some Aspects of Task VI Content

The core of Task VI is based on complex questions: Will the electricity market alone carry out DSM activities? Up to which level? What is a satisfactory level? Which mechanisms can be implemented without hampering various sectors international competitiveness (the electricity sector itself but also some industrial sectors such as aluminium)? How can thinking be organised in such an evolving situation? etc. We wish Task VI had admitted that giving one straight answer to some of these questions is impossible, while exposing and discussing these issues more clearly, in a detailed way, and providing various forms of answers would have been richer.

Gathering 13 countries to work on changing electricity businesses implies quite automatically confronting a range of different positions regarding the electricity market, from perfect management by the "invisible hand" for some national Experts, to the need for strong State regulation for others. Of course, this conflict exists outside the DSM context and is linked to more general positions in the field of economics, politics and even ideology. Again, Task VI should have acknowledged these different approaches and integrated the various contributions, because of the true difficulty to set a common – unreachable? – position.

Despite the intervention of some national Experts, some crucial issues were not sufficiently developed or were taken for granted, evading some fundamental questions. One of the main missing issues lies in the general electricity prices decrease as a consequence of the introduction of competition, leading to less financial interest in DSM. Other missing issues are, for instance, the assessment of generation and transmission external costs, and the monitoring and certification of DSM results.

As examples of assumptions taken more-or-less for granted, we wonder: Why would the mechanisms be likely to be more effective as restructuring electricity industry proceeds – whereas it is evident they will be more needed? Why would retailers carry out energy efficiency as long as it is not business profitable? Why would the transition period be favourable to DSM, rather than to the contrary?

Conclusion

In conclusion, the national Experts group and the Operating Agent can be satisfied with the 25 developed mechanisms, which constitute a great amount of clear information. However, the Task VI final report (too positive and not enough dialectical) doesn't reflect enough the various aspects of a rich and arduous subject, nor the numerous unknown factors that will determine the nature of changing electricity businesses and therefore the future place of DSM.

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

As part of the analysis in Task VI of public policy implications of mechanisms, we examined barriers to promoting DSM and energy efficiency 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 organisations 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 neighbours. 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 emphasised 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 emphasise 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 organisations 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 centralised electricity production centers and does not favor investments in energy efficiency measures. In a competitive market, this barrier may diminish if more decentralised 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 organisations 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 organisation 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. Organisational (Institutional) Barriers

9a. Low Priority of Energy Efficiency

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

9b. Views of Upper Management

Comment: It is difficult for organisations 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 organisations 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) organisations 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 organisations, 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: GLOSSARY

The following are definitions of some terms commonly used throughout this report, including in the mechanism descriptions. Other definitions are included in the text where a term first occurs.

Commercialisation – 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 – Minimising 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 organisation 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 organisation with no financial interest in electricity generating facilities who administers the operation and use of the transmission network business. This may be a separate entity from the one that operates the wholesale electricity exchange market (see Power Exchange).

Liberalisation [see also Restructuring] – [Reform of the electricity sector.] The privatisation 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 behaviour. 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.

Privatisation – 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[13] 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.

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 "liberalisation".

Regulatory Support System – The oversight of an industry (including rules of behaviour, economic oversight and price setting, and establishment/evaluation of programs) for the purpose of the promulgation and preservation of the public interest[14]. Formal regulation is often defined as being administered by an independent governmental body overseeing a privatised industry. But regulatory support can also be provided for government-operated industries and to shape competitive markets.

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

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

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): commercialisation, privatisation, unbundling, and/or the introduction of competition into various utility business funsctions. The term restructuring may be used interchangeably with "reform" or "liberalisation" (though liberalisation 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.

Part 2:
Descriptions of
Developed Mechanisms

Mechanisms Developed During Task VI

Control Mechanisms	
C1	Mandatory sourcing of energy efficiency
C2	Energy efficiency licence conditions for electricity businesses
C3	Integrated resource planning
C4	DSM and energy efficiency as alternatives to network expansion
C5	Revenue regulation
Funding Mechanisms	
F1	Public benefits charge for energy efficiency
F2	Financing of energy efficiency by electricity businesses
Support Mechanisms	
S1	Sustainable energy training schemes for practitioners
S2	Energy centres
S3	Creating entrepreneurial energy organisations
S4	Developing the ESCO industry
S5	Promotion of energy efficiency by industry associations
S6	Aggregating electricity purchasers to achieve energy efficiency
S7	Voluntary agreements for energy efficiency
Market Mechanisms	
M1	Taxes on energy
M2	Tax exemptions and incentives for energy efficiency
M3	Providing consumption information on customers' electricity bills
M4	Communicating pricing and other information for energy efficiency
M5	Energy performance labelling
M6	Developing an energy efficiency brand
M7	Cooperative procurement of energy efficient appliances and equipment
M8	Energy performance contracting
M9	Competitive sourcing of energy services
M10	Competitive sourcing of demand-side resources
M11	Demand-side bidding in competitive markets

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: C1

Mandatory Sourcing of Energy Efficiency

Mechanism Type: Control

Outline	Mandatory sourcing of energy efficiency is a legal requirement imposed by government on electricity businesses and large electricity customers to include in their retail sales mix or wholesale purchases defined energy efficiency outcomes.	
Outcomes	☐ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	↑ More useful and/or relevant
	Commercialisation/ Privatisation	↑ More useful and/or relevant
	Competition	↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	3, 6, 7, 8, 9, 10, 11, 13, 14	
Program barriers addressed	7	
Who Promotes?	Equipment manufacturer, energy management companies, ESCOs	
Who Initiates?	Government	
Who Develops?	All parties involved	
Who Implements?	Retailers	
Who is Targeted?	Customers, ESCOs, Network business	
Funding	Customer tariffs in franchise market Other funding mechanisms in competitive market	
Impacts on electricity businesses	Requires additional resources Loss of income through reduced electricity sales	
Previous experience	Finland – obligation to promote electricity efficiency United Kingdom – Energy Efficiency Standards of Performance for retailers United-States – mandatory targets for DSM	

1. MECHANISM OUTLINE

Mandatory sourcing of energy efficiency is a legal requirement imposed by government on electricity businesses and large electricity customers to include in their retail sales mix or wholesale purchases defined energy efficiency outcomes.

1.1 General Description

What the mechanism means in general terms.

This mechanism creates a distinct retail market for energy efficiency, with the size of the market defined by the government mandate.

In competitive markets, electricity retailers purchase energy on the wholesale market for sale to their customers. The number of retailers is small and retailers are controlled by licence and/or regulation. Therefore, imposing on retailers an obligation to achieve a specified energy efficiency target may be an effective and administratively simple way of ensuring that energy efficiency outcomes are realised.

Similarly, the number of large customers who purchase electricity in the wholesale market is small and imposing an energy efficiency obligation on such customers may also be effective.

The energy efficiency target mandated by the government should be clearly defined with respect to:

- **size** – is it achievable over a realistic time-frame?; what is the base-line for comparisons, eg current wholesale electricity purchases or growth in purchases?; can local manufacturers/suppliers/developers realistically support this target?;
- **deliverables** – will the results of the energy efficiency sourcing be measured in units of energy saved, or in some other measure that can be related to energy efficiency investments?

The mandated energy efficiency target must also be defined in practical terms. The government can require a targeted level of energy savings, linked to the quantity of electricity sold by an electricity retailer or purchased by a large customer. For example, the retailer/customer can be required to demonstrate that they have achieved energy savings equivalent to 5% of sales/purchases.

The energy savings required may:

- be sourced from network businesses, customers, energy services companies (ESCOs) or any other provider;
- apply to a specific region, national market or even outside the country imposing the mandated sourcing;
- be restricted to electro-technologies or cover all energy forms.

The responsibility for achieving the energy efficiency target can be allocated to liable parties on an individual retailer basis, or on a shared basis. Trading of the energy efficiency deliverables between parties can be developed in both cases. On the shared basis, a centralised body representing the retailers can be established to perform the required tasks, namely, seeking the appropriate contributions from retailers and contracting with the providers of the required energy efficiency services.

The technologies/applications contributing to the energy efficiency deliverables can be narrowly or broadly defined depending on the jurisdiction's requirements. A portfolio of options can be defined to target specific technologies or applications requiring support. Alternatively, if environmental outcomes are the sole goal of the deliverables, a least cost approach may be preferred.

Monitoring of achievements, oversight of trading arrangements and administration of penalties may be carried out by an independent body, funded by government.

An important consideration is the funding of this mechanism. This is likely to represent the single most important issue that could hinder development of the mechanism. The mechanism does not specifically require funding, because the government has the ability to simply direct electricity businesses to meet set targets for purchasing energy efficiency at their own cost. However, in principle, any additional costs incurred in providing a societal benefit should be able to be recouped by the electricity business. Therefore, the mechanism would be more acceptable to electricity businesses if a source of funding is identified by the government.

Where pricing regulation of electricity businesses currently exists (eg in the retail franchise component of competitive markets), the most simple and efficient approach to funding this mechanism would be for the regulator to allow the business to recover costs associated with prudent investments in energy efficiency technologies and applications. The costs involved can be passed through to customers and this process can be designed to provide a ceiling for the amount of energy to be provided by a given energy efficiency option, at a set price for that option. The set price may be established at a level commensurate with an acceptable impact on retail franchise prices.

In competitive markets, as the retail franchise component is progressively opened to competition, the opportunity to raise funds from customers disappears. Other funding mechanisms for mandated purchases of energy efficiency by retailers can be progressively introduced, including the public benefits charge, tax exemptions and incentives, financing, subsidies and loans, and energy/CO_2.

Does this mechanism depend on or overlap with other mechanisms described?

Mandatory sourcing of demand-side resources establishes a legal framework for promoting energy efficiency by targeting retailers and other large purchasers of electricity from the national wholesale market. Mechanism *C2 Energy efficiency licence conditions for electricity businesses* will be made redundant.

Mandatory sourcing of demand-side resources will be complemented by mechanisms aimed at making financial resources available to retailers and others for the required investments/purchases. These mechanisms include: *F1 Public benefits charge for energy efficiency; F2 Financing of energy efficiency by electricity businesses; M1 Taxes on energy;* and *M2 Tax exemptions and incentives for energy efficiency*. The mechanism will also be complemented by *M10 Competitive sourcing of demand-side resources.*

Retailers and other large purchasers of energy subjected to mandatory sourcing of demand-side resources will benefit in particular from the external support that may be provided by the following mechanisms: *S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry;* and *S5 Promotion of energy efficiency by industry associations.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

3. Split (misplaced) incentives to energy providers
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)
13. Lack of available expertise (in EE during transition periods)
14. Utility price setting process

Program Barriers

7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because mandatory sourcing of energy efficiency can be imposed irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the requirement imposed by mandatory sourcing of energy efficiency to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The rate at which the size of the retail franchise market reduces during the transition to a competitive electricity market will have a significant impact on the effectiveness of this mechanism. The quicker the rate of reduction, and therefore the larger the number of contestable customers to whom energy efficiency services can be offered, the more effective this mechanism will be.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Mandatory sourcing of energy efficiency promotes increased energy efficiency.

Is the mechanism indirectly supporting the above by some means?

The mechanism promotes the outcome directly.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Various examples of this mechanism are being, and have been, implemented in various jurisdictions.

What are key examples of the above?

European Union

The European Union directive on the internal energy market places obligations on electricity distribution businesses to carry out energy efficiency initiatives. However, implementation of this part of the directive is still at a very early stage.

Finland

The General Provisions of Chapter 1 of the Finnish *Electricity Market Act* include the following obligation to promote electricity efficiency:

> *Companies operating in the electricity market are responsible eg for providing their customers with services relating to the supply of electricity and for promoting electricity efficiency and conservation in their own business operations as well as those of their customers.*

However, this provision does not include a specific energy efficiency target.

United Kingdom

The electricity regulator for Great Britain, OFFER, set electricity saving targets for each public electricity supplier for the price control periods 1994-1998 and 1998-2000. The Standards of Performance for Energy Efficiency operate through conditions on the Public Electricity Supply Licence which covers both electricity distribution and retailing[15]. The Standards outline the energy efficiency targets required to be met, and describe the criteria to which energy savings projects must conform.

Funding for these activities is via a levy of £1 per customer per year on franchise customers. The energy efficiency schemes are targeted at a variety of end uses covering domestic and commercial franchise customers. The levy raised more than £100 million over four years, with expenditure on projects broadly in proportion to the mix of franchise customers (over 90% domestic, with the remainder being small businesses, institutions etc).

The Energy Saving Trust provides advice on development of the Standards, and evaluates project documentation before and after completion. If the project is endorsed, the recommendation for approval is sent to OFFER.

From April 2000, Standards of Performance will be set on both gas and electricity and will apply to all suppliers, not just Public Electricity Suppliers. The United Kingdom Government has announced that, once new legislation is passed, it will take the powers itself to set Energy Efficiency Standards of Performance.

A similar approach to that of OFFER has been used by the electricity regulator for Northern Ireland (OFREG).

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[15] Therefore, the Energy Efficiency Standards of Performance are also an example of mechanism *C2 Energy efficiency licence conditions for electricity businesses*, though they are probably better thought of as an example of this mechanism C1.

United States

There was extensive experience in the United States from the mid-1980s to the mid-1990s when variations of this mechanism were used in many States to set mandatory targets for energy efficiency (DSM) programs to be implemented by vertically integrated monopoly utilities. However, with the increasing move towards the introduction of competitive electricity markets in the United States, this mechanism have largely fallen into disuse in that country.

Where can further information on these existing mechanisms be found?

United Kingdom Standards of Performance: http://www.ofgas.gov.uk

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Energy efficiency companies and associations (including equipment manufacturers, energy management companies, and ESCOs) because it would create a relatively stable market environment for their products and services.

Who would initiate the development of this mechanism?

Government body responsible for energy policy and/or competition policy and economic reform.

Government body responsible for promoting energy efficiency and/or sustainable development.

Who would actually design and develop the mechanism?

All the parties involved.

Which parties are responsible for carrying out activities arising from this mechanism?

Retailers.

Which parties actually realise the DSM and energy efficiency outcomes?

Customers, ESCOs , and network businesses.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism promotes energy efficiency outcomes on its own but to be effective, and enjoy retailer support, the funding of the activities has to be addressed. Initially this could take the form of allowing the costs of sourcing energy efficiency to be passed through to non-contestable franchise customers as part of pricing regulation, progressing to the use of other funding mechanisms as competition deepens.

What are the basic institutional/market requirements?

For effective operation, this mechanism requires:

- a government body capable of developing appropriate mandatory requirements in relation to sourcing of energy efficiency;
- quantified energy efficiency targets as part of the requirements which will lead to significant reductions in electricity use but which are viable (and profitable) for electricity businesses to achieve;
- a system capable of effectively monitoring compliance and acceptable to those parties being monitored;
- an organisation capable of carrying out this monitoring;
- appropriate penalties for non-compliance.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

It is likely that development of this mechanism would involve government management of public consultation and submissions, workshops for interested stakeholders, economic and financial impact assessments, and examination of legislative options.

How are activities arising from this mechanism funded?

Where pricing regulation of retailers currently exists (ie the franchise market), the costs involved can be passed through to customers and this process can be designed to provide a ceiling for the amount of energy to be provided by a given energy efficiency option, at a set price for that option

As the retail franchise market is progressively opened to competition, progressive introduction of other funding mechanisms (the public benefits charge, tax exemptions and incentives, financing, subsidies and loans, and energy/CO_2 taxes) would be required.

6. IMPACTS ON ELECTRICITY BUSINESSES

This mechanism will require additional resources from the electricity businesses. Whereas the cost of purchases of energy efficiency may be able to be fully recouped, the retailers will require the administrative ability to manage matters which may be outside their core business interests.

Depending on the penalties imposed for non-compliance, failure to respond adequately to this mechanism could be inconsequential, embarrassing or financially crippling for the electricity business. Penalties must be carefully designed, and equitably imposed, to ensure that compliance actually occurs.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation will be required to mandate the sourcing of energy efficiency. It may also require retailers to meet set targets for purchasing energy efficiency. Alternatively, voluntary targets could be set accompanied by financial incentives.
- **Establishment of a governing body.** The governing body will: design the program; establish policy rules and principles governing the establishment of the mechanism; determine energy-efficiency targets (definition and size); monitor achievements; provide oversight of trading arrangements; and administer penalties where needed. The type of governing body will vary depending upon the specific institutional/governmental/political structure of each country. The governing body should be a neutral, independent entity. This could be a governmental or regulatory agency, a non-governmental organisation or a Board made up of stakeholder representatives. (Energy service providers should not be voting members of such a Board though they may advise on implementation details through either a separate committee or a non-voting representative to the Board.)
- **Establishment of funding mechanisms.** Funding will be required for the governing body. Funds may be sourced from: the government budget, cost recovery, public benefits charge or energy/CO_2 taxes. In addition, funding may be required for implementing the energy efficiency measures. However, if this mechanism is imposed equitably on all electricity businesses within a jurisdiction, the businesses can fund energy efficiency measures from their own resources without any of the businesses suffering from a competitive disadvantage.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Quantification is a major problem with this mechanism. With many DSM and energy efficiency programs it is difficult to quantify and verify the actual energy efficiency and DSM outcomes from the program. This makes it very difficult to determine whether the mandated energy efficiency target has actually been met.

Where retailers and/or purchasers have already implemented energy efficiency programs prior to the mandated energy efficiency target being set, there may be problems with quantifying the outcomes from these programs and determining how they should be accounted for in relation to the target.

This mechanism may act as a barrier to electricity businesses commencing trading within a particular jurisdiction, particularly if the new entrant has no experience of implementing DSM and energy efficiency programs.

Also, where customers are able to choose their electricity retailer, it may be difficult for a retailer to recover the cost of energy efficiency measures implemented by the retailer in a customer’s premises if that customer moves to another retailer soon after the measures are implemented.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from energy efficiency activities implemented by an electricity business may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The electricity business may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Monitoring of competition among energy service providers is required to make sure market power is distributed evenly. This could be done by industry self-regulation, or by oversight of the governing body.
- Energy-efficiency measures and services should be provided to all customer classes. If one customer class benefits to the detriment of others, then the governing body will need to redesign the program.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage industry participation.
- Reduced electricity sales (and income) and increased program costs might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated from energy services and financing.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

The administrative cost to government of monitoring of achievements, oversight of trading arrangements and administration of penalties may not be acceptable.

The mechanism may not have the flexibility to operate in transitional electricity industry structures depending on how retailers are allowed to recoup costs eg regulated cost pass through is likely eventually to become redundant, whereas funding via a levy may be transferable between changing structures.

Comprehensive examples of how this mechanism might work are not widely available.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None	★ ★ ★	High
Barriers addressed	Low number	★ ★ ★ ★	High number
Effects of restructuring on mechanism	Less useful	★ ★ ★ ★	More useful
Transferability	Low	★ ★ ★ ★	High
Flexibility	Low	★ ★	High
Potential for market transformation	Low	★ ★ ★	High
Cost effectiveness	Low	★ ★ ★ ★	High
Social and environmental impacts	High	★ ★ ★ ★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

The following publications refer to similar mechanisms developed for mandated sourcing of renewable energy rather than energy efficiency.

Renewables Target Working Group (1999) ‘Implementation Planning for Mandatory Targets for the Uptake of Renewable Energy in Power Supplies’, *Report to the Australian Greenhouse Energy Group*, Canberra, Australia.

Wilkenfeld et al (1994) ‘Renewable Energy Resources in Electricity Supply and Use in NSW: Policy, Structural and Pricing Issues’, *Report to the NSW Office of Energy and the NSW Government Pricing Tribunal*, Sydney, Australia.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: C2

Energy Efficiency Licence Conditions for Electricity Businesses

Mechanism Type: Control

Outline	This mechanism establishes a legal framework to require electricity businesses to consider and promote energy efficiency, as part of the conditions under which they are granted a licence to carry out their business.		
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects		
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X	No change
	Commercialisation/ Privatisation	↑	More useful and/or relevant
	Competition	↑↑	Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial		
Policy barriers addressed	3. 6, 10, 11, 13, 14		
Program barriers addressed	2, 7		
Who Promotes?	Government		
Who Initiates?	Government		
Who Develops?	Government		
Who Implements?	Government		
Who is Targeted?	Electricity market participants – generators, network businesses and retailers		
Funding	Government budget or public benefits charge		
Impacts on electricity businesses	Requires additional resources Loss of income through reduced electricity sales		
Previous experience	Australia – retailer licences in New South Wales Norway – licences for grid owners		

1. MECHANISM OUTLINE

This mechanism establishes a legal framework to require electricity businesses to consider and promote energy efficiency, as part of the conditions under which they are granted a licence to carry out their business.

1.1 General Description

What the mechanism means in general terms.

As the electricity industry moves towards a more commercial and competitive focus, governments exert less influence over the business activities of utilities, and legal and regulatory oversight must be used to maintain or implement public policy goals.

Privatisation of electricity businesses and the arrival of privately-owned new entrants into an industry originally dominated by government-owned businesses create requirements to:

- establish the rules for conducting business, by means of regulation;
- ensure that the market participants meet prudential standards;
- impose specific conditions on the activities of market participants, by means of licences.

In simple terms, a licence grants a legal right to carry on a specified activity. Licence regimes are created by government authorities through legislation, to allow corporations and individuals to undertake commercial and other activities. Licensing systems are typically used to enable government authorities to control the performance of the permitted activities and to raise revenue by charging fees for holding valid licences.

Government is able to exert control over the licensed party by imposing conditions on the licence. These conditions can relate to any facet of the activities being carried out under licence. Licence conditions imposed by government on electricity businesses naturally become more significant with movement into more competitive and commercial energy markets. Licence conditions offer one way of ensuring that market participants – such as grid operators, distributors and retailers – carry out DSM and energy efficiency activities.

Licence conditions for energy efficiency can have a number of advantages over other mechanisms that intervene in the market:

- government can decide the required level of DSM and energy efficiency activity;
- marginally attractive (or unattractive) market segments can be addressed. However, licence conditions imposed on electricity retailers do not apply to direct purchases of electricity from the wholesale market by large customers so this market segment is excluded;
- licence conditions can be imposed equally across all members of a participant category, hence not interfering with competition.

The optimal time for imposing licence conditions on any market participant is when the general structure and rules of the new market place are being created. It is theoretically possible to impose such conditions at any stage in the development of a competitive market, but imposing such conditions once the market has commenced is likely to be very difficult.

The licence to operate can include any number or type of conditions. For example, in relation to DSM and energy efficiency, licence conditions can require that the licence holder:

- achieve a set level of expenditure on DSM and energy efficiency activities;
- achieve a set level of energy savings with respect to its own activities;
- carry out specific DSM activities or programs for its customers;
- provide energy efficiency information to its customers, or to the general public;
- prepare plans to carry out its DSM activities;
- prepare regular reports to regulators about DSM and energy efficiency activities;
- obtain independent verification of the DSM and energy efficiency activities.

Where appropriate, obligations imposed through licence conditions can be made tradeable amongst the market participants.

A major issue with licence conditions is ensuring that they do, in practice, achieve DSM and energy efficiency objectives. Licence regimes can often be complex and legalistic, and it is important to ensure that the licence conditions are simple and as easy to comply with as possible. There no point in creating complex reporting or planning activities which require considerable administrative effort to complete but which do not result in the planned outcomes.

Regulators and government authorities can undertake a number of different activities to assist licence holders to understand and meet their obligations under their licences, particularly during the early days of a new system. They can use:

- guidelines which explain the licence condition requirements and how to comply;
- guidelines on how to monitor outcomes for reporting requirements;
- information seminars or training workshops.

Finally, licence conditions are only likely to achieve planned outcomes if they are supported by appropriate sanctions for non-compliance. The ultimate sanction is, of course, cancellation of the licence. Before that stage is reached it would be appropriate to consider financial penalties.

Issues to be considered in relation to this mechanism include:

- the appropriateness of licence conditions to the jurisdiction – are the market participants able to comply?;
- do the resources exist for creating, administering and (importantly) monitoring the compliance with the licences?;
- when should a licence regime be created? Optimal results will be achieved if a framework system is set in place in the early days of the market – ideally, a flexible scheme that can be reviewed and improved as lessons are learnt;
- are the costs imposed on market players to meet their licence obligations unfair in a competitive market?);
- is there scope for reviewing, improving or removing the licence conditions/licence regime?

Does this mechanism depend on or overlap with other mechanisms described?

For electricity retailers, energy efficiency licence conditions could overlap with mechanism *C1 Mandatory sourcing of energy efficiency*. Licence conditions may also overlap with mechanism *S2 Energy centres*.

Mechanisms aimed at making financial resources available to the electricity market participants for DSM and energy efficiency activities will be important. These include: *F1 Public benefits charge for energy efficiency; F2 Financing of energy efficiency by electricity businesses;* and *M2 Tax exemptions and incentives for energy efficiency*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

3. Split (misplaced) incentives to energy providers
6. Lack of awareness by policy makers (of EE opportunities)
10. Lack of adequate paradigm (for evaluating the value of EE)
11. Separation of energy policy process (from environment & social policy)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because energy efficiency licence conditions can be imposed irrespective of the electricity industry structure. However, unbundling would require different sets of licence conditions for each of the different types of electricity businesses, as compared with vertically integrated electricity businesses where only one set of licence conditions would be required.

This mechanism is more useful under commercialisation/privatisation and under competition it is much more useful because electricity businesses can use the requirement imposed by energy efficiency licence conditions to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Licence conditions could directly promote either or both of the above outcomes depending on government objectives.

Is the mechanism indirectly supporting the above by some means?

The mechanism directly promotes the above outcomes.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Licence conditions promoting energy efficiency are in place in a number of jurisdictions around the world, with varying degrees of success in promoting actual energy efficiency outcomes.

What are key examples of the above?

Australia

As part of the restructuring of the New South Wales electricity market in Australia, the State Government introduced licences for businesses involved in the retail supply and distribution of electricity within the state of NSW. One objective of these licences is to address environmental issues associated with electricity supply. With respect to DSM and energy efficiency:

- the retail supplier's licence requires development of 1, 3 and 5 year plans for DSM and energy efficiency; strategies for purchasing energy from sustainable sources; annual reports on these matters;
- the electricity distributor's licence requires investigation of demand management strategies as an alternative to any planned expansion of the distribution network.

Norway

Grid owners are required, as part of the area service licence requirements, to undertake DSM activities. They are encouraged – but not required – to set up energy centres to carry out the DSM work. The requirements include:

- giving information about energy efficiency and historical energy use;
- carrying out simple energy audits of houses and other buildings and instructing their owners about measures for more efficient use of energy;
- encouraging the use of energy and load budgets and standards for energy use in commercial buildings;
- guiding customers in monitoring and controlling energy and energy efficiency;
- establishing contact between industrial companies and relevant consultants.

To cover the costs related to these activities the grid owners are allowed to impose a small distribution charge on customer bills.

The regulator has established guidelines for this activity. However, these measures do not provide a strong incentive to save energy, and limited results are expected.

Where can further information on these existing mechanisms be found?

Licence conditions for retailers in New South Wales, Australia: http://www.doe.nsw.gov.au

License requirements for grid owners in Norway: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Licence conditions are likely to be promoted by government bodies that traditionally were responsible for controlling the electricity industry before restructuring.

Who would initiate the development of this mechanism?

Ideally, the licence conditions would be created early in the restructuring process and consequently a government review or inquiry body might carry out initial investigations into the possible content of the licence conditions.

A government authority or a government created statutory body would be the likely body for creating operating licences and associated operating conditions.

Who would actually design and develop the mechanism?

A government authority would be needed to design the appropriate legislation/regulations and to ensure that the legal instrument creating the licence condition proceeded through the normal government legal channels.

Which parties are responsible for carrying out activities arising from this mechanism?

Licence conditions would be administered by the government agency with the particular expertise in that area. Energy efficiency licence conditions may be administered by the energy industry regulator or the government department with responsibility for energy.

Which parties actually realise the DSM and energy efficiency outcomes?

Licence conditions would typically target key electricity market participants – generators, network businesses and retailers – to carry out the DSM and energy efficiency activities required under their licence conditions

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism establishes an energy efficiency framework on its own but to be effective, and engage the market participants, funding of activities needs to be addressed. An important factor is the availability of economic incentives through the regulatory regime to encourage network businesses to investigate and implement DSM and energy efficiency. Appropriate incentives will increase the effectiveness of the licence conditions.

What are the basic institutional/market requirements?

For effective operation, this mechanism requires:

- a government body capable of developing the licence conditions;

- quantified energy efficiency targets as part of the licence conditions which will lead to significant reductions in electricity use but which are viable (and profitable) for electricity businesses to achieve;
- a system capable of effectively monitoring compliance and acceptable to those parties being monitored;
- an organisation capable of carrying out this monitoring;
- appropriate penalties for non-compliance.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Typically a licensing regime is created and administered by an existing government authority, or a body that has been specifically created for the task. Funding would be required for the set up and operating costs of a government or statutory-based organisation.

How are activities arising from this mechanism funded?

The regulating authority would typically be funded through a government's annual budget process or possibly through a public benefits ('wires') charge or other general public benefits fund.

The responsibility for meeting licence conditions lies with licence holders. Consequently market participants such as distributors and retailers would pay for the costs related to the activities required under licence conditions. Typically they would do so out of their annual budget operations, or they may be permitted by the regulating authority to impose a small charge on customers to recover their costs.

6. IMPACTS ON ELECTRICITY BUSINESSES

The costs of complying with energy efficiency licence conditions are likely to be substantial for electricity businesses. This mechanism will require significant additional resources from electricity businesses. The businesses may have to invest in technologies to achieve customer energy efficiency outcomes, and will also lose income from their customers through reduced electricity sales. The retailers will require the administrative ability to manage matters which may be outside their core business interests. Some businesses may develop opportunities for new business to counteract their increased costs resulting from the implementation of the mechanism.

Depending on the penalties imposed for non-compliance, failure to respond adequately to this mechanism could be inconsequential, embarrassing or result in denied access to the market for the electricity business. Penalties must be carefully designed, and equitably imposed, to ensure that compliance actually occurs.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation will be needed to require electricity businesses to meet certain licensing conditions; non-compliance will result in sanctions, including the possibility of the cancellation of the licence.

- **Establishment of a governing body**. The governing body will: design and implement conditions governing the licence; establish energy efficiency targets for licensing conditions; monitor compliance; and administer penalties for non-compliance. The governing body may be either an independent body (see criteria in mechanism C1) or it could be made-up of energy service providers. There is a history in some countries of licensing boards made up of representatives of the group being licensed. However, care must be taken (through governmental oversight) to avoid conflicts of interest and competitive abuse if a self-governing board is used.
- **Establishment of funding mechanisms.** Funding will be required for the governing body. Funds may be sourced from: the government budget, cost recovery, public benefits charge or energy/CO_2 taxes. In addition, funding may be required for implementing the energy efficiency measures. However, if this mechanism is imposed equitably on all electricity businesses within a jurisdiction, the businesses can fund energy efficiency measures from their own resources without any of the businesses suffering from a competitive disadvantage.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Criticism can be directed at the use of a licensing regime on philosophical grounds, because the existence of government interference, in the form of legal conditions, may be seen as inappropriate in a competitive market place.

However, a counter argument is that restructuring of the electricity sector, in any jurisdiction, is typically undertaken through the reform of existing laws and any new structure will have to operate within a legal and administrative framework. Indeed, legal certainty is vital to the smooth operation of the electricity sector and provided the licence conditions are applied fairly, they do not necessarily have to interfere with market operations.

Existing licencing schemes have been criticised for containing no specific targets nor any penalties for non-compliance with the licence conditions.

This mechanism may act as a barrier to electricity businesses commencing trading within a particular jurisdiction, particularly if the new entrant has no experience of implementing DSM and energy efficiency programs.

Also, where customers are able to choose their electricity retailer, it may be difficult for a retailer to recover the cost of energy efficiency measures implemented by the retailer in a customer's premises if that customer moves to another retailer soon after the measures are implemented.

Finally, the nature of businesses undertaking retailing of electricity in the future could be very different from the utility-type businesses which are common at present. It may be difficult to impose energy efficiency licence conditions on some types of retail businesses in the future, such as brokers who simply act as agents between wholesalers of electricity and retail purchasers.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from energy efficiency activities implemented by an electricity business may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The electricity business may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).
- The licensing conditions cannot be too onerous (eg energy efficiency targets set too high), so that competition among energy suppliers is reduced to only a few electricity businesses that have the resources for complying with the licensing conditions. Similarly, penalties for non-compliance can only be issued after a clear record of non-compliance has been determined.

9.3 Industry and Consumer Issues

- The ESCO industry will clearly benefit from this mechanism.
- Monitoring of compliance among electricity businesses is needed to make sure that the licensing conditions are of substantive value, rather than symbolic value. Since licences have real economic value, oversight by a governing body is critical and non-compliance must be penalised.
- The licensing conditions should ensure that energy-efficiency measures and services are provided to all customer classes. If one customer class benefits to the detriment of others, then the governing body will need to redesign the program (eg either revise existing licenses, or issue new licenses that address this situation).
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage industry participation.
- Reduced electricity sales (and income) and increased program costs might affect the commercial viability of electricity businesses. However, the loss of revenue may be offset by the returns generated from energy services and financing.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

This mechanism will be difficult to implement in a political framework that does not favour licence regimes, but rather relies on a more cooperative approach with industry.

The mechanism would be difficult to transfer between jurisdictions because of differing legal frameworks.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★
Barriers addressed	Low number … High number ★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★ ★
Transferability	Low … High ★ ★
Flexibility	Low … High ★ ★
Potential for market transformation	Low … High ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: C3

Integrated Resource Planning

Mechanism Type: Control

Outline	Integrated Resource Planning (IRP) is a planning methodology that seeks the least cost option for meeting customers' energy service needs. In determining the least cost option, IRP evaluates all supply- and demand-side options over a forecast period from a societal perspective. IRP implies significant regulatory oversight which can be applied by a number of means.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	↓↓ Much less useful and/or relevant
	Commercialisation/ Privatisation	↓ Less useful and/or relevant
	Competition	↓ Less useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 6, 10, 11, 12, 13, 14	
Program barriers addressed	2	
Who Promotes?	Government, environmental and community groups	
Who Initiates?	Government, electricity businesses	
Who Develops?	Government, electricity businesses	
Who Implements?	Electricity businesses	
Who is Targeted?	Electricity businesses, ESCOs	
Funding	Internal resources of government and electricity businesses	
Impacts on electricity businesses	Reduced risk of over-investing in supply-side resources Significant resources required for implementation Over the long term, loss of income through reduced electricity sales	
Previous experience	Denmark – National IRP Plan United States – regulatory-driven IRP	

1. MECHANISM OUTLINE

Integrated Resource Planning (IRP) is a planning methodology that seeks the least cost option for meeting customers' energy service needs. In determining the least cost option, IRP evaluates all supply- and demand-side options over a forecast period from a societal perspective. IRP implies significant regulatory oversight which can be applied by a number of means.

1.1 General Description

What the mechanism means in general terms.

The introduction of a disaggregated, competitive electricity supply industry will affect the appropriateness of various planning models currently used. One such approach that has been significant in promoting energy efficiency and DSM in a number of countries is Integrated Resource Planning (IRP).

In its broadest context IRP includes all energy forms and the whole national energy market. IRP can also be implemented for the electricity industry, or at an individual utility level. A key feature is the regulatory oversight of the process.

IRP can take a variety of forms. At one extreme, government may exert significant control over the process. This may involve establishment of an independent energy planning body with responsibilities including:

- development of IRP procedures, including costing of environmental externalities;
- oversight of public consultation and review of plans;
- amendment of plans;
- setting and reviewing utility performance criteria identified in the plans;
- reviewing and approving major capital investment decisions.

At the other extreme, the utility may simply be required by government to periodically publish a report on its strategic planning process, and seek public comments.

IRP may be initiated in two main ways:

- by governments applying IRP across one or more major industry sectors – this could be termed **"mandatory IRP";**
- by individual electricity businesses, applying IRP only within that particular business – this could be termed **"business-related IRP".**

Whatever the form of the IRP, the following elements are common:

- it is a continuing and iterative process, ideally involving planning, implementation and evaluation;
- it is an attempt to balance long and short-term goals, and to meet multiple goals;
- all resource options are compared in the one forum, and a portfolio approach is promoted;
- public discussion and debate are involved.

Typically mandatory IRP is implemented within a vertically-integrated electricity industry with some oversight by government to ensure that community interests are taken into account.

Integrated resource plans are usually formulated when considering major new investments in generation or transmission capacity, and typically canvas a range of demand- and supply-side options.

A less vertically-integrated industry, together with a reduced role for government in the generation and retail sectors, will reduce the opportunities for mandatory IRP to consider supply-side and demand-side options equally to meet customers' needs. In fact, mandatory IRP works best in an electricity industry composed of vertically integrated monopoly electricity businesses.

In an industry structure where the functions of the electricity industry have been unbundled into separate businesses, both mandatory and business-related IRP can still be undertaken in the natural monopoly elements of the industry, ie the transmission and distribution network sectors. The application of mandatory IRP at the transmission and distribution level of the industry (and the consideration of demand-side options in particular) may act to redress reliance on supply-side solutions. Electricity businesses interested in sourcing new supply options will be required to demonstrate the supply-side project's merit relative to demand-side options.

The role IRP plays in a separate generation sector is likely to be limited to providing information (or guidelines), as the overriding concern of generation businesses will be to participate in the electricity market by providing competitive prices. In competitive generation sectors, tradeable emission permits or fuel tax schemes could be used to achieve similar policy outcomes to IRP.

Separate retail businesses will not be concerned with the development of major electricity assets, only with supplying electricity to customers, and therefore it will not be possible to apply IRP to a competitive retail sector.

Does this mechanism depend on or overlap with other mechanisms described?

Mandatory IRP provides a formal mechanism for introducing government energy policy initiatives into the electricity market and for incorporating public review into the process. The mechanism will be complemented by mechanisms *M4 Communicating pricing and other information for energy efficiency;* and *M10 Competitive sourcing of demand-side resources*.

Electricity businesses would benefit, in particular, from the external support that may be provided by *S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; S5 Promotion of energy efficiency by industry associations.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
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

Program Barriers

2. Lack of information to end users

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Mandatory integrated resource planning is much less useful under unbundling because of the difficulty of unbundled electricity businesses carrying out integrated planning. Mandatory IRP is also less useful under commercialisation/privatisation and competition because electricity businesses would be focussed on delivering profits through electricity sales and IRP would be seen as a distraction. However, elements of business-related IRP could be applied internally by electricity businesses under any electricity industry structure,

How is the mechanism placed to deal with the transition between electricity industry structures?

As the industry becomes less vertically-integrated and/or the role of government is reduced in the competitive generation and retail sectors, the opportunities to consider supply-side and demand-side options equally to meet customers' needs through an IRP approach will be significantly diminished. The effectiveness of mandatory IRP is therefore likely to decline but the effectiveness of business-related IRP should remain the same.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Integrated resource plans are usually formulated when considering major new investments in generation or transmission capacity, and typically canvas a range of demand- and supply-side options. Load shifting with some increases in energy efficiency are likely to result if the plan is implemented successfully.

Is the mechanism indirectly supporting the above by some means?

The direct outcome is the planning process; the above outcomes will result after further action by other parties.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes, IRP is a well established mechanism in a number of jurisdictions with a vertically integrated electricity industry structure.

What are key examples of the above?

Denmark

In Denmark, the Government introduced an amendment to the Electricity Supply Act in 1994 to incorporate IRP into the electricity sector. According to this legislation, the utilities are obliged to carry out planning of the whole electricity system, including production, transmission, distribution and consumption. The planning process is documented every two years. The IRP assesses how best to achieve objectives set for the electricity sector in relation to security of supply, environment, socio-economic factors and price of electricity.

United States

Large scale IRP has been extensively implemented in the US – ranging from cooperation between state regulators and utilities across electrically interconnected states, and planning involving all major fuel resources in single states. However, with the introduction of competition into the electricity industry in many States, the importance of IRP as a planning methodology is declining.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Governments would promote this mechanism where there was a strong interest in ensuring that least cost (including environmental cost) energy resources are used. The mechanism would also be promoted by environmental and community interest groups who consider that utility planning must be appropriately controlled in order to achieve the desired societal outcomes.

Who would initiate the development of this mechanism?

The requirement for mandatory IRP is likely to be initiated by government bodies responsible for controlling the electricity industry. Business-related IRP would be initiated within each electricity business.

Who would actually design and develop the mechanism?

With mandatory IRP, the government body with responsibility for electricity supply, or the electricity industry regulator would design the IRP principles and each electricity business would design and develop appropriate planning processes within those principles. With business-related IRP, all this activity would the place within the electricity business.

Which parties are responsible for carrying out activities arising from this mechanism?

Planning staff within the electricity business, with considerable government oversight in the case of mandatory IRP.

Which parties actually realise the DSM and energy efficiency outcomes?

The electricity business itself through its customers, and ESCOs responding to competitive sourcing of demand-side resources by the electricity business resulting from the implementation of IRP.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

As a strategic planning tool, mandatory IRP could stand alone. Its success depends only on the ability of government to exert control over the electricity industry. Actually achieving energy efficiency outcomes in the near term may require other control mechanisms to be applied.

Business-related IRP is also a strategic planning tool, developed and implemented within each electricity business. Its success will depend on the degree of commitment to its implementation by senior management. As with mandatory IRP, achieving energy efficiency outcomes in the near term will require the development and effective implementation of energy efficiency programs and/or the effective acquisition of demand-side resources as a result of the IRP planning process.

What are the basic institutional/market requirements?

The basic requirements for mandatory IRP are the ability by the government to effectively exert control over the electricity businesses, and the ability to evaluate the different options available for particular situations.

For business-related IRP, the basic requirements are strong commitment to the IRP planning process by senior management and the ability of the business to design, develop and implement effective energy efficiency programs and/or programs to effectively acquire demand-side resources.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal resources of the government regulatory body and the electricity businesses.

How are activities arising from this mechanism funded?

Typically, for mandatory IRP, the government would fund the costs associated with the administration of the relevant legislation. Such funding would not be required for business-related IRP.

For both mandatory and business-related IRP, the electricity business would fund the costs associated with preparing and making public plans developed using the IRP methodology. Alternatively, some aspects of mandatory IRP could be viewed as a community service obligation which should be clearly costed and funded by government.

The electricity business would also fund the energy efficiency and DSM activities that are identified as an outcome of the IRP planning process.

6. IMPACTS ON ELECTRICITY BUSINESSES

IRP can provide benefits to electricity businesses by reducing the risk of over-investment in supply side resources. In the near term, the costs to electricity businesses are likely to be minimal with respect to reduced sales to customers, but significant resources would be required to implement the IRP planning process. In the longer term reduced electricity sales are likely to result from the implementation of outcomes identified during the IRP planning process. These may be significant depending on the type of revenue regulation in place.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements**. Legislation will be required to establish mandatory IRP only.
- **Commitment by electricity business senior management.** This is required for business-related IRP.
- **Establishment of a regulatory body**. This is required for mandatory IRP if a suitable regulatory body does not already exist. The regulatory body will: develop IRP procedures; provide oversight and review of plans; develop and review utility performance criteria (eg targets and incentives); review and approve major capital investment decisions and utility IRP plans; monitor compliance; and administer penalties for non-compliance.
- **Establishment of a funding mechanism.** A funding mechanism is required to establish (if necessary) and operate the regulatory body. In this case, the funding source is most likely to be a government budget item. Funds for business-related IRP can be recovered from increasing electricity prices (cost recovery) or can come from a public benefits charge.
- **Requirement to collect data**. In a competitive market where non-regulated energy suppliers and energy service companies are participating, a mechanism will be needed to require all parties to collect data, including customer and market data and submit this to a central body for storage and analysis.
- **Evaluation of integrated resource plans.** Periodic evaluations of these plans will be required (including the development of performance indicators) to ensure that integrated resource planning is being conducted efficiently and effectively.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.
- **Promotion of energy services.** This will be required to ensure that there is sufficient public awareness about energy services, and enough energy services providers available to enable the implementation of integrated resource plans.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

IRP for transmission network owners is not always possible in areas where the transmission network is highly meshed and there is substantial wheeling of power between interconnected transmission systems owned by different businesses, as in parts of Europe.

Planning mechanisms can have minimal short- to mid-term impacts on energy efficiency if considerable overcapacity exists in the system.

The regulatory oversight required to ensure adequate planning under mandatory IRP may be costly and cumbersome.

The planning process will be based on long-term forecasts of customer demand, which may not be achievable in anticipation of disaggregation. In jurisdictions with competitive electricity markets, reduced cooperation between market participants with regard to operational, market and strategic issues will hamper attempts at IRP.

The approach to IRP will need to be consistent amongst all participants in a state, national or multi-national market.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- The ESCO industry will clearly benefit from this mechanism.
- The development of IRP plans is not sufficient; the design, implementation, and evaluation of specific energy efficiency programs will need to be conducted to make sure progress in promoting energy efficiency is made.
- All customer classes should be able to participate in the IRP process. If one customer class benefits to the detriment of others, then the regulatory body will need to redesign the IRP process to encourage participation from parties that were excluded or neglected.
- The implementation of this mechanism relies on regulatory direction and oversight; while electricity businesses should be encouraged to conduct IRP on their own (“business-related IRP”), regulatory monitoring will still be needed, and utilities and customers will be expected to expend resources participating in the IRP process.
- Reduced electricity sales (and income) and increased program costs might affect the competitive positions of electricity businesses. However, the loss of revenue may be offset by the returns generated from energy services and financing if these are provided directly by electricity businesses.
- Long-term forecasting of customer demand and energy supply is increasingly becoming more difficult. IRP plans may have to have shorter planning horizons (eg 5 years instead of 20) in order to be credible.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

There are a number of difficulties in attempting to evaluate IRP as a mechanism for promoting energy efficiency and DSM:

- the administrative cost to government (and society) may be difficult to quantify;
- consequently, it would also be difficult to qualify how efficiently public resources are used;
- the link between expenditure and outcomes will be difficult to establish;
- IRP will not transform the market to better encourage energy efficiency, particularly within an acceptable time-frame;
- large scale IRP is not consistent with transitional electricity industry structures.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None	★ ★ ★	High
Barriers addressed	Low number	★ ★ ★	High number
Effects of restructuring on mechanism	Less useful	★	More useful
Transferability	Low	★ ★ ★ ★	High
Flexibility	Low	★ ★ ★	High
Potential for market transformation	Low	★ ★ ★	High
Cost effectiveness	Low	★ ★ ★ ★	High
Social and environmental impacts	High	★ ★ ★ ★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: C4

DSM and Energy Efficiency as Alternatives to Network Expansion

Mechanism Type: Control

Outline	This mechanism comprises the development and implementation of regulation which requires network operators to investigate whether demand-side alternatives to network augmentations are more cost-effective than the 'build' option. This regulation can also require network operators to make network planning processes open to public scrutiny and involvement by stakeholders.
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑ More useful and/or relevant
	Commercialisation/ Privatisation ↑ More useful and/or relevant
	Competition ↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial
Policy barriers addressed	1, 2, 6, 7, 10, 11, 12, 13
Program barriers addressed	2, 7
Who Promotes?	Government
Who Initiates?	Government - network regulator
Who Develops?	Government
Who Implements?	Network businesses
Who is Targeted?	Electricity retailers, ESCOs
Funding	Internal resources of government regulatory body
Impacts on electricity businesses	Reduced risk of over-investing in capacity Significant resources required for implementation Over the long term, loss of income through reduced electricity sales
Previous experience	Australia – network licences in New South Wales Canada – local integrated resource planning Norway – DSM by network businesses

1. MECHANISM OUTLINE

This mechanism comprises the development and implementation of regulation which requires network operators to investigate whether demand-side alternatives to network augmentations are more cost-effective than the 'build' option. This regulation can also require network operators to make network planning processes open to public scrutiny and involvement by stakeholders.

1.1 General Description

What the mechanism means in general terms.

This mechanism is effectively the implementation of an Integrated Resource Planning (IRP) approach to the monopoly elements of the electricity industry, ie the transmission and distribution network sectors.

In traditional, vertically-integrated electricity utilities, network planning is carried out as part of the broader, centralised planning process both within individual network operators and at the level of the industry as a whole. With the unbundling of electricity businesses, the responsibility for network planning often passes to individual network operators.

This provides an opportunity for the network regulator to require the network operator to publish, say every 12 months, a *Statement of Opportunities for Network Augmentation*. This Statement could:

- provide a general description of the network operated by the business;
- identify the geographical location and nature of constraints which are currently being experienced in the network or which are expected to develop within the next 10 years from the date of publication of the Statement;
- forecast the load growth expected over the next 10 years:
  - in the network generally; and
  - at each location where a current constraint has been identified or where a constraint is expected to develop within the next 10 years;
- describe the general characteristics of the load profile in each location where a current constraint has been identified, including the major end-uses and customer classes;
- identify the major contributors to peak load in each location, including the major end-uses and customer classes;
- identify the major network augmentations which the business expects will be required over the next ten years, together with estimates of the date by which the business estimates each augmentation will be required to be in service;
- invite submissions from interested stakeholders which may comprise either:
  - comments on the contents of the Statement; or
  - expressions of interest in providing goods or services to the electricity business in relation to the network augmentations identified in the Statement, or alternative augmentations proposed by the stakeholder.

This invitation should include a specific invitation to stakeholders to submit expressions of interest for DSM programs as alternatives to network augmentations.

The mechanism is particularly applicable at the distribution level of the industry where the scale of developments (line extensions, substations) is more closely aligned with achievable DSM and energy efficiency outcomes. The planning and decision making process for network augmentation in a relatively small geographical area can be referred to as Local Integrated Resource Planning, and by its nature will focus on alternatives such as clearly targeted local demand-side options and distributed generation. This will bring the distributor into much closer contact with the end-use customers (who may now only deal with a retail supplier) and create opportunities for new (unregulated) business.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism establishes a regulatory framework for encouraging energy efficiency by targeting distributors and the way they plan augmentation of the network. It should operate in conjunction with mechanism *C5 Revenue regulation* (specifically capping network revenue).

The mechanism will be complemented by: *M10 Competitive sourcing of demand-side resources;* and *M4 Communicating pricing and other information for energy efficiency*.

The distributors will benefit, in particular, from the external support that may be provided by the following mechanisms: *S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry;* and *S5 Promotion of energy efficiency by industry associations.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

1. Excess capacity
2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
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)

Program Barriers

2. Lack of information to end users
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful under unbundling and commercialisation/privatisation and much more useful under competition. An unbundled electricity network business will be focussed on finding cost savings wherever it can and may well be guided by this mechanism into investigating energy efficiency and DSM programs. The establishment of the competitive electricity market provides customers with clearer signals about the variation of electricity prices over time. As customers become more familiar with the operation of the market, it is expected that some customers will identify opportunities to lower their costs through reducing their loads at times of high electricity prices. This provides opportunities for third parties (eg ESCOs) to develop programs which encourage end-users to carry out DSM activities, thereby guaranteeing the achievement of load reductions for the network operator.

How is the mechanism placed to deal with the transition between electricity industry structures?

The main transition issue of interest for this mechanism is the unbundling of network and retail supply functions as planning will now be carried out without direct access to customer information. In implementing the mechanism in unbundled structures, methods will have to be developed to gain access to this data or to carry out network planning without access to customer information if access is denied.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The mechanism is likely to result in load shifting with some increases in energy efficiency.

Is the mechanism indirectly supporting the above by some means?

The direct outcome is changes in the network planning process, specifically the consideration of demand-side options as realistic alternatives to the 'build' option. The above outcomes will result after further action by other parties.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

There are many examples of integrated resource planning applied to the industry in general, and to individual vertically-integrated utilities. Fewer examples exist of planning oversight at the distribution level.

What are key examples of the above?

Australia

In the State of New South Wales, Australia, the distribution businesses are required by legislation to investigate demand-side options before carrying out any network augmentations. The first major application of this requirement is in relation to a planned major augmentation of electricity supply to the Sydney Central Business District. A planning study was commissioned jointly by the transmission and distribution network operators. The study identified a range of demand-side and supply-side options, including several options which involved various combinations of supply-side and demand-side solutions. The study was then published for public comment. At the time of writing, possible outcomes are still being reviewed by the network operators.

Canada

Ontario Hydro uses Local Integrated Resource Planning (LIRP) as the methodology of choice for planning facilities and strategies for meeting customer or area supply needs. LIRP is defined as a planning and decision making process which considers, evaluates and compares all viable demand- and supply-side options in an unbiased manner to meet the electrical service needs of customers in a defined area. Options considered can be categorised as transmission and distribution, DSM, local generation and purchase, and operating/risk taking solutions. The major challenges of LIRP are developing least cost plans from a diverse option mix with different characteristics, and comparing and evaluating the financial, technical and environmental characteristics of the plans.

Objectives of the LIRP studies include:

- provide customised solutions to customer needs by using the typical local area demand profile;
- accurately identify the key elements of the problem;
- compare costs of options, including externalities, on a common basis;
- consider the value of small capacity options in managing risks and uncertainties.

Outcomes for Ontario Hydro have included a greater reliance on end-use load forecasts, closer relationships with customers, a better appreciation of the costs and benefits of investments, and better outcomes as a result of competition between suppliers to Ontario Hydro.

Norway

In Norway, the network businesses are natural monopolies which are exposed to a form of revenue regulation in which the revenues of the businesses can be increased by only a portion of their investments in new network capacity.

This has lead to an increase in interest by the network businesses to investigate DSM and energy efficiency as alternatives to network expansion. Cooperation between the network businesses and regional energy efficiency centres has developed in which the centres are designing DSM and energy efficiency programs for specific regions and areas within the territories of network businesses.

Where can further information on these existing mechanisms be found?

Study of major augmentation of electricity supply to the Sydney Central Business District, Australia: http://www.energy.com.au/cbdreport/main.pdf

DSM by network businesses in Norway: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Depending on the scale of the network, different levels of government would be interested in having oversight of the planning process for different reasons. National governments would be keen to ensure that the benefits of electricity market reforms were not lost through poor investment decisions in the networks. Regional governments are likely to want to retain some control over the industry and probably are responsible for implementing regulation. Local governments may own or have owned these businesses, or may be active in local energy management.

Who would initiate the development of this mechanism?

The network regulator, or other government body charged with promoting economic efficiency in network operations.

Who would actually design and develop the mechanism?

Government regulators can create the mechanism by making, or amending existing, regulations requiring network operators to prepare regular *Statements of Opportunities*, or similar public documents.

Which parties are responsible for carrying out activities arising from this mechanism?

Network business staff would identify needs, develop and screen options, and formulate and evaluate plans. Community groups and individuals may wish to contribute to decision making by a network business on the strategy for network augmentation, and may wish to comment on the *Statement of Opportunities*.

Which parties actually realise the DSM and energy efficiency outcomes?

By requiring network businesses to produce a *Statement of Opportunities*, the mechanism encourages the involvement of stakeholders in the wider market place.

Stakeholders may be interested in network augmentation in relation to 'build' strategies, DSM strategies, or both. There are two main groups of stakeholders who may have an interest in developing (and implementing) DSM programs:

- electricity retailers;
- energy service companies (ESCOs) who specialise in advising customers on reducing their costs through increased energy efficiency and other demand management measures.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism should be considered in conjunction with revenue regulation to promote economically efficient planning, but to achieve energy efficiency outcomes other targeted mechanisms will be required. An important factor is the availability of economic incentives through the regulatory regime to encourage network businesses to investigate and implement DSM and energy efficiency as alternatives to network expansion. Appropriate incentives will increase the effectiveness of this mechanism.

What are the basic institutional/market requirements?

The basic requirements are the ability to effectively regulate at the level of the distribution business, and the ability to evaluate the different options available for particular environments.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal resources of the government regulatory body.

How are activities arising from this mechanism funded?

Typically, the government would fund the costs associated with the administration of the relevant legislation.

The network operators would fund the costs associated with preparing and making public, the *Statement of Opportunities* or similar public document. The adoption of IRP in network planning could be viewed as a means of moving towards more cost-reflective price signals (ie correcting a market distortion). Alternatively, the implementation of some aspects of IRP could be viewed as a community service obligation which should be clearly costed and funded by government.

The network operators would also fund the DSM activities where these were shown to be more cost effective than network augmentation.

6. IMPACTS ON ELECTRICITY BUSINESSES

The mechanism can provide benefits to network businesses by reducing the risk of over-investment in capacity. In the near term, the costs to network businesses are likely to be minimal with respect to reduced sales, but significant resources would be required to adequately investigate alternatives to network augmentation. In the longer term reduced electricity sales may result, which may be significant depending on the type of revenue regulation in place.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation will be needed to require network operators to investigate whether demand-side alternatives to network augmentations are more cost-effective than the ‘build’ option. This legislation may also require network operators to make network planning processes open to public scrutiny and involvement by stakeholders.
- **Establishment of a regulatory body**. This is required to take the initiative to conduct local integrated resource planning if a suitable regulatory body does not already exist.
- **Establishment of a funding mechanism.** A funding mechanism is required to establish (if necessary) and operate the regulatory body. Funding may be sourced from: the local, regional or national government budget, cost recovery, a public benefits charge, or energy/CO_2 taxes.
- **Requirement to collect data**. In a competitive market where non-regulated energy suppliers and energy service companies are participating, a mechanism will be needed to require all parties to collect data, including customer and market data and submit this to a central body for storage and analysis.
- **Evaluation of local integrated resource plans.** Periodic evaluations of these plans will be required (including the development of performance indicators) to ensure that local integrated resource planning is being conducted efficiently and effectively.

- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.
- **Promotion of energy services.** This will be required to ensure that there is sufficient public awareness about energy services, and enough energy services providers available to enable the implementation of local integrated resource plans.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

To implement this mechanism, network businesses would require access to customer-specific retail sales data, and marketing and sales resources. A stand-alone network business may not have core competencies in this area and may be reliant on retailers being willing to cooperate and provide access to retail sales data.

Implementation of this mechanism by a network business may lead to the network business encouraging customers to be efficient in their use of electricity while retailers continue to promote increased electricity use. The result could be very confusing for the customer.

The regulatory oversight required to ensure adequate planning could be costly and cumbersome.

The planning process will be based on long-term forecasts of customer demand, which may not be realistic.

There are significant uncertainties in forecasting, measuring and verifying the actual results of DSM and energy efficiency programs and network businesses may be reluctant to rely on such programs as compared with the certain outcomes of network expansion

It may be difficult to implement this mechanism in areas where the transmission network is highly meshed and there is substantial wheeling of power between interconnected transmission systems owned by different businesses, as in parts of Europe.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from energy efficiency activities implemented by an electricity business may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The electricity business may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- The ESCO industry will clearly benefit from this mechanism.
- The development of a "*Statement of Opportunities for Network Augmentation*" is not sufficient; the design, implementation, and evaluation of specific energy efficiency programs will need to be conducted to make sure progress in promoting energy efficiency is made and networks are not overloaded or constrained.
- All customer classes should be able to participate in the local integrated resource planning process. If one customer class benefits to the detriment of others, then the regulatory body will need to redesign the process to encourage participation from parties that were excluded or neglected.
- The implementation of this mechanism relies on regulatory direction and oversight; while electricity businesses should be encouraged to conduct local integrated resource planning on their own regulatory monitoring will still be needed, and utilities and customers will be expected to expend resources participating in the planning process.
- Reduced revenue from network services and increased program costs might affect the competitive positions of network operators. However, the loss of revenue may be offset by the returns generated from energy services and financing if these are provided directly by the network operator.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

It will be difficult to quantify energy efficiency and DSM outcomes with respect to expenditure on this mechanism.

This mechanism will not transform the market to better encourage energy efficiency, particularly within an acceptable time frame.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None — High ★
Barriers addressed	Low number — High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful — More useful ★ ★ ★ ★
Transferability	Low — High ★ ★ ★ ★
Flexibility	Low — High ★ ★ ★

Potential for market transformation	Low High ★ ★
Cost effectiveness	Low High ★ ★ ★
Social and environmental impacts	High Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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Kahn E and Goldman C (1991) *The Role of Competitive Forces in Integrated Resource Planning*, Lawrence Berkeley Laboratory, Berkeley, CA, USA.

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: C5

Revenue Regulation

Mechanism Type: Control

Outline	Under revenue regulation, the total 'allowable' revenue of an electricity business is set each year at a particular dollar figure. Within this revenue cap, the business is free to set the structure and levels of retail prices in any way it chooses. Any over- or under-collection of revenue in one year is corrected in determining the 'allowable' revenue for the following year. This mechanism is applicable only to monopoly electricity businesses.		
Outcomes	☐ Load shifting ☐ Energy efficiency ☐ Direct effects ☑ Indirect effects		
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	↑	More useful and/or relevant
	Commercialisation/ Privatisation	X	No change
	Competition	X	No change
Addressed Customers	☐ Residential ☐ Commercial and small industrial ☐ Large industrial		
Policy barriers addressed	1, 3, 14		
Program barriers addressed	Nil		
Who Promotes?	Government		
Who Initiates?	Government – electricity industry regulator		
Who Develops?	Government – electricity industry regulator		
Who Implements?	Staff of electricity businesses		
Who is Targeted?	Electricity businesses, ESCOs		
Funding	Government budget funding for regulator; cost recovery for gross margin revenue regulation		
Impacts on electricity businesses	No loss of revenue caused by reduced sales resulting from increased energy efficiency		
Previous experience	Australia – network businesses in New South Wales Great Britain – retailers and distribution businesses United States – vertically integrated utilities		

1. MECHANISM OUTLINE

1.1 General Description

Under revenue regulation, the total ‘allowable’ revenue of an electricity business is set each year at a particular dollar figure. Within this revenue cap, the business is free to set the structure and levels of retail prices in any way it chooses. Any over- or under-collection of revenue in one year is corrected in determining the ‘allowable’ revenue for the following year. This mechanism is applicable only to monopoly electricity businesses.

What the mechanism means in general terms.

The revenue regulation mechanism is applicable only to monopoly electricity businesses. Therefore, in competitive electricity markets, the mechanism applies only to the monopoly elements of the electricity industry – the transmission and distribution network businesses. Where retail franchises still exist, this mechanism can also be applied to that part of the retail business which supplies retail franchise customers.

Revenue regulation can be used to ‘decouple’ revenue from sales volume, though this is not necessarily a result of this type of regulation.

Under revenue regulation, the total ‘allowable’ revenue of an electricity business is set each year at a particular dollar figure calculated according to an established formula. The formula used for calculating the allowable revenue can be set to achieve various percentages of decoupling from 0% to 100%. With 100% decoupling, the retail supplier becomes indifferent to sales volume, with increased sales above the forecast volume resulting in no additional revenue to the utility.

Revenue regulation with decoupling is usually used to overcome the financial disadvantage faced by those electricity businesses which promote energy efficiency. Without decoupling, these businesses are disadvantaged through the revenue they forego.

Revenue regulation is an alternative to price capping in regulating prices. Under price cap regulation every additional kilowatt-hour sold or transported through the network means more revenue. This is a disincentive to promoting energy efficiency which results in a reduction in the number of kilowatt-hours sold or transported.

Under revenue regulation, the allowable price level varies inversely with the sales volume – the higher the sales volume, the lower average prices must be to meet the revenue target and vice versa. This reduces the incentive to maximise sales.

Even where energy efficiency investments are clearly cost-effective for the electricity industry, the organisational structures of electricity businesses are largely geared toward supply-side investments as a result of needing to meet rapidly growing demand. Revenue regulation encourages “cultural” change within electricity businesses by breaking the link between volume of sales and profit.

There are different options available for implementing revenue regulation. For example, revenue regulation could be applied to an electricity business in relation to its:

- total annual revenue; or
- gross margin (ie revenue minus expenses).

There are different implications for energy efficiency in each approach.

Under total revenue regulation, if less electricity than expected is sold or transported by an electricity business, the business will be allowed to retain the money that would otherwise have been spent on purchasing wholesale electricity or on augmenting the network. This will ensure that the business has an incentive to purchase energy savings wherever they are cheaper than wholesale electricity purchase or network augmentation.

Under total revenue regulation, an electricity business will have a commercial incentive to minimise costs per unit of electricity saved in energy efficiency program in a similar manner to any other business cost. There will be no need to provide for the business to recover the costs of energy efficiency programs. Further, there will be little need to monitor and review the business's energy efficiency programs, as it should invest only in commercially attractive energy efficiency activities.

Under gross margin regulation, an electricity business is indifferent between buying more or less wholesale electricity or augmenting the network, as compared with promoting energy efficiency. Under gross margin regulation, there will be little incentive for an electricity business to encourage customers to use electricity efficiently. The costs of each alternative will be passed through to the customer.

Under gross margin regulation, a method is required to set the costs of economic energy efficiency programs which the electricity business is allowed to recover. Possible methods include: benchmarking of energy efficiency costs; allowing recovery of an agreed value for energy savings; and actively vetting expenditure on energy efficiency to ensure that businesses undertake only cost-effective programs.

The basic requirements to enable the implementation of revenue regulation are the ability to effectively regulate prices at the level where revenue regulation is to be applied. In competitive electricity markets, this means that revenue regulation can be applied only to the monopoly businesses – the retail franchise and network businesses. However, in restructured electricity industries, the moves toward unbundling of retail supply and network functions and the disappearance of the retail franchise market make it more effective to develop this mechanism for the network functions alone.

Many issues need to be resolved regarding the implementation of revenue regulation including:

- the impact on energy efficiency of the various regulatory options such as total revenue cap, margin cap, cap per customer, cap per customer class or extent of decoupling;
- whether cost pass-through or allowable rates of return for DSM investments will be allowed;
- if retail franchise markets are included, to what degree will cross subsidisation between and within market segments by non-participants in energy efficiency programs be tolerated?

Does this mechanism depend on or overlap with other mechanisms described?

If revenue regulation stimulates interest among network operators and retailers in providing energy efficiency services to customers and this provides a commercial benefit the revenue regulation mechanism may be complemented by mechanism *M10 Competitive sourcing of demand-side resources*.

Network operators and retailers with franchise customers would benefit, in particular, from the external support that may be provided by the following mechanisms: *S3 Creating* *entrepreneurial energy organisations; S4 Developing the ESCO industry;* and *S5 Promotion of energy efficiency by industry associations..*

The revenue regulation mechanism particularly targets network operators and the way they earn income through operation of the network. It could overlap with mechanism *C4 DSM and energy efficiency as alternatives to network expansion* as its implementation would also encourage network operators to address the supply and demand balance.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

1. Excess capacity

3. Split (misplaced) incentives to energy providers

14. Utility price setting process

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Revenue regulation is applicable only to monopoly electricity businesses and it will be more useful under unbundling because the monopoly elements of previously vertically integrated businesses will be separated out. Under commercialisation/privatisation and competition, the usefulness of revenue regulation for monopoly businesses will be unchanged.

How is the mechanism placed to deal with the transition between electricity industry structures?

The main transition issue of interest for this mechanism is the unbundling of network and retail supply functions. Splitting revenue targets and allocating them to the new business(es) should be a relatively straightforward process.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Revenue regulation does not promote specific outcomes, but removes the disincentive to their consideration. Revenue regulation is not intended to create a bias in favour of energy efficiency. Its objective is to reduce an existing regulatory bias against energy efficiency.

Is the mechanism indirectly supporting the above by some means?

Indirectly encourages consideration of the most commercially attractive options available to a monopoly electricity business.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes. Revenue regulation and other methods to break the link between sales volume and revenue have been implemented in New South Wales, Australia, Great Britain, Northern Ireland, and in some states of the US (eg California, New York, Connecticut, Washington and Maine).

What are key examples of the above?

Australia

Prior to the development of the competitive electricity market in Australia, there was very little economic regulation of the electricity industry. Almost all electricity businesses were government-owned and prices for electricity were agreed between the businesses and the government, usually on an annual basis. Retail customers paid one price which bundled together charges for both energy and network services. Frequently, there was also a separate charge for connection to the network. Prices for most wholesale customers were calculated on a similar basis.

As proposals for introducing a competitive electricity market in Australia were developed, government bodies were established to carry out economic regulation of the electricity industry. Unbundling of the generation, network services and retail supply functions were also carried out. Therefore, it became necessary to develop separate pricing structures for energy supply (at both the wholesale and retail level) and for network services.

In September 1994, the relatively new economic regulator of the electricity industry in the State of New South Wales, the Government Pricing Tribunal, published a study of revenue regulation and demand management. This report recommended the introduction of a form of revenue regulation for the electricity distributors in New South Wales, which at that time were combined network services and retail franchise supply businesses. In its report, the Tribunal stated:

> *The Tribunal wishes to ensure that the regulation of prices helps the community to tap the potential gains from demand management more effectively. To this end it wishes to, firstly, improve the price signals to which demand management responds and, secondly, remove as far as possible regulatory biases against demand management………At this stage the Tribunal is inclined to regulation which substantially decouples revenue from energy sales for the distributors as it believes this will help overcome the regulatory bias against demand management.*

The Tribunal; introduced revenue regulation for the distribution businesses, initially without decoupling of revenue and then later with an element of decoupling. Since that time, network services have been progressively unbundled from retail supply.

Revenue regulation is now an accepted method, under the National Electricity Code, for the economic regulation of monopoly network businesses in the Australian competitive electricity market. In New South Wales, a "pure" revenue cap has been introduced which totally decouples the revenue earned by the network business from the volume of electricity transported through its network.

Great Britain

In Great Britain, Public Electricity Suppliers (PESs) comprise both distribution network businesses and electricity retailing businesses. Initially, the PESs had a retail franchise for small customers, but this was progressively withdrawn as a fully competitive electricity market was established in which all customers, including the former franchise customers, are able to choose their electricity retailer.

In April 1994, the electricity regulator for Great Britain (OFFER) introduced a price control formula which applied only to the former franchise retailers. This formula introduced revenue regulation which allowed the retailer to 'pass through' to its customers regulated transmission and distribution costs. Pass through of generation costs was also allowed, subject to an 'economic purchasing' test. This formula resulted in approximately 80% of the revenue from the retail energy supply businesses being decoupled from sales volumes.

The distribution network businesses of the PESs are subject to a price control formula in which 50% of allowed revenues are dependent on sales volumes and 50% on customer numbers. In other words, the dependence of distribution revenues on sales volumes is weakened but not removed.

United States

Forms of revenue regulation with decoupling were applied in some US States from the mid-1980s to encourage utilities to promote energy efficiency. Over time, those States which implemented revenue regulation moved progressively towards 100% decoupling, sometimes also with additional financial incentives paid to those utilities which implement energy efficiency customer programs.

US electricity businesses significantly increased investment in customer energy efficiency over the decade following the introduction of revenue regulation. A revenue cap approach was used in the states of Maine, New York, Washington and California. California's Electric Revenue Adjustment Mechanism (ERAM) operated by requiring the utility to register deficit sales revenue compared to those forecast. The utility could recover this the following year through customer price increases. The mechanism worked in reverse if there was excess revenue from sales above those forecast.

However, other measures were also introduced which may also have encouraged energy efficiency, particularly various cost recovery schemes. While regulators in the United States generally only allowed cost recovery for economic energy efficiency programs, there was a controversy over how much of the investment in customer energy efficiency led to lower bills. These concerns were accentuated by the cross-subsidies between participating and non-participating customers. This controversy also occurred in the US states where price capping was supplemented by regulatory "add-ons" to overcome the bias against energy efficiency under price capping.

With the introduction of competition into the electricity industry in many US States, the use of revenue regulation for non-monopoly elements of the electricity industry has been discontinued.

Where can further information on these existing mechanisms be found?

Independent Pricing and Regulatory Tribunal, New South Wales, Australia (successor to the Government Pricing Tribunal): http://www.ipart.nsw.gov.au

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Revenue regulation has been widely promoted by particular governments and regulators of the electricity industry because it can be implemented by using existing resources within monopoly electricity businesses. Revenue regulation is also relatively light-handed and low cost.

Who would initiate the development of this mechanism?

The government body promoting regulation design. For example, in New South Wales, Australia the electricity industry regulator, the Independent Pricing and Regulatory Tribunal, stated "The Tribunal's objectives are clear. It wishes to establish a workable form of regulation which balances the desirability of treating demand and supply side options equally, so that the industry has an incentive to encourage efficient demand management, and the need for simple transparent regulation which minimises compliance costs."

Who would actually design and develop the mechanism?

The electricity industry regulator.

Which parties are responsible for carrying out activities arising from this mechanism?

Existing staff and administrative resources of the monopoly electricity businesses would be used to promote the commercial interests of the businesses.

Which parties actually realise the DSM and energy efficiency outcomes?

ESCOs and electricity businesses are likely to implement any DSM and energy efficiency programs with clients and customers (at least in the short term).

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism does not actively encourage energy efficiency outcomes, and needs to be considered in conjunction with mechanisms that are more clearly targeted.

What are the basic institutional/market requirements?

The basic requirements for this mechanism are the ability to effectively regulate at the level of the retail franchise and network businesses, and the ability to evaluate the different options available for implementing revenue regulation.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Government funding for the regulator to undertake the necessary regulation development, public consultation, regulatory impact assessment etc.

How are activities arising from this mechanism funded?

Under total revenue regulation there would be no need to provide for recovery of costs of energy efficiency programs. However, under gross margin regulation some mechanism for the recovery of the costs of energy efficiency programs would need to be applied.

6. IMPACTS ON ELECTRICITY BUSINESSES

If an electricity business is required to promote energy efficiency and DSM by some other mechanism, revenue regulation ensures that reduced sales will not result in reduced revenue. This is the main benefit to electricity businesses of this mechanism.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Establishment of a regulatory body**. An independent regulatory body will be required to regulate prices and revenue of monopoly electricity businesses. This is different from government oversight of a government owned/operated utility. This regulatory body should be entirely independent from other government functions and independent of the utility sector they are overseeing. Credibility and public confidence are critical to the success of this activity.
- **Establishment of a funding mechanism.** A funding mechanism is required to establish and operate the regulatory body. Funding may be sourced from: the government budget, cost recovery, a public benefits charge, or energy/CO_2 taxes.
- **Evaluation of revenue regulation.** Periodic evaluations of revenue regulation will be required (including the development of performance indicators) to ensure that it is being conducted efficiently and effectively.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

This mechanism appears at first glance to be very complex. However, while the development of a revenue regulation formula for specific electricity businesses may initially be complex, this work is usually done by specialists within the electricity regulator, working with relevant people from the electricity businesses. Once the formula has been established, its implementation is relatively routine.

Monopoly electricity businesses may respond to revenue regulation by encouraging fuel switching, account splitting, customer transfers etc rather than pursuing energy efficiency. If the income of an electricity business is tied to revenue per customer, the business could reduce the cost of servicing each customer by encouraging customers to switch to other fuels such as gas or by encouraging customers to split their accounts. If total revenue is capped, this discourages the electricity business from gaining new customers and provides an incentive for the business to encourage existing customers to move to other service areas. A partial decoupling of revenue from sales volume will help avoid this.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The impact of revenue regulation on energy efficiency is unclear and may vary by the type of revenue regulation. Monopoly electricity businesses may promote fuel switching, account splitting, customer transfers, etc. rather than promote energy efficiency.
- An infrastructure for providing energy efficiency services may not be developed unless other mechanisms are developed that help promote energy efficiency.

9.2 Trading/Financial Impacts

- The demand for energy efficiency may not increase if revenue regulation is the only mechanism implemented. Business activity for ESCOs and other private and public organisations may actually decrease unless revenue regulation is accompanied by other mechanisms which directly promote the implementation of energy efficiency.
- There may be an impact on prices under revenue cap regulation as a result of changes in the economy. Under price capping, utility revenues tend to rise during a boom and fall during a recession. If revenue is fixed, then prices will tend to fall during a boom and rise during a recession. This arises because of the simple relationship between price, quantity and revenue. It is not appropriate that consumers insulate utilities from economic cycles in this way.

9.3 Industry and Consumer Issues

- The ESCO industry may not benefit from this mechanism alone.
- The impact on customer classes is unclear. However, if one customer class (eg large commercial and industrial customers) benefits to the detriment of others, then the regulatory body will need to redesign the regulatory process to ensure that one class of customers does not unduly benefit from this process.
- A "cultural impact" is expected within monopoly businesses because: (1) the link between sales and profit is broken; and (2) where total revenue is regulated, cost recovery for energy efficiency programs is may not be needed.
- Revenue regulation is expected to lead to lower average electricity bills due to lower average consumption. As any surplus generation capacity is absorbed, revenue regulation is expected to deliver both lower bills and lower prices by avoiding the cost of new supply side capacity.
- In the short term, average unit prices are likely to fall under both revenue regulation and price capping due to efficiency gains. Under revenue regulation, the fall in prices is likely to be slower and the fall in average bills faster than under price capping.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

It will be difficult to quantify the energy efficiency and DSM outcomes achieved by expenditure on this mechanism.

The mechanism will not transform the market to better encourage energy efficiency, particularly within an acceptable time frame.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None ★★★	High
Barriers addressed	Low number ★	High number
Effects of restructuring on mechanism	Less useful ★★★	More useful
Transferability	Low ★★★★	High
Flexibility	Low ★★★★	High
Potential for market transformation	Low ★★★	High
Cost effectiveness	Low ★★★★	High
Social and environmental impacts	High ★★★★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: F1

Public Benefits Charge for Energy Efficiency

Mechanism Type: Funding

Outline	A public benefits charge is a method of raising funds from the operation of the electricity market, which can then be directed into DSM and energy efficiency activities.
Outcomes	☐ Load shifting ☐ Energy efficiency ☐ Direct effects ☑ Indirect effects
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑↑ Much more useful and/or relevant
	Commercialisation/ Privatisation ↑↑ Much more useful and/or relevant
	Competition ↑↑ Much more useful and/or relevant
Addressed Customers	☐ Residential ☐ Commercial and small industrial ☐ Large industrial
Policy barriers addressed	6, 10, 11, 12, 13
Program barriers addressed	2, 5, 7
Who Promotes?	Government, some electricity businesses, ESCOs
Who Initiates?	Government, ESCO industry association
Who Develops?	Government
Who Implements?	Government
Who is Targeted?	Electricity businesses, ESCOs, energy centres
Funding	Government budget for administrative costs
Impacts on electricity businesses	Loss of income through reduced electricity sales – this may be mitigated if electricity businesses have access to funds raised through the public benefits charge to carry out energy efficiency programs. Increased costs to administer the public benefits charge.
Previous experience	Belgium – agreement between electricity retailers and the government Norway – distribution network businesses Portugal – non-bypassable levy

1. MECHANISM OUTLINE

A public benefits charge is a method of raising funds from the operation of the electricity market, which can then be directed into DSM and energy efficiency activities.

1.1 General Description

What the mechanism means in general terms.

A public benefits charge (also often known as a system benefits or 'wires' charge) is a charge or tax imposed on certain participants in the electricity market. The charge is normally created by government to generate funding for public purpose programs, such as energy efficiency or renewable energy. An energy efficiency public benefits charge can generate funds for new organisations to implement energy efficiency programs, or to maintain or increase existing energy efficiency programs. It can also be linked to achieving specific energy efficiency goals.

Such charges around the world share similar features, but can vary widely from scheme to scheme, depending on:

- **the objective of the charge** – why it has been created and how the money will be spent (ie whether it is pre-allocated to specific purposes). If the objective is to create a new fund, the goals of the fund will influence the decision about how the charge will be used, eg only for information programs, or more broadly to fund activities which lead directly to energy efficiency outcomes, such as subsidising the installation of energy efficient equipment;
- **the way in which the charge is levied –** how it is calculated. There are several alternatives:
  - ♦ a rate per unit quantity of energy delivered to a customer or passing through a network;
  - ♦ a rate per unit value of energy purchased by a customer or delivered by a network;
  - ♦ a set charge, eg a fixed charge per customer;
  - ♦ cost recovery charges for specific energy efficiency programs;
- **the scope of the charge** – who is charged and how much. The issue of who should pay requires decision makers to clearly determine their objective in creating the public benefits charge. If the intent is to preserve (or increase) funding for existing energy efficiency activities, then the charge should affect only those customers currently participating in those activities. Alternatively, if the objective is to ensure that all customers pay a uniform charge for programs with broader societal benefits, then the public benefits charge will be imposed on customers who have not previously participated in those activities. Some options include:
  - ♦ a broad based, non-bypassable charge that is collected from key market players (eg network operators) and which is then passed on in regulated prices;
  - ♦ a uniform charge levied on all (franchise) customers;
  - ♦ electricity businesses allowed by governments to charge customers for DSM or energy efficiency programs they choose (or are required by law) to carry out.

- **the administration or governance regime for the charge** – who manages the money. – utilities, a government authority (existing or specially created), non-profit corporations or authorities with board of directors;
- **the duration of the charge** – for example
  - ♦ it could be set up with an indefinite life time;
  - ♦ it could be established to expire at a specified date;
  - ♦ it could be implemented for a defined time period with provisions to consider in the future whether such a charge is still needed.

A public benefits charge can be collected at various points in the electricity market:

- retail sales;
- distribution network;
- transmission network;
- wholesale pool.

Typically a public benefits charge would be based on the quantity of energy traded, but may also be derived (or topped up) by licence fees, participation fees or trading penalties. The charge itself plus any additional fees can be changed over time with little impact on competition, as they are applied across the board.

Public benefits charges are administratively simple to establish and collect, and they can raise large amounts of money if they are calculated as a rate per unit of energy.

Public benefits charges offer significant advantages over other funding mechanisms in the transition between industry structures:

- changes in ownership or number of businesses will not affect the amount of money raised, if the charge is calculated as a rate per unit of energy;
- deepening of competition means that regulatory pricing approaches such as passing costs through to customers become inappropriate.

Public benefits charges also attract much criticism – on policy rather than technical grounds. They increase the price of electricity for all customers which may be regarded as counter to the outcomes being promoted by industry restructuring and market reform. Some commentators consider that pre-allocation of revenue to specific purposes is not in the best interests of public policy. Finally, in some countries, and particularly where the energy industry is in government ownership, there is potential for misdirection of funds for political purposes rather than for what they were originally intended.

Important matters to consider include:

- whether a government wants to have public policies to address energy efficiency or prefers to leave it to the market;
- when a government has decided to develop such policies, whether the government wishes to use customer funds to support these policies;
- how the funds will be raised so as not to disadvantage any market players. It has been suggested that a non-bypassable charge collected from all customers is most appropriate for a competitive market, as all customers then contribute equitably to public interest

programs. This is in contrast to imposing charges on energy businesses who then pass on the costs to their customers (new entrant businesses may not have these additional costs to carry);

- how to determine the purposes for which the funds will be used. There will be competition for the funds with other public policy goals, hence it is important to:
  - ensure that the benefits to society clearly exceed the costs;
  - target activities to areas not adequately addressed by existing service providers;
  - design programs that bring lasting changes to the market;
- how to determine the amount and duration of funding. This is one of the most difficult public policy issues to resolve. Clear links should be made between the overall policy goals and objectives and the level of funding required to achieve those goals. A review period should be created to assess progress;
- how to determine who will manage the funds. Possibilities include existing agencies, electricity businesses, and a new organisation which may be established specifically for this purpose. It may be necessary to determine the degree of political support for creation of a new organisation.

All these issues will need to be addressed in a manner appropriate to the social, political and economic situation of any country or jurisdiction considering using a public benefits charge.

In its early stages, the most politically acceptable and outcome focused means of implementing a public benefits charge would be to impose a small charge on the network businesses (which have the most manageable scope of transactions). This charge could be administered by a government body with energy efficiency interests and with revenue directed at clearly identified community service obligations, such as public housing etc. With demonstrated success and acceptance, the public benefits charge could then be extended in its scale and application.

Does this mechanism depend on or overlap with other mechanisms described?

Most mechanism require funding, therefore most mechanisms will depend on this mechanism if a public benefits charge is a major source of funding for energy efficiency and DSM. The only mechanisms that do not depend on (or at least benefit from) funding mechanisms are those that are promoting direct commercialisation of energy efficiency. These mechanisms would make all the public funding mechanisms redundant, and include: *F2 Financing of energy efficiency by electricity businesses;* and *M8 Energy performance contracting.*.

Other public funding mechanisms that would have varying degrees of overlap with the public benefits charge include *M1 Taxes on energy* (if the tax receipts are used to fund energy efficiency and DSM) and *M2 Tax exemptions and incentives for energy efficiency.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

6. Lack of awareness by policy makers (of EE opportunities)

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)

Program Barriers

2. Lack of information to end users
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is equally much more useful and/or relevant under all three aspects of electricity industry restructuring because public benefits charges provide funding for all other mechanisms which promote DSM and energy efficiency, irrespective of the electricity industry structure.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The public benefits charge provides funding for other mechanisms that promote the above outcomes.

Is the mechanism indirectly supporting the above by some means?

Indirect support through providing funding.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

Belgium

The electricity retailers in Belgium have made an agreement with the government to raise their electricity prices and to use the additional revenue to fund energy efficiency programs. The Belgian Government allocates some of these funds to social programs to ensure that disadvantaged groups receive some benefit from the increased electricity prices.

Norway

In Norway, following restructuring in 1991, the government initiated two related programs funded by a small public benefits charge levied on the distribution network businesses:

- an energy conservation information program;
- the creation and partial funding of independent regional energy conservation centres to provide energy efficiency services.

Portugal

The Portuguese Government has introduced a non-bypassable levy which is a component of the non-bypassable tariff called "global use of the system" (*Uso Global do Sistema*) which applies to all users of the transmission network. The objective of the non-bypassable levy is to cover costs of the implementation of energy, environmental or economic policy measures of public interest. These policy measures could include the implementation of DSM and energy efficiency programs.

Where can further information on these existing mechanisms be found?

Energy efficiency programs by network businesses in Norway: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Governments which wish to establish a funding source for DSM and energy efficiency separate from government funds. Some electricity businesses which consider they will be regulated or mandated to provide or invest in energy efficiency may be keen to establish a dedicated funding source for these activities. ESCOs and some other parties, such as promoters of energy centres, would be interested in a funding source for their activities.

Who would initiate the development of this mechanism?

Government body responsible for promoting energy efficiency, possibly in conjunction with the industry association/lobby groups looking after the interests of the above parties.

Who would actually design and develop the mechanism?

The government body responsible for promoting energy efficiency, typically through legislation or regulations.

Which parties are responsible for carrying out activities arising from this mechanism?

Administration of the funds that are collected could typically be carried out by a government body.

Which parties actually realise the DSM and energy efficiency outcomes?

Parties such as electricity businesses, energy centres and ESCOs, working with end-use customers.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The existence of the public benefits charge itself does not lead to energy efficiency outcomes.

DSM and energy efficiency activities are implemented most typically by whoever is the recipient of the funds raised by the charge. Possible recipients include:

- energy information centres;
- retailers;
- ESCOs;
- entrepreneurial organisations that design and manage energy efficiency programs.

What are the basic institutional/market requirements?

Political will and ability to introduce the charge.

Government body to create public benefits charge and legislative ability to impose the charge.

Resources to effectively administer the funds raised by the charge and to monitor the progress of the activities funded by the charge.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Typically a public benefits charge would be created and administered by an existing government authority, or a body that has been specifically created for the task. Its costs would involve set up and operating costs for a normal government or statutory based organisation.

How are activities arising from this mechanism funded?

The responsible body would typically be funded through a government's annual budget process and through the public benefits fund itself.

6. IMPACTS ON ELECTRICITY BUSINESSES

This mechanism could have a range of impacts on electricity businesses depending on where it is applied in the electricity market, and to what degree it raises electricity prices.

If electricity businesses have access to the funds generated by the mechanism to carry out energy efficiency activities, they may be able to ensure that such activities are profitable or at least revenue neutral. However, this may not be the case if the energy efficiency activities are carried out by third parties. In the longer term the electricity businesses would simply experience reduced sales due to the third party implementation of energy efficiency and the effects of increased prices.

There is also likely to be a non-recoverable cost to electricity businesses associated with any administration or collection of the charge.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation will be needed to establish a public benefits charge requiring consumers to pay money to generate a pool of funds for energy efficiency (and possibly other public interest programs). The legislation will need to specify the objectives of the charge, the way in which the charge is levied, the scope of the charge, the administration of the charge, target audience, and the duration of the charge.
- **Establishment of a governing body**. The legislation will assign responsibility to a lead governing body: eg. to a new organisation or Board or to a government agency, electricity business, or nonprofit organisation. The governing body will: establish policy rules and principles governing the use of public benefits monies; and design, administer and evaluate energy-efficiency programs. As with other mechanisms of this type, the governing body must be viewed as credible, unbiased and honest in their administration of public funds.
- **Establishment of a funding mechanism.** A portion of the revenue raised from the public benefits charge will be used to establish (if necessary) and operate the governing body.
- **Evaluation of public benefits funds.** Periodic evaluations of how the revenue from the public benefits charge is being used will be required (including the development of performance indicators) to ensure that the funds are being used efficiently and effectively to achieve clearly defined outcomes.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.
- **Promotion of energy services.** This will be required to ensure that there is sufficient public awareness about energy services, and enough energy services providers available to enable the implementation of programs funded by the public benefits charge.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

The mechanism in itself does not promote energy efficiency, and will only be as effective as other mechanisms for which it provides funding.

If the public benefits charge is levied on all consumers, the price of electricity for all will be increased, which may be an issue in some jurisdictions. In particular, socially disadvantaged groups may not benefit from programs funded by the public benefits charge while still paying higher electricity prices. This so-called “reverse Robin Hood effect” can be alleviated by specifically targeting programs to disadvantaged groups.

Public interest policies, other than promotion of energy efficiency, may be better served by the revenue raised through a public benefits charge.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Monitoring of competition among energy service providers is needed to make sure market power is distributed evenly. This may be done by industry self-regulation, with oversight by the governing body or a government agency.
- Energy-efficiency measures and services should be provided to all customer classes. If one customer class benefits to the detriment of others, then the governing body will need to redesign the program.
- All potential stakeholders should be allowed to participate in rulemaking processes that affect the use of the funds.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage industry participation.
- Reduced electricity sales (and income) and increased program costs might affect the competitive positions of electricity businesses. However, the loss of revenue may be offset by the returns generated from energy services and financing if these are provided directly by electricity businesses.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

A public benefits charge necessarily has social and political impacts, and its promotion, development and operation are likely to be strongly influenced by the existing social and political framework. For these reasons, the mechanism is not readily transferable between different jurisdictions.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None ★ ★ ★ ★ High
Barriers addressed	Low number ★ ★ ★ High number
Effects of restructuring on mechanism	Less useful ★ ★ ★ ★ ★ More useful
Transferability	Low ★ ★ High
Flexibility	Low ★ ★ ★ ★ High
Potential for market transformation	Low ★ ★ ★ ★ High
Cost effectiveness	Low ★ ★ ★ High
Social and environmental impacts	High ★ ★ ★ ★ ★ Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: F2

Financing of Energy Efficiency by Electricity Businesses

Mechanism Type: Funding

Outline	This mechanism focuses on developing the role that electricity businesses can play in bundling together financing and energy efficiency services for their customers, particularly as a means of developing new business opportunities.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** X	No change
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑	More useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	3, 6, 9, 13	
Program barriers addressed	2, 5, 6, 7	
Who Promotes?	Within the electricity business	
Who Initiates?	Within the electricity business	
Who Develops?	Within the electricity business	
Who Implements?	Within the electricity business	
Who is Targeted?	Electricity business customers	
Funding	Internal corporate funding by the electricity business	
Impacts on electricity businesses	New commercial opportunity for the electricity business	
Previous experience	United States – many regulatory-driven examples	

1. MECHANISM OUTLINE

This mechanism focuses on developing the role that electricity businesses can play in bundling together financing and energy efficiency services for their customers, particularly as a means of developing new business opportunities.

1.1 General Description

What the mechanism means in general terms.

Financing of energy efficiency by electricity businesses results in customers themselves paying for energy efficiency, in contrast to subsidies and rebates provided by government and/or electricity businesses.

Cost-effective end-use energy efficiency pays for itself over time and customers eventually realise economic benefits from energy efficiency improvements. On this basis, energy efficiency programs should, in principle, be paid for by the customers who benefit from them.

Financing can be directly sourced by motivated customers from banks and finance companies, at interest rates commensurate with their particular risk profiles. However, up-front capital requirements and payback periods of more than a few months often remove the motivation for investments by customers in the construction of energy efficient facilities, and the purchase of energy efficient equipment and appliances.

This lack of motivation provides an opportunity for electricity businesses to design and market financing scheme to help remove these barriers.

A basis issue with this mechanism is that electricity businesses will only undertake financing of energy efficiency if they perceive that it is in their commercial interest (ie that they can make a profit from funding energy efficiency projects, they can offer to fund energy efficiency projects as a way to retain customers, or they can gain sufficient public relations or regulatory benefits from funding energy efficiency projects to make the expense worthwhile). Governments and organisations which wish to see electricity businesses financing energy efficiency should therefore concentrate on ensuring that the conditions are right for this activity to be commercially attractive to electricity businesses.

Financing is an attractive tool that can be used by electricity businesses to promote and sell their energy efficiency services. Experience in other industries indicates that availability of financing significantly increases the number of customers interested in a particular product. In the short term, financing offers electricity businesses the means of at least recovering the costs associated with providing energy efficiency services, and in the longer term developing a new, profitable business activity.

In a competitive retail electricity market, bundling financing and energy efficiency services is an attractive means of enhancing customer services and can assist in retaining existing customers and increasing the customer base. Even in a franchise market, electricity businesses seek to add value by providing services in addition to electricity supply, in order to create profitable business activities.

There is a range of possible schemes that involve the financing of energy efficiency activities by electricity businesses. At one end of the range, there are simple arrangements which involve the customer paying back the cost of efficient appliances to the electricity business over time without interest (ie essentially zero interest financing). At the other end are complex financing packages for a range of energy efficiency options.

In marketing a bundled package of financing and energy efficiency services, electricity businesses will have to:

- promote energy management services as an important part of their business portfolio;
- develop an understanding of what will motivate their customers to invest in energy efficiency.
- consider which segment(s) of its customers they wish to engage;
- decide whether the corresponding financing packages should be prescriptive or negotiable;
- determine appropriate interest rates; and
- gain access to the required capital reserves.

More financially sound commercial and industrial customers are easier to service and generally already have access to capital, but provide an attractive, lower-risk target audience. These customers may be best served by customised finance and energy management programs.

In contract, the business opportunities offered by residential customers are probably most effectively realised through more of a program approach based on predetermined conditions for all participants. The retailer could use a combination of rebates and financing to increase interest in the services being offered.

Financing may be a potentially attractive marketing tool for electricity retailers but the ability to offer finance alone is not sufficient. A number of other issues from the customer's perspective can hinder attempts to market the financing of energy efficiency:

- customers must have faith in the party offering financial and energy efficiency services. However it is likely that, even with changes to the electricity industry, most customer will have had a long relationship with the business;
- customers will be interested in their relationship with their service provider continuing into the future. This may be of concern in electricity markets where unbundling and ownership changes will occur;
- customer comfort levels will be affected by issues that vary from customer to customer. For example, some customers will be uncomfortable with the notion of technological change, and, for others, the timing for new investments will be wrong. Retail businesses will need to become adept at dealing with such issues if they wish to promote their customer service abilities.

From the perspective of the electricity business, a major issue will be the ability to retain the customer, in relation to both securing a long term revenue stream from the customer and the difficulty of maintaining any energy efficiency financing arrangement if the customer changes electricity supplier. Electricity businesses may require an agreement from the customer to retain that business as its electricity supplier before providing energy efficiency financing to the customer. However, binding a customer in this way is illegal in some jurisdictions.

Electricity businesses will also have to make decisions about how to source the capital required to provide energy efficiency financing services to customers. Capital may be sources internally, externally or through a combination of the two. Where the energy services business is structurally separated from the parent electricity business, the funds could be derived from the parent company's shareholding. Where such separation does not exist, capital could be sourced directly from the operational budget of the electricity business.

Accessing funds internally has the following advantages:

- it can be relatively straightforward and quick to arrange;
- it is probably cheaper, especially in terms of legal fees etc;
- the arrangements can be more flexible.

Third party financing can increase administrative costs, but may also access more sources of capital. Factors that would need to be considered include:

- whether banks/finance companies are seeking to provide loans;
- the level of debt the electricity business is willing to incur;
- the acceptability of the financing costs of the loan;
- the repayment term of the loan;
- the nature of guarantees required by the lender;
- the level of interest rate charged.

Alternatively, the electricity business could take on the role of loan guarantor on behalf of individual customers or an energy efficiency program manager. Yet another option that may be considered, especially for niche applications, is the leasing of energy efficient equipment. Leasing may be able to provide more cost-effective solutions but is also constrained by a number of practical issues (eg in the case of default of lease payments).

In order to promote this mechanism, any legislative and regulatory barriers and taxation disincentives to electricity businesses being able to offer financing should be identified by government and removed. These barriers may currently exist, or they may emerge, for example, if and when the electricity business is privatised.

It would also be useful for government to provide retail electricity businesses with 'best practice' information on bundling financing and energy efficiency services.

Does this mechanism depend on or overlap with other mechanisms described?

Financing of customer energy efficiency by an electricity business creates a commercial incentive for the business to pursue economic energy efficiency opportunities. Consequently, other mechanisms that encourage electricity businesses to pursue energy efficiency (such as *C1 Mandatory sourcing of energy efficiency; C2 Energy efficiency licence conditions for electricity businesses;* and *S7 Voluntary agreements for energy efficiency*) may become redundant if the businesses choose to promote energy efficiency for commercial reasons. However, this mechanism does not guarantee energy efficiency outcomes – electricity businesses may simply choose to pursue other commercial opportunities.

Successful implementation of this mechanism would remove the need to create funding for energy efficiency through *F1 Public benefits charge for energy efficiency; M1 Taxes on energy;* and *M2 Tax exemptions and incentives for energy efficiency.*

Mechanisms which could help electricity businesses to better serve their customers should be pursued in conjunction with this mechanism to increase the potential for success. These include: *S1 Sustainable energy training schemes for practitioners; S6 Aggregating* *electricity purchasers to achieve energy efficiency; M3 Providing consumption information on customers' electricity bills;* and *M8 Energy performance contracting.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

3. Split (misplaced) incentives to energy providers
6. Lack of awareness by policy makers (of EE opportunities)
9. Customer instability (problem for energy providers)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
5. Lack of end-user and other market actor's experience impacts
6. Financial barriers
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because unbundled electricity businesses can continue to finance energy efficiency programs in the same way that vertically integrated ones can. Under commercialisation/privatisation and competition this mechanism is more useful and/or relevant because electricity businesses can use their funding of energy efficiency programs to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

Unbundling of an integrated utility into various businesses including the retail business may be problematic for this mechanism, depending on the how the required capital is sourced. For example, whereas the larger, integrated utility may be prepared to accept the risks of developing a new business and funding it from the operating budget, the new, smaller retail business is likely (at least initially) to be more risk averse, and less inclined to draw on shareholder or third party capital.

A move to full competition at the retail level will remove the potential for regulatory involvement in new business activities. However there is still likely to be competition regulation that could influence the range of services that the retail business considers. For example, attempts to control a customer's choice of electricity retailer through conditions attached to the retailer providing financing for energy efficiency may be deemed anti-competitive.

Privatisation of the electricity retail business could create problems for subsidiary businesses that were not yet achieving commercial rates of return for the new owners. There would be new requirements on the private business to pay tax, but also opportunities to offset profits with the expenses incurred by new enterprises.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Retailer financing of energy efficiency primarily promotes the commercial interests of the retailer and customer. Outcomes are likely to vary greatly between electricity businesses because of differing management philosophies toward the development of new business, and the varying nature of customers between businesses. However, even though the potential energy efficiency gains could conceivably be negligible (although this is unlikely), the costs to society of promoting this mechanism are small.

Is the mechanism indirectly supporting the above by some means?

Financing schemes could indirectly support any of the above, depending on the interests of the electricity business and the customer. Alternatively, the mechanism could be used to exclude specific energy efficiency applications that threatened the electricity business (eg cogeneration).

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

A small number of electricity businesses, particularly in the United States, have experience with providing financing to customers. An increasing number of electricity businesses worldwide are providing their customers with services in addition to electricity sales.

What are key examples of the above?

United States

ENVEST is a business unit within the utility Southern California Edison, established to promote energy efficiency through integrating the activities of customers, ESCOs, equipment suppliers and the utility. ENVEST has significant project management and quality control functions. Customers are offered two modes of financing. The initial capital required is sourced from the parent company's shareholder and ratepayer funds.

Sacramento Municipal Utility District uses loans as a tool to support mainly residential customer energy efficiency programs. A key feature is the strong trade ally relationship with energy efficiency equipment sellers and installers. Capital is sourced from the utility's general fund, based on the rationale of being fully engaged with customers in the increasingly competitive environment.

Energy FinAnswer is a PacifiCorp program which provides money to commercial customers at below market rates for cost-effective energy efficiency, and slightly higher rates for other measures that may be chosen by the customer. Loan durations are individually negotiated with the customers to assure positive cash flow, and are repaid through an energy service charge on the customer's bill. Capital is sourced from ratepayers funds.

Capital Advantage is run by Pacific Gas & Electric, mainly for small to medium sised customers, as an alternative to rebates for cost-effective energy efficiency measures. The finance is provided through a bank, and the cost that the customer sees reflects some PG&E buy-down of the bank's market interest rate.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

This mechanism would be promoted within the electricity business as a means of keeping existing customers and attracting new customers by offering value-added services in a competitive retail environment. There would also be an interest in creating a new business for profit. The key party would probably be the business development group within the electricity business, with external input from the financial sector and energy management experts.

Who would initiate the development of this mechanism?

An electricity business would make a commercial decision whether to develop an energy services business, which may or may not also involve a financing service for target customers. Typically, a business plan for the proposed business would be prepared by the retailer's business development group and submitted to the Board for endorsement.

Who would actually design and develop the mechanism?

Within the electricity business the commercial and financial groups would probably carry out the work required.

Which parties are responsible for carrying out activities arising from this mechanism?

Energy services customer service staff would package the electricity business' preferred financing option(s) and energy management services, and market these to the target customer group. The customer service staff should have marketing and financial skills beyond those usually found in traditional electricity businesses. The ultimate aim should be to sell energy efficiency on its own merits by helping customers to improve their cash flow, equity position, returns on investment etc.

Which parties actually realise the DSM and energy efficiency outcomes?

The customers of the electricity business realise the DSM and energy efficiency outcomes. Electricity businesses may choose to offer a financing package or a range of financing options to potential new customers eg a building project developer, a well defined existing customer segment eg commercial buildings, broadly across all customer segments or any combination of these. Similarly, electricity businesses may choose to finance a specific application, or a range of technologies and may even use their leverage to control customer behaviour (eg financing made available only if gas-fired cogeneration not installed at a hospital).

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

Effective implementation of this mechanism implies signing up customers for electricity business financing. While this could be achieved in isolation from other mechanisms, the concept is largely untried. Hence those mechanisms that can help electricity businesses to improve their customer focus could also be encouraged.

What are the basic institutional/market requirements?

Legislative and regulatory ability on the part of electricity businesses to undertake new business activities.

Staff in the business development group of the electricity business with the necessary expertise to be able to analyse the commercial viability of proposed energy efficiency projects.

Mature capital market prepared to engage new and relatively unknown customers, and to extend useful amounts of capital.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal corporate funding by the electricity business of the development of a new business opportunity.

How are activities arising from this mechanism funded?

Financing of energy efficiency would operate as part of the energy business' energy services business, with the work of customer service staff funded by the revenue of the business. In its formative stages it is likely that the costs of the energy services business would be absorbed by the parent business.

The source of the actual investment capital that is provided to participating customers depends on a number of factors, and may be the electricity business itself or a third party lender.

6. IMPACTS ON ELECTRICITY BUSINESSES

This mechanism represents a commercial opportunity for electricity businesses. Any expenditure to promote the mechanism will be entirely voluntary and will be based on a commercial assessment of the potential returns from new business. While promotion of energy efficiency services may reduce sales of electricity, it is anticipated that the loss of revenue would be offset by the returns generated by financing and energy service provision.

Electricity businesses should carry out periodic evaluations of their financing programs (including the development of performance indicators) to ensure that the funds are being used efficiently and effectively to achieve clearly defined outcomes.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative and regulatory requirements.** Any legislative and regulatory barriers and taxation disincentives to electricity businesses being able to offer financing must be removed.
- **A mature capital market**. The capital market should be prepared to engage new and relatively unknown customers, and to extend useful amounts of capital.
- **Provision of "best practices" information**. This information should be made available to electricity businesses, eg information on bundling financing and energy efficiency services.
- **Implementation and promotion of complementary mechanisms.** Complementary mechanisms are required to encourage electricity businesses to use financing for energy efficiency services: e.g., training schemes for sustainable energy practitioners, expanding

information on customers' electricity accounts, developing energy efficiency as a product, providing the customer with clear price signals that support energy efficiency, performance contracting, and development of strong trade ally programs with energy efficiency equipment sellers and contractors.

- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.
- **Promotion of energy services.** This will be required to ensure that there is sufficient public awareness about energy services, and enough energy services providers available to enable the implementation of financing programs implemented by electricity businesses.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Whereas financing can provide a new business opportunity for electricity businesses, it also brings with it new risks that a business may be unwilling or unable to accept. Uptake of the mechanism would be entirely dependent on the commercial attitude of electricity businesses, which could be expected to vary widely both within and between countries. Consequently, it is difficult to estimate the extent to which energy efficiency outcomes may be realised.

One particular issue is that electricity businesses may provide financing only to energy efficiency projects which do not threaten their core business of selling electricity, eg an electricity business may not finance a gas-fired project, even though this may be the most energy efficient alternative. There is little which can be done about this, since it would be inappropriate for a regulatory body to require electricity businesses to carry out actions which were contrary to their commercial interests.

It will be difficult to quantify the energy efficiency and DSM outcomes achieved by expenditure on this mechanism. However, this not be of great concern to the electricity business if it is funding energy efficiency projects principally to retain customers or to gain public relations benefits.

If the electricity business uses internal funds as the source of loan capital, the issue of cross subsidy of participating customers by non-participating customers may arise. The issue is less significant if the funding is externally sourced, or even if the energy service business operates separately.

There may be a problem if the electricity business seeks to use the provision of financing for energy efficiency projects to bind a customer to purchase electricity from its electricity retailing business. Within the European Union, such contractual provisions may be declared illegal, based on a ruling by the World Trade Organisation.

If the electricity business is not able to bind a customer to which it has provided financing, problems may arise if the customer moves to another retailer. The retailer which provided the finance is no longer able to use its retail billing facility to recover the financing charges from the customer and will have to establish another billing mechanism to do this.

Experience has shown that including additional charges (for example financing/energy services) on customers' accounts may not be straightforward. Electricity businesses would need to evaluate whether the additional costs of making changes to their billing system outweighed the financial benefits created by the new services.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Monitoring of competition among energy service providers is needed to make sure market power is distributed evenly (this is particularly worrisome if access to financing is unequal - eg only large electricity businesses are able to borrow funds or obtain financing for their customers). This can be done by industry self-regulation and government oversight.
- The risks of financing may be perceived as too high for electricity businesses. Therefore, they may not take advantage of this mechanism as a new business opportunity and, as a result, energy efficiency is not promoted. Risk aversion may be greater for smaller electricity businesses than for smaller businesses due to their financial situation.
- Reduced electricity sales (and income) and increased program costs might affect the competitive positions of electricity businesses. However, the loss of revenue may be offset by the returns generated from the financing program and from energy services if these are provided directly by electricity businesses.

10. EVALUATION

10.1 Evaluation Issues

It will be difficult to quantify the energy efficiency and DSM outcomes achieved by expenditure on this mechanism.

The mechanism will be difficult to implement in a political framework that discourages or prohibits electricity businesses from engaging in new businesses in addition to supplying electricity.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None High ★ ★
Barriers addressed	Low number High number ★ ★ ★

Effects of restructuring on mechanism	Less useful ★ ★ ★ ★ More useful
Transferability	Low ★ ★ ★ ★ High
Flexibility	Low ★ ★ ★ ★ High
Potential for market transformation	Low ★ ★ ★ ★ High
Cost effectiveness	Low ★ ★ ★ ★ High
Social and environmental impacts	High ★ ★ ★ ★ ★ Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Fieldstone Private Capital Group Ltd (1993) *Financing Renewable Energy Projects: A Guide for Developers*, United Kingdom Department of Trade and Industry, London, UK.

Flanigan, T et al (1995) 'Financing Customer Energy Efficiency', *IRT Environment*.

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Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S1

Sustainable Energy Training Schemes for Practitioners

Mechanism Type: Support

Outline	The training schemes covered by this mechanism are designed to improve the trainees' ability to achieve sustainable energy outcomes, and are generally more vocationally oriented than energy information programs targeted at end-users or consumers. The schemes would emphasise energy efficiency and renewable energy technologies and applications.		
Outcomes	☐ Load shifting ☐ Energy efficiency ☐ Direct effects ☑ Indirect effects		
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X	No change
	Commercialisation/ Privatisation	X	No change
	Competition	↑	More useful and/or relevant
Addressed Customers	☐ Residential ☐ Commercial and small industrial ☐ Large industrial		
Policy barriers addressed	6, 7, 12, 13		
Program barriers addressed	2, 3, 5, 7		
Who Promotes?	Government, training providers		
Who Initiates?	Government		
Who Develops?	Educational institutions, energy centres		
Who Implements?	Educational institutions, energy centres		
Who is Targeted?	Energy practitioners, end-use customers		
Funding	Government budget, user pays		
Impacts on electricity businesses	New commercial opportunity for the electricity business if it becomes an energy service provider Loss of revenue caused by reduced sales		
Previous experience	Australia – targeted training programs by SEDA Denmark – subsidy for new energy management staff Japan – training by Energy Conservation Center Norway – training for service personnel		

1. MECHANISM OUTLINE

The training schemes covered by this mechanism are designed to improve the trainees' ability to achieve sustainable energy outcomes, and are generally more vocationally oriented than energy information programs targeted at end-users or consumers. The schemes would emphasise energy efficiency and renewable energy technologies and applications.

1.1 General Description

What the mechanism means in general terms.

There is increasing recognition that to remove barriers to sustainable energy, mechanisms must move beyond reliance on purely technical solutions and address social, cultural and educational issues. Introducing sustainable energy practices into training and education is seen as an important way to achieve market transformation toward more efficient use of energy.

Traineeship schemes can be designed to equip professionals and tradespeople in the commercial energy industry with strong sustainable energy skills. Sustainable energy training schemes will typically focus on providing information and instruction to people whose occupations influence energy use in businesses and institutions.

To differentiate this training from more traditional energy training schemes, the curriculum will include material directed towards raising the participants' awareness about ecological sustainability. The purpose of this awareness raising is to motivate the participants to propose sustainable energy solutions to their clients and/or principals. In particular, two types of material will be included in the training curriculum:

- theoretical material about climate change linked to the Kyoto agreement;
- practical material on specific sustainable energy solutions which could be proposed by the training participants to their clients and/or principals.

Training schemes are typically carried out by government bodies or energy centres. However restructured electricity markets could experience an increase in training requirements for electricity businesses and ESCOs, as part of their 'new' business activities.

Training can be designed to increase energy efficiency in a range of consumer and energy practitioner activities, and can take place by:

- working with educational institutions to influence their curricula;
- developing traineeship or other incentive schemes to attract practitioners into the sustainable energy sector;
- improving the skills of the people already in the sustainable energy and energy efficiency business (eg hardware installers, energy practitioners);
- developing training that specifically targets operators and decision makers who would not traditionally view themselves as having influence over sustainable energy issues (eg operatives in the building and construction sector);
- training people who sell energy efficient and renewable energy products and appliances.

Educational institutions can be encouraged to introduce energy efficiency modules into their curricula or to enhance existing energy courses. This could take place at any level of education, such as:

- at universities for engineers, environmental scientists and other disciplines;
- at technical training institutions for tradespeople such as plumbers, fitters and joiners;
- at primary and secondary schools, as part of environmental science and other subjects

The majority of existing sustainable energy training schemes focus on improving and updating the skills of people working in areas that impact on energy consumption. Increasingly, training is being designed to encourage people who work in sectors traditionally not associated with energy management, for example the building sector.

Promotional and training programs can be designed to assist people to market and sell the benefits of energy efficient products to their customers. Specific training can be designed and delivered for appliance retailers, wholesale providers of energy-using equipment such as motors, and real estate and property salespeople.

Sustainable energy training schemes may have to establish their resources and expertise from scratch, probably under funding constraints, and possibly duplicating skills already available within the electricity industry. Promoters of such training schemes may find it very difficult to quantify outcomes in terms of improved energy efficiency. However, if increased sustainable energy skills are not an outcome from energy sector reforms, specific training schemes may have to be implemented by governments.

In some jurisdictions, sustainable energy training schemes for practitioners have been in place for some time. In these cases, it may be necessary to revitalise some of these training schemes, for example by:

- benchmarking training best practice;
- focussing on new points of entering the need for training, eg training retail staff about energy labelling;
- building support networks as a new way of training sustainable energy practitioners;
- retraining sustainable energy practitioners as techniques are refined and new techniques are developed.

Issues to consider in relation to this mechanism include:

- the objective of the training scheme;
- whether a market exists for the expertise that will be created;
- the funding/level of resources required for the training scheme;
- the nature of training scheme – community service obligation or user pays?

Does this mechanism depend on or overlap with other mechanisms described?

Other mechanisms that would be particularly relevant are: *S3 Creating entrepreneurial energy organisations; S5 Promotion of energy efficiency by industry associations; S6 Aggregating electricity purchasers to achieve energy efficiency;* and *M2 Tax exemptions and incentives for energy efficiency* (if these were applied to training).

Depending on the particular situation, there may be overlap or synergy with mechanisms that actively promote electricity businesses as sustainable energy providers, namely: *C2 Energy efficiency licence conditions for electricity businesses; F2 Financing of energy efficiency by electricity businesses;* and *S4 Developing the ESCO industry*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling and commercialisation/privatisation have no effect on this mechanism because training schemes will continue irrespective of the electricity industry structure. However, under competition, this mechanism is more useful and/or relevant because electricity businesses can use the trained personnel to implement energy efficiency programs and gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since it operates quite separately to any of the changes occurring in the structure of the electricity industry.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Most training schemes focus on achieving more energy efficient practices and behaviour. However, training could also be provided to encourage load shifting.

Is the mechanism indirectly supporting the above by some means?

The mechanism provides indirect support by developing skilled practitioners.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

A number of training schemes have been developed worldwide but outcomes in terms of energy efficiency are difficult to measure.

What are key examples of the above?

Australia

In New South Wales, Australia, the Sustainable Energy Development Authority (SEDA) has developed training modules for the following groups:

- architects and building designers;
- residential and commercial building companies;
- land and property developers – sales and design teams;
- product suppliers – eg insulation, skylights.

The demand for this training has been high, because it has been developed as part of a suite of activities to increase energy efficiency in the building sector. For example, municipal councils are the bodies responsible for approving new residential properties, and they are raising their minimum energy performance requirements through participation in a number of energy programs. Consequently all builders and developers who wish to compete in the more progressive market place are using the training services made available by SEDA.

SEDA is also working with industry to promote training and accreditation courses for solar water heater installers.

SEDA provides twenty Sustainable Energy Traineeships each year (each worth AUD 5000). This money is provided to employers to assist them to take on apprentices in trades including plumbers, electricians, fitters and joiners. The trainees receive training (in addition to their normal apprentice work) provided by SEDA and upon the completion of their studies, they are employed by the people who sponsored their traineeship.

Denmark

In July 1996 a new state subsidy scheme was introduced in Denmark concerning employment of staff members who act either in an energy advisory capacity or are involved with practical energy management in small- and medium-sized enterprises with considerable energy consumption.

A subsidy of up to 50% of the total project costs may be granted to energy efficiency projects in which at least one new employee is taken on – either as an energy staff member or as a replacement for an employee who will be working on the project as an energy staff member. The project must target an increase in the energy efficiency activities of the enterprise and measures must be taken to ensure a continuation of the results after the end of the project. Projects may consist of tasks such as participation in energy audits, planning and implementation of energy management, and staff training in energy efficiency.

The subsidy scheme is an extension of a legislative package of green taxes adopted in 1995 by the Danish Parliament

Japan

The Energy Conservation Centre in Tokyo provides training and accreditation including: training of ISO14001 environment judges; training courses for factory energy managers, and conducting examinations for qualified energy managers.

Norway

The Information Centre for Energy Efficiency (OFE) provides information and training as the agent of the Norwegian Water Resources and Energy Directorate. OFE provides training courses aimed at service personnel and persons with a technical responsibility in the private and public building sector. The training scheme consists of 80 qualified teachers and high quality training material. One of the most important objectives of the courses is to combine theoretical and practical knowledge. In 1998 over 140 courses with roughly 2500 participants have been arranged. Depending on the type and level, each course can last from one to five days. OFE also supports different educational projects in public schools.

Where can further information on these existing mechanisms be found?

Energy Conservation Center, Japan – http://www.eccj.or.jp

Sustainable Energy Development Authority, Australia: http://www.seda.nsw.gov.au

Norwegian Water Resources and Energy Directorate: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Sustainable energy training schemes are most likely to be promoted by government departments and/or organisations with the responsibility for sustainable development or energy efficiency, and by the bodies (educational institutions, energy centres) likely to benefit from offering the courses.

Who would initiate the development of this mechanism?

Government departments/organisations responsible for sustainable development or energy efficiency.

Who would actually design and develop the mechanism?

Educational institutions, energy centres.

Which parties are responsible for carrying out activities arising from this mechanism?

Educational institutions, energy centres.

Which parties actually realise the DSM and energy efficiency outcomes?

Conducting training schemes can influence the actions of a range of consumers – including the practitioners trained, and in some cases, the customers who receive the goods or services from the trained personnel.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone, but its success will depend on existence of a job market for those undertaking training, and financial support for the training schemes themselves.

What are the basic institutional/market requirements?

A funding source for the training scheme.

Skilled staff to prepare and deliver energy efficiency training.

A market, commercial or otherwise, for sustainable energy.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Typically, design and development of training schemes would be funded by the government departments/organisations responsible for sustainable development or energy efficiency.

How are activities arising from this mechanism funded?

Typically, training schemes would be funded from the government budget.

Where training is provided 'commercially' (user pays) a portion of the funding would be sourced from the training organisation itself.

6. IMPACTS ON ELECTRICITY BUSINESSES

If electricity businesses have access to the training schemes, they may be able to create new business opportunities for the business through providing energy services to customers. The cost to the business of participating in such schemes would be negligible.

However if training opportunities are largely taken up by third parties the electricity businesses would simply experience reduced sales due to the third party implementation of energy efficiency.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Establishment of a funding mechanism.** Fees may be charged for training courses and these fees may cover all or only part of the cost of providing the training. Where fees cover only part of the cost, additional funding may be sourced from: the government budget, a public benefits charge, or energy/CO_2 taxes.
- **Evaluation of local integrated resource plans.** Periodic evaluations of the training courses will be required (including the development of performance indicators) to ensure that the training is being conducted efficiently and effectively.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.

- **Promotion of energy services.** This will be required to ensure that there is sufficient public awareness about energy services, and hence a market for the skills being taught through the training courses.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

The results of this mechanism are intangible since it is not possible to demonstrate a clear link between training schemes and energy efficiency and DSM outcomes. Intangible results will make training schemes difficult to justify.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- While it is difficult to evaluate the impact of training schemes, it is likely that the demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of employing the increased numbers of skilled people graduating from the training schemes, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- There will be no direct impact from training schemes but there are likely to be indirect impacts through increased demand for energy efficiency.

9.3 Industry and Consumer Issues

- Training should be provided to all customer classes. If funding is from a governmental agency and if one customer class benefits to the detriment of others, then the agency will need to review the policies surrounding the use of government funds for training.
- Reduced revenue from network services and increased program costs might affect the competitive positions of electricity businesses. However, the loss of revenue may be offset by the returns generated from energy services and financing if these are provided directly by electricity businesses.

10. EVALUATION

10.1 Evaluation Issues

It is difficult to establish a clear link between expenditure on training schemes and the achievement of energy efficiency and DSM outcomes. These outcomes can therefore only be achieved, especially within an acceptable time-frame, in conjunction with more targeted mechanisms.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None High ★ ★ ★ ★
Barriers addressed	Low number High number ★ ★ ★
Effects of restructuring on mechanism	Less useful More useful ★ ★ ★
Transferability	Low High ★ ★ ★ ★ ★
Flexibility	Low High ★ ★ ★ ★ ★
Potential for market transformation	Low High ★ ★ ★ ★
Cost effectiveness	Low High ★ ★ ★
Social and environmental impacts	High Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Elm-Larsen, U (1997) 'Subsidy Scheme for Employment of Energy Staff Members in Enterprises', in *Sustainable Energy Opportunities for a Greater Europe: The Energy Efficiency Challenge*, ECEEE Conference Proceedings, Summer Study.

Norwegian Water Resources and Energy Directorate (1998) Private communication, Terje Stamer Wahl.

Sustainable Energy Development Authority Energy Smart Homes Program (1998) *Architects and Building Designers Training Booklet*. Sydney, Australia.

Sustainable Energy Development Authority Energy Smart Homes Program (1998) *Smart Showerheads Training Booklet*. Sydney, Australia.

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Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S2

Energy Centres

Mechanism Type: Support

Outline	This mechanism involves the establishment of organisations with the sole or main purpose of promoting energy efficiency and DSM. These organisations may operate independently from electricity businesses or they may be linked to such businesses in a variety of ways.
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑ More useful and/or relevant
	Commercialisation/ Privatisation ↑ More useful and/or relevant
	Competition ↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial
Policy barriers addressed	6, 7, 12, 13
Program barriers addressed	2, 3, 4, 5, 7
Who Promotes?	Governments or electricity businesses
Who Initiates?	Governments or electricity businesses
Who Develops?	Governments or electricity businesses with input from consumer groups
Who Implements?	Staff from energy center, contractors
Who is Targeted?	End-users
Funding	Government budget, public benefits charge, membership fees, electricity businesses
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business Loss of revenue caused by reduced sales
Previous experience	Canada – Kortright Center Japan – Energy Conservation Center Korea – Korea Energy Management Corporation Norway – Energy Service Centres Sweden – regional energy efficiency centers United Kingdom – Energy Efficiency Advice Centres

1. MECHANISM OUTLINE

This mechanism involves the establishment of organisations with the sole or main purpose of promoting energy efficiency and DSM. These organisations may operate independently from electricity businesses or they may be linked to such businesses in a variety of ways.

1.1 General Description

What the mechanism means in general terms.

The basic premises behind the establishment of energy centres is that energy efficiency is not consistent with the commercial business drivers of electricity businesses, and that the energy services industry will not address certain market segments. This may or may not be the case depending on the characteristics of the energy market in question, and the types of regulation that have been put in place.

However, electricity businesses may find that establishing links with energy centres, or even establishing a wholly-owned energy centre, an attractive business proposition. The attitude of electricity businesses to energy centres depends on the structure of the electricity industry and, particularly, on regulatory requirements in relation to DSM and energy efficiency.

Energy centres can undertake a range of energy efficiency activities, can be government or private organisations, and can contract out programs or undertake the activities themselves. These characteristics may change over time to reflect broader changes in the energy market, such as the effects of retail competition on energy services and the impacts of regulation.

As a mechanism, the development of energy centres must be carefully tailored to the particular political and energy market environments, or risk losing support. While energy centres are an administratively simple way of addressing selected energy efficiency matters, history shows that support for them can readily disappear.

Following are some key issues to address when promoting energy centres as a viable proposition.

- **Sponsorship** – the range of sponsors should be as broad as possible because involvement of several stakeholders reduces the risk of losing support through political and bureaucratic changes in government sponsors. Sponsorship by industry as well as government bodies may provide a significant safeguard against loss of support.
- **Funding** – dedicated funding (eg via a levy on electricity customers or a public benefits charge) may be more sustainable than government funding. However, if electricity businesses actively oppose the levy or charge and insist on exerting some control over how the money is spent, government funding may be more effective in achieving energy efficiency outcomes. Subscriptions from energy centre members may be another source of funding. Also, if appropriate to the centre's activities, some commercial activity would strengthen the case for maintaining non-commercial funding.
- **Duplication of Services** – if other players in the energy market, eg energy service companies (ESCOs) and electricity businesses, are willing to provide the same services commercially (or are mandated or regulated to do so), it will be difficult to rationalise an ongoing requirement for government support of energy centres.

At one end of the spectrum, an energy centre may have a small resource base and focus on providing general energy information to the wider community. At the other end, energy centres can be very well resourced and carry out a range of research and development activities, promote ESCOs, nurture institutional and international linkages and business opportunities, and play an important role in providing advice in relation to both business and government policy.

Most energy centres focus on providing information about stationary energy sources, while some also include the transport sector in their energy activities. Ideally the energy centre will be fuel neutral, with the primary objective being to achieve energy efficiency savings across the whole energy sector.

Most energy centres provide information to a range of end users, such as commercial, industrial, and residential energy end users; while some focus more specifically on one group, such as the industrial sector or residential households. Some energy centres are regionally based and therefore benefit from close contact with their customers but are often poorly resourced. National energy centres, on the other hand, are often very well resourced and have the ability to build up a critical mass of energy efficiency expertise to provide a range of services but may suffer from being physically distant from many potential customers.

Energy centres often provide free information to end users and interested parties. Such non-commercial activity eg advice and assistance to the residential sector, could be considered as a public service obligation and should be funded by government. Energy centres can also conduct fee-for-service arrangements, such as energy audits and performance contracting, ideally on behalf of electricity businesses rather than in competition with them.

Energy centres can carry out a range of activities including:

- responding to general inquiries about energy use, both from visitors to the energy centre and through an inquiry phone line;
- producing general energy information in the form of: information brochures and leaflets; regular newsletters; internet information sites; posters and essay contests; public exhibitions and seminars; commendation awards for efficient commercial and industrial facilities;
- providing information about energy efficient products and appliances;
- carrying out residential energy audits, either by visiting homes or asking questions over the phone and providing information;
- carrying out energy audits of industrial and commercial sites and buildings;
- establishing links between industrial and commercial companies and relevant energy consultants/service providers;
- providing training and education programs, which can range from simple programs for school children, to more complex training activities and accredited courses for the energy services sector;
- surveying, collecting and offering energy efficiency data, including working with other countries and international bodies such as the IEA, UNIDO, APEC etc

Energy centres may have to establish their resources and expertise from scratch, probably under funding constraints, possibly in competition with electricity businesses. Also, energy centres may find it very difficult to quantify outcomes in terms of improved energy efficiency, at least with respect to information programs. However, despite these difficulties, if electricity market reform does not act to ‘commercialise’ energy efficiency and there is reluctance to legislate or regulate for energy efficiency, this is one of only a few mechanisms that may have any impact.

Issues to consider in relation to this mechanism include:

- the objective of the energy centre;
- the range of customers the energy centre will focus on;
- the funding/level of resources required for the energy centre;
- the nature of the energy centre activities – pure information provision, or extend into training and research and development?
- whether sponsorship of the energy centre by an energy provider compromises the 'messages' the energy centre is presenting to its audience.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism would benefit significantly from a dedicated funding source such as *F1 Public benefits charge for energy efficiency*.

There may be considerable overlap with mechanisms that actively promote electricity businesses or others in the energy centre role, namely: *C2 Energy efficiency licence conditions for electricity businesses; F2 Financing of energy efficiency by electricity businesses;* and *S4 Developing the ESCO industry*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because energy centres can promote DSM and energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the interest in energy efficiency generated by energy centres to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The main transitional issue is whether new electricity businesses are mandated, regulated or commercially driven to offer customers the services that energy centres may be expected to provide. However, this mechanism is well placed to deal with the transition since its method of application does not change across all industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Energy centres could promote either or both of the above outcomes, depending on the activities chosen.

Is the mechanism indirectly supporting the above by some means?

The mechanism largely provides indirect support by providing information.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes, there are numerous examples of energy centres, both successes and failures, from around the world, including, more recently, in changing electricity market environments.

What are key examples of the above?

Canada

The Kortright Centre near Toronto promotes the adoption of practical applications of renewable energy technologies and energy efficient technologies and practices. Its location in unspoiled, natural surroundings and the appeal of its hands-on public education programs have resulted in increasing numbers of visitors, demands for information, media interest and external advising.

Deliverables of the centre include demonstrations of renewables and energy efficient technologies, public education programs, school programs, multi-media skills and productions, fact sheets, information hotline and consulting services.

The Kortright Centre promotes partnerships, and has conducted cooperative ventures with government organisations, including utilities, non-profit groups and industry. The themes promoted by the centre have evolved over time to reflect the changes in funding bodies. The Renewable Energy Theme was established in the early 1980's as part of an agreement between the Ministries of Energy and Natural Resources, and the Kortright Centre's owner, the Metro Toronto & Region Conservation Authority. This theme then became a broader Environment Theme after the Ministries of Energy and Environment merged. Ministry funding ceased in 1995, and the utility Ontario Hydro provided funds for the following two years, which saw the centre return to an energy theme. The program is now continuing under local government and industry funding.

Japan

The Energy Conservation Center is funded by members (more than 3,300) and income from a number of projects. It has a long history (established 1978) and places a strong emphasis on cooperation.

The activities undertaken by the Energy Conservation Center include:

- information and energy conservation promotional activities – such as: energy exhibitions, media advertisements, promoting the Energy Star program, promoting ESCOs, promoting the energy efficiency tax system, conducting poster and essay contests, production of monthly publications and the awarding of excellence awards to industrial operations;
- research and data collection including: surveying, collecting and disseminating energy conservation case studies and data; carrying out research and development; exchanging information with the IEA and CADDET;
- training and accreditation including: training of ISO14001 environment judges; running training courses for factory energy managers, and conducting examinations for qualified energy managers;
- conducting audits and providing energy expertise;
- conducting and participating in international conferences and developing its international activities of training and cooperative projects.

Korea

The Korea Energy Management Corporation (KEMCO), established by the *Rational Energy Utilization Act* is a non-profit governmental organization charged with the promotion and implementation of national energy efficiency and conservation initiatives. More than half of KEMCO's overall budget is provided by government

KEMCO's. major activities are as follows:

- management of energy-intensive companies and buildings;
- monitoring the observance of energy management guidelines;
- dissemination of energy efficient technologies and facilities;
- energy audit programs;
- promotion of ESCO activities;
- replacement of inefficient boilers, kilns and furnaces;
- promotion of waste heat recovery;
- promotion of energy efficient building design;
- efficiency standards and labelling for major appliances;

- management of the fuel economy of passenger cars;
- public campaigns and education;
- efficiency management of energy equipment and appliances;
- financial assistance for rational energy utilization;
- R&D on new and renewable energy sources and energy efficiency.

Norway

The Energy Service Centres (ESCs) are a network of about 20 regional energy centres which are funded by a distribution charge placed on grid operators. Grid owners are required, as part of the area service licence requirements, to undertake DSM activities. They are encouraged – but not required – to set up energy centres to carry out the DSM work. The activities that are required to be carried out (and which are typically carried out by the regional ESCs) include:

- giving information about energy efficiency and historical energy use;
- carrying out simple energy audits of houses and other buildings and instructing their owners about measures for more efficient use of energy;
- encouraging the use of energy and load budgets and standards for energy use in commercial buildings;
- guiding customers in monitoring and controlling energy and energy efficiency;
- establishing contact between industrial companies and relevant consultants.

The Energy Service Centres operate as separate companies throughout Norway. More than 150 of the 200 utilities in Norway are carrying out their DSM activities through the Centres.

Norway also has 'operating agents', responsible for the practical application of activities on behalf of the government authorities. For example, the Information Centre for Energy Efficiency (OFE) is responsible for the public information and training activities on behalf of the Norwegian Water Resources and Energy Directorate. OFE carries out general information and promotion activities regarding energy efficiency directed toward the construction, and residential and commercial buildings sectors. This is achieved by means of a newsletter, brochures and leaflets, the internet, exhibitions and conferences, and training and education.

Sweden

A series of regional energy efficiency centres have been formed throughout Sweden. The centres disseminate information about energy efficiency and alternative energy sources and also work to initiate and coordinate projects. Their target audience is broad, including companies, industries, local organisations and other end users. Fifty percent funding is provided by the EC and the remaining 50% from local sources.

United Kingdom

In the United Kingdom, Energy Efficiency Advice Centres (EEACs) provide free, impartial advice on energy efficiency to householders and owners of small businesses. The EEACs were set up and jointly funded by the Energy Saving Trust (EST) and local authorities. There are currently 45 centres and the EST aims to expand the network to have full national coverage (up to 50 centres) by mid-2000.

Separate to the centres, but also providing information about energy use, is an organisation called CREATE. It produces educational material about energy efficiency for use with all ages in schools, and administers a refund program for schools which invest in their buildings to reduce energy use.

Where can further information on these existing mechanisms be found?

Energy Conservation Center, Japan – http://www.eccj.or.jp

Norwegian Water Resources and Energy Directorate: http://www.nve.no

Energy Saving Trust, United Kingdom: http://www.est.org.uk

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Energy centres are most likely to be promoted by government agencies and/or organisations which have responsibility for sustainable development or energy efficiency. Electricity businesses would promote energy centres where they have determined that establishing links with energy centres, or even establishing a wholly-owned energy centre is an attractive business proposition

Who would initiate the development of this mechanism?

Government agencies or electricity businesses.

Who would actually design and develop the mechanism?

Government agencies or electricity businesses with input from relevant consumer groups.

Which parties are responsible for carrying out activities arising from this mechanism?

Staff employed by the energy centres themselves, or contractors funded by the energy centres.

Which parties actually realise the DSM and energy efficiency outcomes?

End users – either end users in general, or a particular category of end user, eg domestic, commercial or industrial.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

Energy centres should be provided with dedicated funding, at least in the start-up phase and probably for their lifetime.

What are the basic institutional/market requirements?

Adequate/appropriate funding source.

Commitment to ongoing support from government and industry.

Clear understanding of the market niche that is to be served.

Development of effective methods for contacting and communicating with target audiences.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Energy centres may be funded from internal sources and/or resources of Government agencies responsible for sustainable development or energy efficiency. There may also be contributions from industry.

Energy centres linked to electricity businesses will be funded by those businesses.

How are activities arising from this mechanism funded?

Staff employed by the energy centres, or their contractors, can be funded in a variety of ways including:

- full or seed funding from government (general tax base);
- through a public benefits charge or levy imposed on energy sales;
- membership funding from external organisations;
- funding from electricity businesses.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses may find that establishing links with energy centres, or even establishing a wholly-owned energy centre, an attractive business proposition, particularly if subject to regulatory requirements in relation to DSM and energy efficiency. This would enable non-core, unprofitable activities to be carried out off the balance sheet, which may be important to some businesses.

Energy centres may also provide competition to electricity businesses, particularly if operating successfully in commercial and industrial markets, by promoting fuel switching and energy services hence reducing electricity sales.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Establishment of a funding mechanism.** Subscriptions and user fees may be charged to users of an energy centre and these fees may cover all or only part of the cost of operating the energy centre. Where fees cover only part of the cost, additional funding may be sourced from: the government budget, cost recovery, a public benefits charge, energy/CO_2 taxes, or direct funding by an electricity business.
- **Elimination of duplication of services.** When establishing an energy centre, and periodically thereafter, it is important to ensure that the energy centre is not duplicating services being adequately provided by government or the private sector.
- **Evaluation of energy centres.** Periodic evaluations of energy centres will be required (including the development of performance indicators) to ensure that the energy centres are being operated efficiently and effectively and are delivering clearly defined outcomes.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Energy centres which are funded directly from government budgets are vulnerable to political and bureaucratic changes. Those that are linked to a public benefits charge or other long term charges on the electricity industry would appear to have a more certain future (in terms of funding at least). However, public benefits charges may be opposed by electricity businesses.

Considerable lead times are required to establish energy centres and develop their resources and expertise.

There may be a problem with duplication between the services provided by energy centres and those provided by electricity businesses.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- There will be no direct impact from energy centres but there are likely to be indirect impacts through increased demand for energy efficiency.

9.3 Industry and Consumer Issues

- If an energy centre is funded by the government, there may be a requirement that the energy centre must target its services to all customer classes.
- Energy centres' services should not duplicate what the private sector is doing, unless the benefits are greater than the costs; otherwise, business activity (and support of the energy centres) will be reduced.

10. EVALUATION

10.1 Evaluation Issues

A clear link between public expenditure on energy centres and energy efficiency and DSM outcomes is likely to be difficult to establish, and consequently it would be difficult for government to determine how efficiently public resources are used in establishing and maintaining energy centres.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None High ★ ★ ★ ★
Barriers addressed	Low number High number ★ ★ ★
Effects of restructuring on mechanism	Less useful More useful ★ ★ ★ ★
Transferability	Low High ★ ★ ★ ★ ★
Flexibility	Low High ★ ★ ★ ★ ★
Potential for market transformation	Low High ★ ★
Cost effectiveness	Low High ★ ★ ★ ★
Social and environmental impacts	High Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Australia and New Zealand Minerals and Energy Council IRP Study Management Committee (1994) *Least Cost Energy Services for Australia: Demand Management and Integrated Resource Planning in a Competitive Electricity Market*, Canberra, Australia.

Norwegian Water Resources and Energy Directorate (1998) Private communication, Terje Stamer Wahl.

Office of Electricity Regulation (1992) *Energy Efficiency: The Way Forward*, Birmingham, United Kingdom.

The Energy Conservation Centre, Japan (1993) *Japan Energy Conservation Handbook*, Tokyo, Japan.

The Energy Conservation Centre, Japan (1997) *ECCJ Profile*, Tokyo, Japan.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S3

Creating Entrepreneurial Energy Organisations

Mechanism Type: Support

Outline	This mechanism involves the creation by government of organisations with clear responsibilities for achieving energy efficiency outcomes. Entrepreneurial energy organisations are distinguished from energy centres because their objectives are more commercial than those of energy centres and they aim to eventually become self-funding over time.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	↑ More useful and/or relevant
	Commercialisation/ Privatisation	↑ More useful and/or relevant
	Competition	↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	6, 7, 12, 13	
Program barriers addressed	2, 3, 4, 5, 7	
Who Promotes?	Government	
Who Initiates?	Government	
Who Develops?	Government	
Who Implements?	Staff from the organisation, contractors	
Who is Targeted?	End-users	
Funding	Initial start-up funded from government budget. Usually expected to become self-funding over time	
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business if it forms an alliance with an entrepreneurial energy organisation Loss of revenue caused by reduced sales which could be offset by revenue from the new business	
Previous experience	Australia – Sustainable Energy Development Authority United Kingdom – Energy Saving Trust	

1. MECHANISM OUTLINE

This mechanism involves the creation by government of organisations with clear responsibilities for achieving energy efficiency outcomes. Entrepreneurial energy organisations are distinguished from energy centres because their objectives are more commercial than those of energy centres and they aim to eventually become self-funding over time.

1.1 General Description

What the mechanism means in general terms.

Traditionally, organisations promoting energy efficiency, such as energy centres, were largely funded by government, and focused on the provision of government subsidies for the development of energy efficiency technologies and practices. In addition, there was an emphasis on programs aimed at encouraging behavioural change and providing energy information to consumers.

A more recent trend involves governments establishing entrepreneurial energy organisations specifically to increase the use of energy efficient (and, often, renewable energy) technologies and practices, through a wide range of cost-effective, and/or commercially-oriented activities. Such organisations provide a hedge against the risk that the uncertainties created by reforming energy markets and restructuring electricity businesses will result in significant reductions in traditional energy efficiency programs carried out by government and energy sector businesses.

Entrepreneurial energy organisations focus on market transformation, ie they are mandated to increase the commercialisation and 'mainstreaming' of energy efficiency technologies and renewable energy across all sectors in the community. Such organisations will often still carry out a range of 'traditional' activities, such as information provision, branding and energy labelling. However, the emphasis is on establishing the promotion of energy efficiency as a commercially viable self-funding activity.

Entrepreneural energy organisations have two defining characteristics which distinguish them from energy centres:

- their objectives are more commercial than those of energy centres;
- they aim to eventually become self-funding over time.

The underlying premise behind the establishment of independent, entrepreneurial energy organisations by government is that the promotion of energy efficiency is seen as being not consistent with the activities of electricity businesses. There may also be a concern that the commercial energy services industry may not address the government's energy and environmental concerns.

Governments are establishing entrepreneurial energy organisations for a variety of reasons, including:

- an aversion to adopting more prescriptive mechanisms such as legislation and regulation;
- a commitment to building on the success of more traditional mechanisms such as energy centres;
- an emphasis on commercialisation and partnerships, consistent with some public policy approaches.

Entrepreneurial energy organisations can be created with broad responsibilities. In addition to designing and managing market transformation programs they can also be granted powers to enter into commercial arrangements such as: creating companies; entering into joint ventures and investing venture capital directly in the commercialisation of cutting edge energy efficient technologies.

The main administration and governance options for establishing entrepreneurial energy organisations include:

- giving authority to administer programs to existing or newly created government agencies;
- creating non-profit corporations or authorities with Boards of Directors;
- creating a small independent advisory board, responsible for developing and overseeing a competitive process to select program administrators to manage the delivery of energy efficiency programs and services.

There are a variety of options for funding entrepreneurial energy organisations, including:

- government funding only;
- a mix of government and other funds sourced from, for example:
  - fees paid by energy suppliers;
  - a public benefits charge;
- a mix of government funds and ‘fee for service’ charges made by the organisation itself;
- over time, income gained by the organisation from its investments in new energy efficient technology.

Key issues to address when promoting entrepreneurial energy organisations as a viable proposition include:

- the degree of commitment from government in terms of both political support and agreed funding;
- whether other players in the energy market such as ESCOs or energy sector businesses are willing to provide the same services commercially (or are mandated or regulated to do so). If so, it will be difficult to rationalise an ongoing requirement for government support.

Issues to be considered in relation to this mechanism include:

- the objectives of the organisation;
- the target audience for the organisation;
- the appropriate funding/level of resources fro the organisation;
- commercial nature of the organisation’s activities;
- the degree of overlap with existing energy market participants.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism would benefit significantly from a dedicated funding source such as *F1 Public benefits charge for energy efficiency*, rather than being funded from the government budget. This funding requirement may diminish over time as the entrepreneurial organisation moves towards self-funding.

There may be considerable overlap with mechanisms that actively promote electricity businesses or others in the energy centre role, namely: *F2 Financing of energy efficiency by electricity businesses; S4 Developing the ESCO industry;* and, possibly, *S2 Energy centres*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because entrepreneurial energy organisations can promote DSM and energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the interest in energy efficiency generated by entrepreneurial energy organisations to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The main transitional issue is whether new electricity businesses are mandated, regulated or commercially driven to offer customers the services that entrepreneurial energy organisations may be expected to provide. However, this mechanism is well placed to deal with the transition since its method of application does not change across all industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The focus for entrepreneurial energy organisations would most typically be on directly promoting increased energy efficiency. However the commercial focus of programs run by such organisations would also encourage end users to consider reducing their energy costs by load shifting wherever possible.

Is the mechanism indirectly supporting the above by some means?

Some activities carried out within entrepreneurial energy organisations may indirectly support the above objectives, eg information programs. However, the majority of activities directly support the objectives.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

A number of agencies that include elements of an entrepreneurial energy organisation have existed for some time. These include France's ADEME, the Netherland's NOVEM, New Zealand's EECA and Finland's MOTIVA. More recent examples include Australia's SEDA and the United Kingdom's Energy Saving Trust.

What are key examples of the above?

Australia

The Sustainable Energy Development Authority (SEDA) is a New South Wales State Government agency created by legislation and funded directly by the government. It commenced operation in 1996 with the objective of reducing the level of greenhouse gas emissions in the State by investing in the commercialisation and use of sustainable energy technologies. It was created at the time of restructuring of the New South Wales electricity industry and introduction of a competitive market.

SEDA's priorities are to:

- focus on energy efficiency, renewable energy and cogeneration;
- identify funding opportunities that transform the market for sustainable energy technologies by entering into joint ventures, providing grants, and accepting royalties and returns on investments without a bureaucratic approach.

The aim is to assist the sustainable energy industry to increase its share of the energy market in NSW.

SEDA is specifically not supporting fundamental research or one-off projects that do not show potential for market transformation. Programs in place include:

- Energy Smart Business
- Green Power Accreditation Program
- Energy Star Office Equipment
- Energy Smart Homes and Local Councils
- Cogeneration Investment Program

- Energy Smart Government
- Community Housing Energy Program
- Energy Smart Allies
- Renewable Energy Investment Program.

United Kingdom

The Energy Saving Trust (EST) was established by the United Kingdom Government and the gas and electricity industries in response to concerns about global warming and the role of energy consumption. Its objective is the efficient use of all forms of energy in the UK, leading to a reduction in the consequential environmental impact.

Since 1993 EST has been operational as a private, non-profit company. Originally it was intended that 75% of funding would come from levies on gas and electricity customers, with the balance being derived from local authorities. Currently, very little funding is being provided from electricity and gas customers and the EST is funded directly by the national government.

The electricity regulator (OFFER) has imposed Standards of Performance which require that the electricity companies achieve specified levels of energy savings. These savings are achieved through programs developed and implemented by the electricity companies and funded by a levy of £1 per customer. The EST provides advice on development of the Standards, and evaluates project documentation before and after completion. If a project is endorsed by the EST, the recommendation for approval is sent to the regulator.

Since 1995, the EST has been given the revised role of working with industry to develop schemes and markets for energy efficiency activities and energy services, with the key objectives:

- to pump-prime markets for energy efficiency products;
- to direct public attitudes towards energy efficiency solutions;
- to promote the development of energy service companies.

The emphasis is on market-based schemes, and achieving leveraged funding from a wide range of third party contributors.

Where can further information on these existing mechanisms be found?

Energy Efficiency and Conservation Authority, New Zealand: http://www.eeca.govt.nz

Energy Saving Trust, United Kingdom: http://www.est.org.uk

Sustainable Energy Development Authority, Australia: http://www.seda.nsw.gov.au

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Entrepreneurial energy organisations are most likely to be promoted by government agencies with the responsibility for sustainable development or energy efficiency, or interest in the environmental implications of energy market reforms. They would be probably be promoted because of the perception that the electricity industry would be unwilling or unable to implement energy efficiency measures, and that market mechanisms would not deliver the required outcomes.

Who would initiate the development of this mechanism?

Government would normally initiate the creation of the organisation, possibly with involvement from the energy industry.

Who would actually design and develop the mechanism?

Government agencies responsible for sustainable development or energy efficiency, with input from relevant energy market participants.

Which parties are responsible for carrying out activities arising from this mechanism?

Staff employed by the entrepreneurial energy organisations themselves, their contractors and program partners.

Which parties actually realise the DSM and energy efficiency outcomes?

Entrepreneurial energy organisations can be created to target specific end use customer segments, or to develop a wide range of programs, to cover the broader community.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

This mechanism could stand alone.

What are the basic institutional/market requirements?

Adequate/appropriate funding source.

Commitment to ongoing support from government.

Clear understanding of the market niche that is to be served.

Development of effective methods for implementing programs.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal funding and resources of Government agencies responsible for sustainable development or energy efficiency for initial start-up. However, it is usually expected that entrepreneurial energy organisations will become self-funding over time.

How are activities arising from this mechanism funded?

Various sources of funding could include:

- funding from the government budget only (to be phased out over time).
- a mix of government and other funds sourced from, for example:
    - fees paid by energy suppliers;
    - a public benefits charge;
- a mix of government funds and ‘fee for service’ charges made by the organisation itself;
- over time, income gained by the organisation from its investments in new energy efficient technology.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses wishing to become energy service providers may benefit from being able to align their customer service with the products and services being promoted and supported by an entrepreneurial energy organisation.

Electricity businesses which rely solely on electricity sales for revenue are likely to see their sales diminish over the longer term as the entrepreneurial energy organisation's commercial activities and market transformation initiatives become established.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation will be required to establish an entrepreneurial energy organisation. It should specify the objectives of the organisation, the way in which the organisation is funded, the scope of the organisation, the target audience, the appropriate funding level, the administration of the organisation, commercial nature of activities, degree of overlap with existing energy market participants, and the length of time the organisation will exist (ie a "sunset" clause).
- **Establishment of a funding mechanism.** Initial funding may be sourced from: the government budget, cost recovery, a public benefits charge, energy/CO_2 taxes, or user fees. One of the defining features of an entrepreneurial energy organisation is that over the longer term it aims to become self-funding from its commercial activities, particularly venture capital activities. An initial source of funding for venture capital will therefore have to be identified.
- **Elimination of duplication of services.** When establishing an entrepreneurial energy centre, and periodically thereafter, it is important to ensure that the organisation is not duplicating services being adequately provided by government or the private sector.
- **Evaluation of entrepreneurial energy organisations.** Periodic evaluations of entrepreneurial energy organisations will be required (including the development of performance indicators) to ensure that the organisations are being operated efficiently and effectively and are delivering clearly defined outcomes.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Because most entrepreneurial energy organisations are initially government funded, they are vulnerable to political and bureaucratic changes. Those that are linked to public benefit charge or other long term charges on the electricity industry would appear to have a more certain future (in terms of funding at least). However, public benefits charges may be opposed for a number of reasons.

If an entrepreneurial energy organisation successfully makes the transition from being publicly funded to raising its own funds from commercial activities, there may be a problem in ensuring that its commercial activities remain focussed on energy efficiency and are not diverted to more profitable areas.

Considerable lead times would be required to establish such organisations, and develop their resources and expertise.

There may be a problem with duplication between the services provided by energy centres and those provided by electricity businesses.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- An infrastructure for providing energy efficiency services must be capable of meeting increased demand, otherwise expectations will not be met.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from an entrepreneurial energy organisation's activities may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The organisation may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- There may be some pressure for entrepreneurial energy organisations to target their services to all customer classes. However, given the essentially commercial nature of the organisations' activities, the organisation may decide to service the most profitable customers rather than equally servicing all customer classes. Depending on the ownership of the entrepreneurial organisation, some direction from the owner(s) may be required if it is determined that the organisation should service all customer classes.
- Entrepreneurial energy organisations' services should not duplicate what the private sector is doing, unless the benefits are greater than the costs; otherwise support from private sector businesses may be reduced.

10. EVALUATION

10.1 Evaluation Issues

A clear link between public expenditure on entrepreneurial organisations and energy efficiency outcomes is likely to be difficult to establish (at least initially), and consequently it would be difficult for government to determine how efficiently public resources are used.

The political framework is likely to be a significant determinant in the acceptability of this mechanism. Consequently, the mechanism is not readily transferable between different jurisdictions.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High	★ ★
Barriers addressed	Low number … High number	★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful	★ ★ ★ ★
Transferability	Low … High	★ ★
Flexibility	Low … High	★ ★ ★
Potential for market transformation	Low … High	★ ★ ★ ★ ★
Cost effectiveness	Low … High	★ ★ ★ ★
Social and environmental impacts	High … Low	★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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Office of Electricity Regulation (1992) *Energy Efficiency: The Way Forward*, Birmingham, United Kingdom.

Sustainable Energy Fund Working Group (1995) *Final Report to the Treasurer and Minister for Energy*, NSW Electricity Reform Taskforce, Sydney, Australia.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S4

Developing the ESCO Industry

Mechanism Type: Support

Outline	This mechanism involves government encouraging the development of a diverse energy services sector which is commercially focused and independent of electricity market regulation. Energy service companies (ESCOs) within this sector will provide energy services across the board to a range of customers. ESCOs could be established in parallel with electricity businesses or even as distinct business units within existing electricity businesses.
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑ More useful and/or relevant
	Commercialisation/ Privatisation ↑ More useful and/or relevant
	Competition ↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial
Policy barriers addressed	6, 7, 8, 9, 10, 12, 13
Program barriers addressed	2, 3, 4, 5, 6, 7, 8, 9
Who Promotes?	Government, ESCO industry association
Who Initiates?	Government, ESCO industry association
Who Develops?	Government, ESCO industry association
Who Implements?	Government, ESCO industry association
Who is Targeted?	ESCOs and end-users
Funding	Government budget possibly with contributions from the ESCO industry association
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business if it sets up its own ESCO or forms an alliance with an independent ESCO Loss of revenue caused by reduced sales which could be offset by revenue from the new business
Previous experience	Korea – ESCO assistance program United Kingdom – ESCO Development Programme United States – Energy Fitness Program

1. MECHANISM OUTLINE

This mechanism involves Government encouraging the development of a diverse energy services sector which is commercially focused and independent of electricity market regulation. Energy service companies (ESCOs) within this sector will provide energy services across the board to a range of customers. ESCOs could be established in parallel with electricity businesses or even as distinct business units within existing electricity businesses.

1.1 General Description

What the mechanism means in general terms.

Energy service companies (ESCOs) are organisations which provide a range of services which help end users buy and use energy efficiently and cost-effectively. ESCO development schemes are programs which create and assist the commercial development of the energy services sector, so that energy efficiency services are widely available in the energy market.

Most frequently, ESCOs are private companies that offer a comprehensive set of services to improve the efficiency of a large customer's operations in order to save both energy and money. Customers of such ESCOs are primarily in the industrial, commercial and government sectors. ESCOs may or may not be associated with energy providers such as electricity retailers.

ESCOs typically promote energy performance contracting as a financial mechanism for encouraging the use of their services. Performance contracts guarantee that the ESCO will achieve certain estimated energy savings from its improvements program, and the ESCO receives its payment from these savings. The benefit for customers is that they take on minimal risk when entering into the contract, as the ESCO will have to absorb any shortfall in energy and financial savings.

Performance contracting is not the only way that ESCOs do business, however, as they can also provide their services under a straightforward contractual agreement if a consumer chooses to pay for the energy saving improvements up front. The benefit for ESCOs under this approach is that they can immediately collect the savings made from the improvements program.

While this traditional model is still appropriate for most current ESCO activity the concept of ESCOs is now broadening to include companies that arrange for and supply energy, as well as provide energy efficiency services to consumers. In addition, there is a growing interest in promoting ESCO activities for the smaller end users in the domestic and small business sector. An ESCO that fits under this broader definition could provide services such as: the competitive purchasing of various energy and fuel sources; combined heat and power (cogeneration); end-use efficiency measures; and energy consumption monitoring and management.

The main barriers to the development of a diverse, independent energy services sector which is commercially focused and able to provide energy services across the board to a range of customers are:

- lack of interest in energy efficiency by consumers, particularly domestic and small businesses, where energy costs can be a small proportion of overall costs;
- low prices of energy that occur when competition commences, and the corresponding low commercial imperative to address energy efficiency;

- lack of capital (equity financing or equity investments) for establishing ESCOs;
- uncertain or prohibitive government policies and regulations relating to the use of performance contracting;
- financial returns for ESCOs in the small business and residential sectors that are small and often risky.

There are a range of activities that can be carried out to promote independent ESCO development. Many of these can be developed and managed by government authorities, often with involvement of industry associations. There are basically two types of these activities:

- direct support to ESCOs themselves;
- activities which support ESCOs indirectly, eg through promoting energy efficiency in ways which support ESCO's business.

Following are summaries of some activities which support ESCOs directly.

- Encourage the streamlining of the procurement process by standardising documentation and procedures for selecting and contracting with ESCOs. This can be done by government or by an ESCO Association.
- Provide standard business development support services targeted directly at ESCOs such as start-up grants, subsidies and rebates; support with developing business plans; start-up business incubator services;
- Encourage the development of funding sources specifically for ESCOs to provide working capital for marketing and project preparation and development. Government departments and/or industry associations can assist ESCOs by investigating possible sources of funding and working to promote alliances with key players in the finance sector. Types of institutions that could be appropriate alliance partners include: private banks and lending institutions, venture capital firms, equity funds, strategic partners (eg utilities and engineering firms), leasing companies and equipment manufacturers.
- Licence or certify ESCOs for consumer protection (particularly if ESCOs assume traditional utility functions eg metering, billing) and to boost public confidence in ESCOs. Accreditation of ESCOs can be done by industry associations or a government agency.
- Create an ESCO Association. In countries where ESCO development is at its very early stages, an Association of Energy Service Companies can be created to promote the growth of ESCOs. The government can provide financial support for establishing such an association, with ongoing expenses eventually covered by membership fees.

Following are summaries of some activities which support ESCOs indirectly.

- Develop public information programs about energy efficiency, promoting the environmental and financial benefits. Customers need to be sufficiently aware of energy management issues in general before they will be receptive to the services of ESCOs. Different strategies will obviously have to be developed for the industrial sector, the commercial and the domestic sector.
- Develop strategies to facilitate ESCO promotion of performance contracting. For example:
  - ♦ work can be done by government departments or the industry itself to standardise contracts and proposals for the measurement and verification of savings;

- ♦ governments can promote energy performance contracting in their own buildings, by reviewing regulations for, and removing any institutional impediments to, the application of performance contracting.

- Develop a third party financing network to coordinate of the efforts of the various and diverse actors to accomplish market penetration of energy-efficient technologies. The network could include ESCOs, national and regional energy efficiency agencies, industry associations, lighting and equipment manufacturers and suppliers, financial institutions, community agencies, energy businesses and other suppliers of energy services.
- Establish an equipment leasing organisation. Existing leasing companies might be interested in offering energy-efficient equipment, or specific equipment leasing organisations may have to be established to provide a supply of energy efficient equipment.
- Promote through legislation and regulation, the provision of energy services by electricity and gas suppliers.
- Develop a framework and models for involvement of local authorities in ESCO activity. With financial assistance from government, local authorities could be encouraged to participate in energy service provision in their local region by:
  - ♦ acting as aggregators or brokers for energy purchases;
  - ♦ providing energy efficiency advice and equipment;
  - ♦ collaborating with ESCOs in providing energy services to domestic customers.
- Explore ways of bringing private finance into the improvement of public housing stock. For example, governments could provide incentives for financial institutions to fund energy efficiency projects in the public housing sector, possibly using the ‘shared savings’ concept.

Following are issues to consider when creating a mechanism to assist ESCO development.

- To what extent will the ESCOs themselves be able to achieve the desired DSM/energy efficiency goals? For example, ESCOs are often criticised as performing only in a limited range of areas, ie with large institutional, commercial and industrial customers. Other mechanisms may be more appropriate to promote energy efficiency in the domestic sector.
- What is the best way to help ESCOs develop? This will depend on the specific structure of the electricity industry within a jurisdiction, and the direction any reforms will take. ESCOs themselves undergo significant changes when the electricity sector is restructured – in the US for example, many utilities and electric and gas providers have acquired small and medium sized ESCOs and few small ‘independent’ ESCOs remain. Some utilities and energy providers are building their own retail energy services companies (RESCOs) to market both energy commodities and energy-related services.

Does this mechanism depend on or overlap with other mechanisms described?

Development of a commercial market for energy services rather than simply energy supply represents a paradigm shift in the way that most energy markets are currently operating. Hence some energy efficiency policy framework should be adopted to stimulate the development of this market.

Successful implementation of this mechanism would remove the need to promote electricity businesses as the key agents for implementing energy efficiency.

Mechanisms which could help ESCOs to better serve their customers should be pursued in conjunction with this mechanism to increase the potential for success. These include: *S1 Sustainable energy training schemes for practitioners; S3 Creating entrepreneurial energy organisations; S5 Promotion of energy efficiency by industry associations; S6 Aggregating electricity purchasers to achieve energy efficiency; M7 Cooperative procurement of energy efficient appliances and equipment;* and *M8 Energy performance contracting*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

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)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
6. Financial barriers
7. Product/service unavailability
8. Inseparability of product features
9. Organisational (institutional) barriers

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because ESCOs continue to promote DSM and energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can set up their own ESCOs to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

It is unlikely that this mechanism would become significant until retail competition deepens in the electricity industry and a number of businesses are offering customers energy services.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

ESCOs can carry out a range of activities, so mechanisms to assist ESCOs would indirectly promote both of the above outcomes.

Is the mechanism indirectly supporting the above by some means?

The support is indirect, as outcomes will depend on how effectively the ESCOs themselves can perform in the market.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Not to any significant extent, though programs to develop ESCOs and their role in promoting energy efficiency have been recently established.

What are key examples of the above?

Korea

In Korea, ESCOs have been established as successful businesses through assistance from the Korean Government, especially in the areas of finance, institutional support and public education. An ESCO association was established in 1999 with government support.

Considering that the Korean electricity industry is dominated by a large vertically integrated monopoly company, the success of the Korean ESCO industry is surprising. Major assistance was provided through the Korean Government allowing ESCOs to access 'the fund of rational energy utilization' (a public benefits charge mechanism). The Government also revised the government procurement and contracting regulations to allow ESCOs to undertake energy efficiency improvements in public buildings.

Korean ESCOs have experienced difficulties arising from increasing debt levels as their businesses have expanded. Also, Government regulations have set qualifying conditions on bidding for providing energy services that have restricted those ESCOs which are small companies with a low capital base to only bidding for small projects.

United Kingdom

The United Kingdom Round Table on Sustainable Development report, *The Domestic Energy Market: 1998 and Beyond* notes that the Department of Trade and Industry envisages that a competitive domestic market should encourage the development of alternative forms of service including energy efficiency, for example through energy management companies.

The Energy Saving Trust (EST), with funds from the Department of Environment, Transport and the Regions is carrying out a two year, £2 million ESCO development program. This commenced in November 1997, and is aimed primarily at the domestic and small business market. Its purpose is to assist the development of ESCOs, which provide both energy and energy efficiency measures. The program aims to affect the end use of energy (eg energy efficiency measures such as insulation), by providing examples of pilot projects of energy services packages operating in a number of target market sectors.

The program operates through a bid process - eg for 1998/99, 19 schemes were selected from 35 bids for funding. Four of these schemes were 'innovative bids' which focus on pilot projects or business start-ups, while 15 were public housing bids which aim to develop business plans.

In conjunction, the EST is also investigating the various areas in which involvement by the Trust could be most beneficial to ESCO development, including gas and electricity suppliers, local authorities, and different financing and delivery models.

United States

The US Department of Energy's Energy Fitness Program works with ESCOs, public and private ESCO customers and other interested parties to identify and remove barriers to increased delivery of energy efficiency by ESCOs. The program is one of DOE's Energy Star Partnerships and is part of the Rebuild America Program. The Energy Fitness Program aims to help performance-based ESCOs ensure that the installation of energy efficient equipment is maximised by educating customers as to how savings can fund the refurbishments.

The Program has four objectives:

- increase awareness of performance contracting amongst building owners;
- identify and remove barriers to increased delivery of energy efficiency, new high efficiency technologies and renewable energy by ESCOs;
- provide accessible information about the energy performance contracting industry;
- increase ESCO sales of efficient and renewable energy products.

The Program operates through a partnership approach with organisations such as the National Association of Energy Service Companies (NAESCO), the National Conference of State Legislatures (NCSL), the National Association of Regulatory Utility Commissioners (NARUC), the National Association of State Energy Officials (NASEO) and the US Conference of Mayors (USCM).

Where can further information on these existing mechanisms be found?

Energy Saving Trust, United Kingdom: http://www.est.org.uk

NAESCO – http://www.naesco.org

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Promoting the development of ESCOs is likely to be of concern to government organisations with interests in the development of the competitive energy market, and the implications for energy efficiency activities across all customer classes eg agencies responsible for energy and environment.

Industry associations, where they exist, would also promote the development and growth of ESCOs as would government departments concerned with industry development.

Who would initiate the development of this mechanism?

Government in conjunction with relevant industry associations.

Who would actually design and develop the mechanism?

Government in conjunction with relevant industry associations.

Which parties are responsible for carrying out activities arising from this mechanism?

Government in conjunction with relevant industry associations.

Which parties actually realise the DSM and energy efficiency outcomes?

The ESCOs, who then work with end users to identify and achieve the outcomes

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone.

What are the basic institutional/market requirements?

The mechanism requires customers knowledgeable and sophisticated enough to be willing and able to seek energy services rather than simply being supplied with energy.

The ESCO industry must be able to do business with the support of sympathetic government policies.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Government funding.

How are activities arising from this mechanism funded?

Government funding for the ESCO development program with industry association involvement.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses may find establishing links with ESCOs, or establishing a wholly-owned ESCO, an attractive business proposition, particularly if the electricity business is subject to regulatory requirements in relation to DSM and energy efficiency. This activity could be used to add value to existing customers, or attract new customers in a competitive market.

However, non-utility ESCOs may eventually provide significant competition to electricity businesses wishing to offer energy services to their customers, particularly in the commercial and industrial markets, hence reducing electricity business revenues.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative and regulatory requirements.** Legislation may be required to establish an ESCO development program. If required, the legislation should specify the objectives of the program, the way in which the program is funded, the scope of the program, the target audience, the appropriate funding level, the administration of the program, degree of overlap with existing energy market participants, and the duration of the program. In addition, any legislative and regulatory barriers and taxation disincentives to the use and enforcement of performance contracts must be removed.
- **Establishment of funding mechanisms.** Funds are required for startup and for long-term operation of the program. Funds may be sourced from: user charges, the government budget, cost recovery, public benefits charge or energy/CO_2 taxes.
- **Elimination of duplication of services.** When establishing the ESCO development program, and periodically thereafter, it is important to ensure that the program is not duplicating services being adequately provided by government or the private sector.
- **Evaluation of the ESCO development program.** Periodic evaluations of the ESCO development program will be required (including the development of performance indicators) to ensure that the program is being implemented efficiently and effectively and is delivering clearly defined outcomes.
- Develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- Promote through legislation and regulation the provision of energy services by electricity and gas businesses.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Currently, ESCOs are only participating in a limited segment of the energy services market. ESCOs do not serve the single-family market without significant financial subsidies from utility-sponsored DSM programs. It has been suggested that in a restructured energy market ESCOs (and RESCOs) most likely will continue to target large institutional, commercial and industrial customers.

Setting up an ESCO is costly and time consuming – particularly in countries that are unaccustomed to the operation of competitive markets in the electricity industry. Transaction costs can be significant. Further, it sometimes takes a long time for an ESCO to find clients/customers, and to establish a first contract, particularly in the government/institutional sector. Equally, it is time consuming for customers to identify an ESCO appropriate for their energy services needs and to develop and enter into a contract for energy services. These issues make working with ESCOs and implementing an ESCO development program complex undertakings.

Issues of risk management are important to performance contracting. This involves both:

- the credit risk that either client or ESCO will default on finance payments;
- the technical risk that the energy efficiency measures will fail to perform to the expected level. Elements that introduce technical risk include: management of capital costs;

management of ESCO time input; delays in implementation of energy efficiency measures; initial performance of energy efficiency measures; maintenance of initial performance levels; energy costs; equipment failures; measurements of savings and changes in energy due to factors outside the control of the contract.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from an ESCO's activities may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The ESCO may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- There may be some pressure for publicly funded ESCOs to target their services to all customer classes. However, given the essentially commercial nature of the organisations' activities, the ESCO may decide to service the most profitable customers rather than equally servicing all customer classes. Private sector ESCO will always service the most profitable customers.
- Publicly funded ESCOs should not duplicate what the private sector is doing, unless the benefits are greater than the costs; otherwise support from private sector businesses may be reduced.
- Reduced electricity sales (and income) and increased program costs might affect the competitive position of electricity businesses. However, the loss of revenue may be offset if an electricity business owns an ESCO.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage industry participation.

10. EVALUATION

10.1 Evaluation Issues

A clear link between public expenditure on developing the ESCO industry and energy efficiency outcomes is likely to be difficult to establish, and consequently it would be difficult for government to determine how efficiently public resources are used.

The political framework is likely to be a significant determinant in the acceptability of this mechanism. Consequently, the mechanism is not readily transferable between different jurisdictions.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None	High	★ ★ ★
Barriers addressed	Low number	High number	★ ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful	More useful	★ ★ ★ ★
Transferability	Low	High	★ ★
Flexibility	Low	High	★ ★ ★
Potential for market transformation	Low	High	★ ★ ★ ★
Cost effectiveness	Low	High	★ ★ ★ ★
Social and environmental impacts	High	Low	★ ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency **Demand Side Management Programme**	**Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses**

Developed Mechanism No: S5

Promotion of Energy Efficiency by Industry Associations

Mechanism Type: Support

Outline	This mechanism involves industry associations promoting energy efficiency services to their members. An industry association may be able to provide its members with access to energy efficiency services which the individual members themselves may be unable to obtain.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑	More useful and/or relevant
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑	More useful and/or relevant
Addressed Customers	☐ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 6, 7, 13	
Program barriers addressed	2, 3, 5, 7	
Who Promotes?	Industry association members	
Who Initiates?	Industry association	
Who Develops?	Industry association, maybe with assistance from government	
Who Implements?	Staff of industry association, contractors	
Who is Targeted?	ESCOs, electricity businesses	
Funding	Industry association fees, government seed funding	
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business if it forms an alliance with an industry association Loss of revenue caused by reduced sales which could be offset by revenue from the new business	
Previous experience	Australia – Housing Industry Association PATHE initiative	

1. MECHANISM OUTLINE

This mechanism involves industry associations promoting energy efficiency services to their members. An industry association may be able to provide its members with access to energy efficiency services which the individual members themselves may be unable to obtain.

1.1 General Description

What the mechanism means in general terms.

An industry association is a formalised grouping of like-minded businesses which see some value in collaboration, and strength in association. The members of an industry association may be competitors in the marketplace but are partners within the association. Some industry associations, particularly in industries which are large users of energy, provide information, advice and other services on energy efficiency to their members.

The energy efficiency services provided to members by industry associations may include:

- promoting energy efficiency and energy management by targeting and providing information to association members;
- providing a point of contact on energy efficiency for association members;
- advising association members on technical issues, contacts and the market for energy efficiency services;
- offering advice to association members on energy efficiency consultants, contractors and operators;
- constructing and maintaining a detailed database of energy efficiency projects carried out by association members, and the relevant energy efficiency professionals involved;
- promoting and managing national and international information exchange on energy efficiency.

An industry association would support its members by addressing the main barriers to the implementation of cost-effective energy efficiency by its members. These barriers may include:

- lack of interest in energy efficiency by association members, particularly smaller businesses, where the transaction costs of implementing energy efficiency improvements can be prohibitive;
- low prices of energy that occur when competitive energy markets commence, and the corresponding lack of a commercial imperative to address energy efficiency;
- lack of access to capital (equity financing or equity investments) by association members;
- uncertain or prohibitive government policies and regulations relating to the use of performance contracting.

There is a range of activities that industry associations can carry out to promote energy efficiency and energy management by their members. These include:

- developing information programs for association members promoting the financial benefits of energy efficiency,. Association members have to be sufficiently aware of energy management issues in general before they will be receptive to the services of ESCOs or other providers of energy services;

- recommending particular ESCOs which association members have found to provide cost-effective energy efficiency solutions. This will boost member confidence in ESCOs;
- developing strategies to support ESCO promotion of performance contracting to association members;
- identifying third party financing sources to provide working capital for energy efficiency projects commissioned by association members;
- brokering voluntary agreements for energy efficiency with government on behalf of individual association members or the industry as a whole;
- benchmarking the results of energy efficiency projects carried out by members so that members can determine the relative effectiveness of their own projects in terms of both costs and energy savings.

Does this mechanism depend on or overlap with other mechanisms described?

Mechanisms which could help ESCOs to better serve their customers should be pursued in conjunction with this mechanism. These include: *S1 Sustainable energy training schemes for practitioners; S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; S6 Aggregating electricity purchasers to achieve energy efficiency; M7 Cooperative procurement of energy efficient appliances and equipment;* and *M8 Energy performance contracting*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because industry associations can promote DSM and energy efficiency, irrespective of the electricity industry structure.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition, but will need to have most impact before retail competition provides a large, sophisticated market for energy services.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

This mechanism could promote either or both of the above outcomes.

Is the mechanism indirectly supporting the above by some means?

The mechanism indirectly supports the above outcomes.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Several examples of associations promoting energy efficiency to their members, but little information about outcomes.

What are key examples of the above?

Australia

The Housing Industry Association Limited (HIA) is Australia's peak building, renovating and development industry association, making it the largest building industry association by far. It is a respected industry group whose mission is to:

> *Promote policies and provide services that enhance members' business practices, products and profitability consistent with the highest standards of professional and commercial conduct.*

HIA's core membership focuses on the development and re-development of land and buildings. Members are involved with integrated housing and land development, the construction of single dwellings, medium and high-rise residential development, commercial building, refurbishment, the manufacture and supply of building products, materials, fittings and fixtures, the financing of property development, and specialist services.

'HELP' is at the core of the HIA product and service package. HIA is committed to providing members with 'Help, Information and Advice' in order to enable them to confidently meet the challenges of the rapidly changing building industry.

One of the many HIA member services is the Planning, Development and Environment service which provides professional involvement and advice for members on land use planning and environmental issues at all levels of government. As the name suggests the service focusses particularly on the role the industry can play in implementing initiatives that improve the environmental performance of the building and construction industry. HIA delivers its environmental program through its PATHE (Partnerships Advancing the Housing Environment) initiative.

PATHE was developed by HIA in collaboration with Environment Australia, Greening Australia and the Australian Greenhouse Office to promote technologies, design principles and practices that can significantly improve the quality of Australia's built environment.

PATHE develops and demonstrates best practice environmental management in the building industry. The strategy is an ambitious three-year partnership and change initiative, underpinned by the principles of cooperative endeavours, demonstration and self-management.

By forging partnerships between builders, manufacturers, trade contractors and community organisations the building industry will be better placed to provide the Australian community with affordable, environmentally friendly products and services.

PATHE aims to:

- improve the environmental performance of Australia's building and land development industry;
- facilitate change in a way that involves the industry, while meeting community expectations on housing types, locations and costs;
- educate consumers that environmentally benign houses are more comfortable as well as being cheaper to run;
- identify market-driven mechanisms to encourage the adoption of environmental innovations in the building industry; and
- facilitate the continuing uptake of leading environmental management principles as they emerge, in order to maintain both the quality and cost effectiveness of Australia's built environment.

The three areas where PATHE aims to have the most immediate impact are:

- waste management - including planning to minimise waste when projects are being scoped, reducing waste generated on site, and reusing or recycling waste where possible;
- energy efficiency - reducing the dependency on fuelled systems to maintain comfortable living temperature all year round; and
- environmental management practices - encompassing a range of on-site measures to reduce such impacts as water run-off, erosion, and deforestation.

A keystone of the PATHE communications strategy is the quarterly PATHE Newsletter, which provides vital information for all PATHE stakeholders. The Newsletter provides an overview of PATHE's progress, GreenSmart building tips, and new environmental products.

PATHE environmental management guides are available on Waste Management, Stormwater Management and Energy Efficiency.

PATHE Industry Impact events are being held around Australia. The objective is to equip industry practitioners to use their environmental knowledge as a pro-active marketing tool in attracting and satisfying customers. PATHE networks and forums are being established in State capital cities and regional centres to facilitate the exchange of information and ideas relating to Australia's built environment.

Where can further information on these existing mechanisms be found?

Housing Industry Association of Australia: http://www.hia.asn.au

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Industry association members which are large users of energy, or energy service providers (electricity busiinesses or ESCO), who may be dissatisfied with present services provided by industry associations.

Who would initiate the development of this mechanism?

Industry associations.

Who would actually design and develop the mechanism?

Industry associations, maybe with government assistance and seed funding.

Which parties are responsible for carrying out activities arising from this mechanism?

Mainly staff members of the industry association. The association may contract out its energy efficiency activities to a third party specialist provider.

Which parties actually realise the DSM and energy efficiency outcomes?

ESCOs, energy management companies.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone.

What are the basic institutional/market requirements?

A market for energy services rather than simply electricity businesses providing electricity.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Probably seed funding from government.

How are activities arising from this mechanism funded?

Funded by industry association membership fees and/or specific fees for the energy efficiency service.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses wishing to become energy service providers may benefit from being able to align their customer service with the products and services being promoted and supported by industry associations. In addition, the industry association may provide electricity businesses with contacts with customers who have interest in energy services, at minimal cost to the electricity business.

Electricity businesses which rely solely on electricity sales for revenue are likely to see their sales diminish over the longer term as the industry association's energy efficiency activities become established.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Establishment of funding mechanisms.** Funding will be required to cover the cost of services provided by the industry association. Initial funding may be available from government sources. Over the longer term funds may be sourced from: membership fees, government grants for specific projects, and revenue from the provision of services to association members on a commercial basis.
- **Elimination of duplication of services.** When establishing the association's energy efficiency services, and periodically thereafter, it is important to ensure that the association is not duplicating services being adequately provided by government or the private sector.
- **Evaluation of the association's energy efficiency services.** Periodic evaluations of the energy efficiency services provided by the association will be required (including the development of performance indicators) to ensure that the services are being implemented efficiently and effectively and are delivering clearly defined outcomes.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

The members of the association would have to have an inherent interest in, and be able to gain concrete benefits from implementing, energy efficiency before the industry association would be motivated to promote energy efficiency to its members.

The industry association would have to be of sufficient size and have sufficient resources to be able to take on the responsibility of promoting energy efficiency to its members.

Industry associations are often perceived as just another bureaucracy and their activities are often not sufficiently targeted. Governance of industry associations is often weak, as the association is not a key concern of the various board members.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for members of the industry association and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from the association's energy efficiency services may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The association may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- The industry association should target services to all industry members. If one type of member benefits to the detriment of others, then the industry association will need to review its policies: eg encourage activities in neglected areas and/or reduce activities in areas already covered.
- The industry association should not duplicate what the public sector is doing, unless the benefits are greater than the costs; otherwise, industry support of the association will be reduced.

10. EVALUATION

10.1 Evaluation Issues

A clear link between expenditure on promotion of energy efficiency and benefits to association members is likely to be difficult to establish.

Significant energy efficiency outcomes are unlikely to be achieved within an acceptable time-frame.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★ ★ ★
Barriers addressed	Low number … High number ★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★ ★
Transferability	Low … High ★ ★ ★ ★
Flexibility	Low … High ★ ★ ★ ★
Potential for market transformation	Low … High ★ ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Nil.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S6

Aggregating Electricity Purchases to Achieve Energy Efficiency

Mechanism Type: Support

Outline	This mechanism enables customers to influence electricity businesses through exercising consumer purchasing power in a competitive retail electricity market.		
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects		
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	↓	Less useful and/or relevant
	Commercialisation/ Privatisation	↑	More useful and/or relevant
	Competition	↑↑	Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☐ Large industrial		
Policy barriers addressed	2, 6, 7, 8, 9, 10, 12, 13		
Program barriers addressed	2, 3, 5, 7		
Who Promotes?	Local government, NGOs, community groups		
Who Initiates?	Co-operatives, private companies, local government		
Who Develops?	ESCOs, contractors		
Who Implements?	Co-operatives, private companies, local government		
Who is Targeted?	End-use customers		
Funding	Funds raised by the initiating group, possibly with some government funding		
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business if it forms an alliance with the initiating group Possible loss of revenue caused by loss of customers and reduced sales if alliance not formed		
Previous experience	United States – Barnstaple County		

1. MECHANISM OUTLINE

This mechanism enables customers to influence electricity businesses through exercising consumer purchasing power in a competitive retail electricity market.

1.1 General Description

What the mechanism means in general terms.

This mechanism is about enabling customers to cooperate with respect to their electricity purchases to wield significant bargaining power in contestable retail electricity markets. This can occur in distinct communities with a strong environmental ethos or through organisations of like-minded people within larger population centres.

While it is likely that that an important reason for community collaboration will be pursuit of economic benefits, the opportunity will exist to influence the provision of energy efficiency services bundled with the supply of electricity. Communities could effectively achieve energy efficiency goals by aggregating their electricity purchases and then requiring the selected electricity retailer(s) to offer economic energy efficiency services.

Electricity purchasing aggregation arrangements could take a number of forms including:

- local government voluntarily (in consultation with the community) assuming the responsibility of purchasing electricity bundled with energy efficiency services on behalf of its constituents;
- individual households forming a 'buyers' club to negotiate and purchase electricity bundled with energy efficiency services;
- private companies operating as aggregators and representing a group of consumers in purchasing electricity bundled with energy efficiency services;
- energy cooperatives purchasing electricity bundled with energy efficiency services. Energy cooperatives can be formed by a variety of 'members', including non-profit environmental organisations, local governments and private aggregators.

Advocates for competitive electricity markets have argued that for markets to operate effectively, more attention should be paid to the distribution level of the electricity market and to the power of consumers. Electricity purchasing aggregation, for example, could then assist the operation of the electricity market itself by empowering consumers to seek the energy efficiency services they require in return for awarding an electricity purchase contract.

Most efforts to establish competitive electricity markets start with the generation market and transmission access, with little serious attention given to the role of consumers. The danger in generation and transmission-oriented restructuring is that a new competitive industry will be created with players who have enough market-power to capture greater benefits for themselves than for consumers. Direct access proposals that assume consumers will fend for themselves leave individual customers with little power in market transactions and may result in a market which is badly flawed. It is likely that electricity marketers will aggressively pursue the most attractive large customers in an area while leaving small customers to fend for themselves.

Consumer protection advocates argue that consumers are more vulnerable when they deal individually with providers than if they aggregate. As individuals, most consumers will have few options short of expensive litigation when they perceive themselves to be inadequately serviced by service providers.

Does this mechanism depend on or overlap with other mechanisms described?

Aggregating electricity purchases engages participants in the energy market who may otherwise have little interest in energy efficiency or network planning. However, as energy efficiency itself may not be as important to the community as economic efficiency, other mechanisms which establish a legal framework for promoting energy efficiency would be required, such as *C1 Mandatory sourcing of energy efficiency;* and *C2 Energy efficiency licence conditions for electricity businesses*.

Commercial mechanisms aimed at encouraging the retailers, ESCOs and others to provide large-scale energy efficiency services may be important, in particular: *F2 Financing of energy efficiency by electricity businesses;* and *M8 Energy performance contracting*.

Mechanisms with a 'local' focus will complement this mechanism, in particular, *S2 Energy centres*.

All market participants would benefit from the external support that may be provided by: *S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry;* and *S5 Promotion of energy efficiency by industry associations*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
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)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Aggregating of electricity purchasing to achieve energy efficiency is only relevant under commercialisation/privatisation and competition, particularly where customers can choose their electricity retailer. Hence the mechanism is less useful under pure unbundling without one of the other two aspects of electricity industry restructuring.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism operates only when retail competition has been implemented in the electricity market. The mechanism operates most effectively when the transition to a competitive electricity market has been completed.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Aggregation of electricity purchases is probably more focused on economic efficiency for the benefit of consumers. However both or either of load shifting and increased energy efficiency could be achieved through this mechanism.

In addition, the mechanism could promote reduced electricity prices for residential customers and small businesses who otherwise might not enjoy the lower prices of a competitive electricity market, and a range of consumer protection benefits negotiated with the electricity retailer.

Is the mechanism indirectly supporting the above by some means?

The mechanism indirectly supports energy efficiency outcomes by engaging otherwise passive participants in the electricity market.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

A number of community aggregation schemes are being trialed.

What are key examples of the above?

United States

One of the first examples of large-scale, automatic small consumer aggregation commenced in Barnstable County, in the State of Massachusetts in 1997.

As of September 1997, 14 of the 15 towns within Barnstable County voted in favour of an aggregation strategy whereby residences, small businesses and the few industrial operations located in the Cape Cod area would be aggregated unless they specifically opted out. The aggregated electrical loads of 162,000 customers in 15 towns went ‘on the market’ in 1998. To Commonwealth Electric, the incumbent utility, these customers represent approximately 300 megawatts – half the company’s load – and between US$175 million and US$200 million in annual revenues.

Barnstable County proposed several terms and conditions for potential retailers. As an example, to secure the cooperation of Commonwealth Electric, one of the terms is that Commonwealth Electric continue to provide metering and billing services during the first phase of the aggregation.

Barnstable County planned to contract with a single power retailer for a five year term and the retailer will provide all the electricity needed by the county's consumers. County planners expect to satisfy growth in electricity demand with a combination of energy efficiency and development of new renewable resources, funded by a surcharge assessed on electricity distribution.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Local government, non-government organizations (NGOs), and community groups with interests in consumer protection and environmental issues.

Who would initiate the development of this mechanism?

Cooperatives, private companies, local government responding to the above.

Who would actually design and develop the mechanism?

ESCOs and relevant professionals contracted by the above.

Which parties are responsible for carrying out activities arising from this mechanism?

The cooperatives, private companies or local government groups.

Which parties actually realise the DSM and energy efficiency outcomes?

The customers themselves would carry out the DSM and energy efficiency activities, with advice and assistance from the energy provider and local ESCOs.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism promotes community-scale participation in the energy market, but not necessarily with energy efficiency as a key concern. Other mechanisms would be required to promote an energy efficiency focus for the suppliers of energy. The benefits, both economic and non-economic, would then have to be marketed to the prospective energy purchaser ie the cooperatives, private companies or local government groups.

What are the basic institutional/market requirements?

Legal issues play a part in the success of this mechanism. The ability of consumers to participate in aggregated purchasing differs from jurisdiction to jurisdiction. In some jurisdictions, customers are able to pool together their electricity purchases but in other jurisdictions this is not possible.

In addition to the ability to aggregate electricity purchases, customers must also be able to choose their retail supplier of electricity. Conversely, retail electricity suppliers must have the ability to respond to specifications established by buyer groups.

There also should be a matching of the scale of the consumer organisation with the scale of the electricity supplier – with larger suppliers, organisations with larger aggregated loads are likely to be more influential. Consumer organisations must also have the ability, resources and infrastructure to be able to manage aggregated purchasing.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

The resources would largely be provided by the initiating group itself, in anticipation of longer term financial benefits. Some support may be forthcoming from government programs concerned with community level environmental initiatives.

How are activities arising from this mechanism funded?

The administration of aggregated purchasing could be funded by the savings from energy efficiency measures and lower electricity prices negotiated with the successful energy service provider.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses that do not respond to the requirements of this new type of customer (especially by not being able to provide the level of energy services that may be required) may see a dramatic reduction in their sales if they lose a large number of previously franchise customers. While promotion of energy efficiency services may reduce sales of electricity, it is anticipated that the loss of revenue would be offset by the returns generated by financing and energy service provision.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative requirements.** Legislation may be required to enable consumers to participate in aggregated purchasing of electricity. Legislative action may be needed at more than one level (eg local, state and federal), requiring extensive political resources and internal funds.
- **Ideological issues.** There may be some concerns about the nature of the organisation carrying out the aggregation. For example, concerns have been expressed about the potential for expansion of the role of government as a consequence of local government managed aggregation. Some consumers may not wish to have other parties select an energy provider and negotiate their contract for them; they may consider it a denial of the right to choose. In such circumstances, schemes can be created, and consumers allowed to ‘opt in’ as the scheme develops.
- **Commitment of community leaders.** For this mechanism to be successfully implemented, significant commitment to the aggregation of electricity purchases and the promotion of energy efficiency will be required on the part of community leaders.
- **Promotion of energy efficiency**. The successful implementation of this mechanism depends on a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.

- **Periodic evaluation.** The group which carries out the aggregated purchasing should periodically evaluate the effectiveness of its promotion of energy efficiency services to ensure that this is being done efficiently and effectively.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

It will be difficult to quantify energy efficiency and DSM outcomes with respect to expenditure on this mechanism (although this will only be an issue if any public money is proposed to be spent).

The group responsible for organising the aggregation may not initially be motivated to request energy efficiency activities from the electricity supplier. Even if the motivation is there, the group may experience difficulties in accessing the necessary energy efficiency expertise to develop proposals for submission to the electricity supplier and to evaluate responses to these proposals.

If the group which organises the aggregation of energy purchases perform poorly and does not deliver significant benefits to consumers, there may be no energy efficiency gains from implementing this mechanism.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- If the aggregating group decides to provide energy efficiency services and to purchase electricity, then the aggregating group becomes a competitor for energy efficiency services and inexpensive electricity, resulting in a more competitive marketplace.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. Local community groups could become important traders of energy efficiency services and low cost electricity, and, where available, participants in power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- The aggregating group should target services to all members of the group. If certain members benefit to the detriment of others, then the aggregating group will need to review its policies, eg encourage activities in neglected areas and/or reduce activities in areas already covered.
- The aggregating group should not duplicate what the private or public sector is doing, unless the benefits are greater than the costs; otherwise, member support will be reduced.

- Reduced electricity customers and sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Electricity businesses and local government may feel threatened by the aggregating group's new role and seek to undermine the power of the community group in energy and non-energy arenas.

10. EVALUATION

10.1 Evaluation Issues

The political framework is likely to be a significant determinant in the acceptability of this mechanism. Consequently, the mechanism is not readily transferable between jurisdictions.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None ★ ★	High
Barriers addressed	Low number ★ ★ ★ ★	High number
Effects of restructuring on mechanism	Less useful ★ ★ ★	More useful
Transferability	Low ★	High
Flexibility	Low ★ ★	High
Potential for market transformation	Low ★ ★ ★ ★	High
Cost effectiveness	Low ★ ★ ★ ★	High
Social and environmental impacts	High ★ ★ ★ ★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Asmus, P (1998) 'Power to the People: How Local Governments Can Build Green Electricity Markets', *Renewable Energy Policy Project Issue Brief No. 9.*

Danish Ministry of Energy (1993) *Energy 2000 - Follow Up*, Copenhagen, Denmark.

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: S7

Voluntary Agreements for Energy Efficiency

Mechanism Type: Support

Outline	Voluntary agreements for energy efficiency involve a formal agreement between a responsible government body and a business or organisation. The agreement states that the business or organisation will carry out specified actions to increase the efficiency with which it uses energy.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑	More useful and/or relevant
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↓↓	Much less useful and/or relevant
Addressed Customers	☐ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 6, 7, 12, 13	
Program barriers addressed	2, 3, 5, 7, 9	
Who Promotes?	Governments, electricity businesses, high energy users	
Who Initiates?	Government	
Who Develops?	Government assisted by business associations	
Who Implements?	Business end-users	
Who is Targeted?	Business end-users	
Funding	Business end-users funds development and implementation of voluntary agreements Government funds administration of the program	
Impacts on electricity businesses	Possible new commercial opportunity for the electricity business if it provides advice and services to develop and implement voluntary agreements Loss of revenue caused by reduced sales which could be offset by revenue from the new business	
Previous experience	Australia – Greenhouse Challenge Program Finland – Voluntary agreements on energy efficiency Korea – Voluntary agreements on GHG reduction Netherlands – Long Term Agreements	

1. MECHANISM OUTLINE

Voluntary agreements for energy efficiency involve a formal agreement between a responsible government body and a business or organisation. The agreement states that the business or organisation will carry out specified actions to increase the efficiency with which it uses energy.

1.1 General Description

What the mechanism means in general terms.

A voluntary agreement between government and a business or organisation can provide a framework for achieving specified cost-effective energy efficiency outcomes through a commitment to action from the business/organisation and appropriate support from government.

The agreement may 'brokered' by the relevant industry association on behalf of its members, or it may be directly negotiated between a government representative and individual businesses and organisations. The government representative may be a government department, or a government body with the responsibility for promoting energy efficiency. The agreement may or may not be legally binding.

The agreement will set targets for increased energy efficiency within the business/organisation. The target will typically be set by the participating business/organisation, and the government body will provide information and limited technical assistance to help achieve the stated goal.

A voluntary agreement program can target companies within specific sectors (eg just industrial) or can be broad ranging, and include all commercial enterprises and organisations which use energy. The program may be part of a broader, government endorsed energy efficiency or greenhouse gas emissions reduction program

Some general principles that can be adopted in a voluntary agreements program to engage business interest include:

- the status of the agreement should be clearly stated (such agreements are rarely entirely "voluntary" and may be introduced as an alternative to harsher measures, such as a carbon tax, which may be used as a sanction if the agreements do not produce the required outcome);
- the specification of the agreement should state whether the outcomes of "business-as-usual" energy efficiency actions may be included in the results from the agreement;
- the commitments made in an agreement should allow flexibility to change agreed activities if the required outcomes are not being achieved;
- agreements should not interfere with competition, or create disputes;
- agreements may be industry-wide or business-specific;
- agreements should recognise international business activities.

The energy efficiency measures nominated by the business/organisation for the agreement are likely to be limited to those that are clearly cost-effective, with relatively short payback periods for investments.

The types of energy efficiency measures that may form part of such an agreement can include:

- improve efficiency of existing plant;
- change fuel mix;
- reduce energy losses;
- implement load management;
- improve appliance efficiency;
- reduce building heating, ventilation and air conditioning;
- implement recycling;
- improve vehicle fleet fuel efficiency.

Governments may promote voluntary agreements for a number of reasons including:

- aversion to adopting more prescriptive mechanisms;
- more traditional mechanisms (eg regulation, taxes, information) may not be working successfully;
- consensus with business should lead to more a higher level of achievement of energy efficiency targets;
- cooperation rather than conflict may already be a part of a country's culture;
- voluntary agreements can be seen as a useful first step toward stronger policies (if required);
- blame for failure to perform is directed at business rather than government.

Typically, governments may provide the following assistance to businesses participating in voluntary agreements:

- technical advice on cost-effective energy efficiency measures;
- training sessions on developing improved energy efficiency strategies;
- information packages, such as case studies;
- networking with relevant organisations;
- promotion of the energy efficiency achievements of the business.

Implementation of the voluntary agreement should typically involve the following steps:

- establish the baseline of current energy efficiency activities within the business;
- identify the cost-effective options for improving energy efficiency;
- develop action plans for achieving the nominated energy efficiency outcomes;
- define performance indicators and monitoring procedures appropriate to each action plan;
- formulate the agreement itself;
- report on results.

The resources required to manage a voluntary agreements program could be quite extensive. Governments typically fund an administrative body to manage the program. Implementing and managing a voluntary agreements program could involve any or all of the following:

- creating an entirely new government body;
- creating an administrative regime within an existing government body;
- promoting the program to companies, and promoting the achievements of the participating companies;
- funding administrative staff to promote the program and consult with industry;
- funding administrative staff to assist industry by conducting audits and recommending actions.

The participating businesses and organisations are normally responsible for the bulk of the funding required to achieve increased energy efficiency. This funding covers the costs of a range of activities, including:

- carrying out energy audits;
- preparing company wide inventories of energy use;
- preparing action plans to reduce energy use;
- implementing action plans to reduce energy use, including any investment in new energy efficient technologies.

Does this mechanism depend on or overlap with other mechanisms described?

Businesses and organisations participating in voluntary agreements for energy efficiency would benefit from *F2 Financing of energy efficiency by electricity businesses* (especially if specific financial assistance such as government subsidies is not available); *S3 Creating entrepreneurial energy organisations; S4 Developing the ESCO industry; M2 Tax exemptions and incentives for energy efficiency;* and *M8 Energy performance contracting*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)

5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability
9. Organisational (institutional) barriers

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because voluntary agreements can promote DSM and energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the interest in energy efficiency generated by voluntary agreements to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

It is likely that most voluntary agreements would be drafted to focus mainly on increased energy efficiency. However, in particular situations, load shifting activities may be included in the agreement.

Is the mechanism indirectly supporting the above by some means?

Voluntary agreements directly target specific increased energy efficiency or greenhouse gas emission reduction outcomes.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes, there are a number of energy efficiency voluntary agreement programs underway or under development worldwide, some on a strictly voluntary basis and others involving legally binding targets.

What are key examples of the above?

Australia

Late in 1994, the Commonwealth Government agreed to drop its proposals for a carbon tax in return for voluntary agreements with industry regarding greenhouse gas emission reductions. This led to the development of the Greenhouse Challenge Program, with government relying on voluntary agreements to achieve some 75% of projected emission reductions. The Government established the Greenhouse Challenge Program within the Australian Greenhouse Office to assist businesses to develop and implement voluntary agreements.

The Electricity Supply Association of Australia responded with a cooperative agreement to assist its membership, collectively or individually, to develop voluntary agreements with Government. Within the first year some 30 electricity businesses had indicated their willingness to participate in the program.

Within the state of New South Wales, and separate to the Commonwealth program, the State Government, through its Sustainable Energy Development Authority (SEDA) implemented the Energy Smart Buildings Program. This program aims to reduce energy consumption of government buildings in NSW by 25% of the current level by 2005.

Government agencies joining the Energy Smart Buildings Program sign a voluntary Memorandum of Understanding (MOU) with SEDA to upgrade all facilities within an agency's portfolio over the next seven years wherever it is cost effective to do so. One of the important features of the program is that, for the first time, the New South Wales Treasury is allowing participating government agencies to keep the cost savings they make through energy efficient upgrades. The MOU sets out a number of 'milestones' – such as undertaking an energy efficiency upgrade of one space within six months of signing the MOU and completing one building space upgrade within two years. Upgrades include lighting, heating and cooling, ventilation and equipment.

Considerable resources are being invested by SEDA to ensure that participating government agencies have access to free, objective assistance and advice to assist them to carry out activities such as: conducting an energy audit; securing innovative financial packages for energy efficiency upgrades, and ensuring staff are trained and motivated to 'own' their agency's individual energy efficiency program.

Finland

Voluntary energy efficiency agreements are an important element of Finnish energy policy. Voluntary agreements have been developed with industry and the public sector and were introduced in 1992. It was then that the Ministry of Trade and Industry (MTI) signed the first agreements with industry and with the local government sector.

Industrial energy efficiency policy relies mainly on voluntary agreements. In November 1997, MTI signed six new framework agreements on energy efficiency with the organisations representing industry and employers, and energy producers and distributors. In signing the framework agreements, the organisations are committed to promoting energy efficiency and to encouraging their members to sign individual energy efficiency agreements.

A private sector company signing an energy efficiency agreement is committed to appointing a specific person to take charge of energy efficiency activities, auditing and analysing energy use, preparing an energy efficiency plan, implementing measures in accordance with the plan, and reporting annually to the relevant sector organisation.

A public sector agreement was signed with the organisation representing local and regional authorities and another with the City of Helsinki in 1993. The local government sector agreements were renewed in 1997. Each municipality concluding such an agreement will be committed to carry out measures similar to those taken by private sector companies. The target is to have 10% less specific heat consumption in municipal buildings in 2005 as compared with 1990.

Currently, voluntary agreements in Finland cover about 75% of industry, 50% of the energy sector and 30% of local government. The financial incentives for companies and organisations to sign voluntary energy efficiency agreements are an additional 10% subsidy for the energy audits and a 10% subsidy for the implementation of the investments proposed in the energy audit report.

The voluntary energy efficiency agreements will remain in effect until 2005. The follow-up and reporting systems are under development. The goal is to develop systems that will enable an enterprise to produce the data required both for the follow-up to the energy efficiency agreement and for reporting to the environmental authorities.

Korea

In Korea, voluntary agreements on greenhouse gas reduction were the most important greenhouse policy measure of an initiative termed 'countermeasures for climate change mitigation' which was confirmed by a meeting of related government Ministers, under the chairmanship of the Prime Minister, in December 1998.

Voluntary agreements are a cooperative program between the Korean Government and private sector companies. The program is co-managed by the Government and the private sector.

A company which intends to join the program must set energy consumption and greenhouse gas emission reduction targets and then submit a concrete action plan within three months after submitting a letter of intent to the Korean Energy Management Corporation (KEMCO). The action plan must contain details of how the plan will operate, an energy efficiency improvement target, a greenhouse gas emission reduction target, and a detailed process design.

After receiving the action plan, KEMCO reviews the plan and verifies the calculations relating to the energy efficiency and greenhouse gas reduction targets. KEMCO then executes the agreement if the company qualifies.

A company which joins the voluntary agreement program will be supported with low interest loans and tax incentive for energy efficiency and greenhouse gas reduction measures. Technical guidance and public relations promotion for the company will also be offered.

The voluntary agreement program was implemented in 1998 after one year of case study and close investigation of the program. During the first year of its implementation, 15 companies, including Pohang Iron & Steel Co. Ltd (POSCO), the largest energy consumer of the Korean industrial sector, joined the program. Up to September 1999, the total number of companies that have joined the program had reached 46, including Hyundai Motors Co and LG Chemical Ltd. Twenty more companies are expected to join before December, 1999.

The companies that have joined the voluntary agreement program will reduce greenhouse gas emissions by 3,774 kilotonnes of carbon in five years through adoption of energy efficiency technology, installation of alternative energy utilising facilities such as combined heat and power, improvement of manufacturing process, utilisation of clean energy sources, waste heat collection, and improvement of operations management.

The Netherlands

Since 1992, the Dutch Government has promoted the development of Long Term Agreements (LTAs) on energy efficiency across the economy. The LTAs are a contract under civil law and are based on negotiated targets. These pre-empt the threat of future regulatory requirements for energy efficiency. Government financial support from the Ministry of

Economic Affairs, and through the Agency for Energy and the Environment, is provided in the form of subsidies and audits to LTA participants.

By the beginning of 1997, LTAs had been signed with 30 industry associations and six end user groups from the services sector. This represents about 1000 industrial companies and covers more than 90% of industrial primary energy consumption. Monitoring has shown that overall energy efficiency in 1995 had improved by 10% compared to the reference year of 1989.

Where can further information on these existing mechanisms be found?

Australian Greenhouse Office: http://www.greenhouse.gov.au

Sustainable Energy Development Authority, Australia: http://www.seda.nsw.gov.au

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Government departments with responsibility for promoting increased energy efficiency, electricity businesses and businesses/organisations (plus business associations) using significant amounts of energy. Electricity businesses and high energy users would be keen to avoid the more prescriptive approaches to energy policy.

Who would initiate the development of this mechanism?

Government departments/bodies responsible for implementation of energy efficiency.

Who would actually design and develop the mechanism?

Government beodies, with assistance from business associations.

Which parties are responsible for carrying out activities arising from this mechanism?

Business end-users formulate and implement the actions required within the voluntary agreement.

Which parties actually realise the DSM and energy efficiency outcomes?

Businesses end-users would carry out the energy efficiency activities.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone, but financing of energy efficiency investments would assist its implementation.

What are the basic institutional/market requirements?

A key requirement is the ability for government and business to interact in a cooperative rather than adversarial fashion.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

The work required to initiate and develop voluntary agreements to their final stages will require the allocation of significant resources by the business end users participating in the voluntary agreements program.

Administration of the program will require the allocation of significant resources by government.

How are activities arising from this mechanism funded?

It is expected that, in most cases, businesses/organisations themselves would be expected to fund the energy efficiency investments. The mechanism would be made more successful if some form of financial assistance were developed to support the businesses.

6. IMPACTS ON ELECTRICITY BUSINESSES

This mechanism will require some additional resources from electricity businesses, although these are not likely to be significant. The businesses may have to invest in technologies to achieve customer energy efficiency outcomes, and will also lose some income from their customers through reduced energy sales. Some electricity businesses may develop opportunities for new energy service business to counteract these loses.

If electricity businesses which are participating in voluntary agreements fail to respond adequately to this mechanism there are likely to be few consequences because of its voluntary nature, though there may be some loss of public relations opportunities. However, if it becomes obvious that a large number of participants are not fulfilling their obligations under voluntary agreements, some form of sanction may be introduced.

Reduced electricity customers and sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Cooperation and commitment.** For this mechanism to be successful, government and business must be willing to interact in a cooperative rather than adversarial fashion. Government must also be willing to commit to this type of mechanism before applying more prescriptive mechanisms if this one does not succeed.
- **Government policy.** Government should have a clear policy on why it wishes to promote voluntary agreements compared to more prescriptive mechanisms, and be prepared to explain this policy. Otherwise business, and the public, will form their own opinions about the government's motivation which may well undermine the benefits of such a policy.
- **Target setting.** Energy efficiency targets must be set high to obtain energy savings that are greater than the "business as usual" case. However, in the case of voluntary participation, targets cannot be set too high; otherwise, businesses and organisations will not participate.

- **Allocation of resources.** Businesses and organisations participating in voluntary agreements must be willing to allocate significant resources to promoting and investing in energy efficiency. Similarly, government must be willing to allocate significant resources to the administration of the voluntary agreements program.
- **Promotion of energy efficiency**. The successful implementation of this mechanism depends on a commitment by both the government and business organisations which participate in the voluntary agreements to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary for both the government and the business organisations to develop public and staff information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Periodic evaluation.** The effectiveness of the voluntary agreements in actually achieving energy efficiency should be periodically evaluated to ensure that the agreements are efficiently and effectively achieving the government's objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

There is some concern that the energy efficiency targets to be achieved through voluntary agreements may be set too low to encourage a large number of businesses/organisations to participate. However, accurate target setting may be difficult if quantitative data on the energy saving outcomes of specific energy efficiency measures are not readily available.

The transaction costs of achieving energy efficiency through voluntary agreements may be perceived as being high because of the additional expenses involved in administering the agreements as compared with the costs of simply implementing energy efficiency programs. However, in addition to actually achieving energy efficiency targets, participants in voluntary agreement are also gaining experience in carrying out energy efficiency activities, experience which they may otherwise never have gained. Comparatively high transaction costs should be measured against the benefit of this increased experience.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from energy efficiency activities implemented by a business may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The business may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- The voluntary agreement should target services to all participants. If certain participants benefit to the detriment of others, then government will need to review the voluntary agreement, eg encourage activities for other participants or in neglected areas and/or reduce activities in areas already covered.
- The voluntary agreement should not duplicate what the private sector is doing, unless the benefits are greater than the costs; otherwise, support by participating business organisations will be reduced.

10. EVALUATION

10.1 Evaluation Issues

The mechanism will be difficult to implement in a political framework that favours strong control of industry rather than a more cooperative approach.

A clear link between public expenditure on voluntary agreements and energy efficiency and DSM outcomes is likely to be difficult to establish, and consequently it would be difficult for government to determine how efficiently public resources are used.

The mechanism will not transform the market to better encourage energy efficiency, particularly within an acceptable time frame.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★ ★ ★
Barriers addressed	Low number … High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★ ★
Transferability	Low … High ★ ★ ★
Flexibility	Low … High ★ ★ ★ ★
Potential for market transformation	Low … High ★ ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M1

Taxes on Energy

Mechanism Type: Market

Outline	Energy taxes are imposed by government at some point in the energy supply chain. The effect of an energy tax is to increase the final price that end-users pay for each unit of energy purchased from their energy supplier, although the tax may be levied at any point in the supply chain. One effect of increased prices to the end user is to encourage more efficient use.	
Outcomes	☐ Load shifting ☐ Energy efficiency ☐ Direct effects ☑ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X No change
	Commercialisation/ Privatisation	X No change
	Competition	X No change
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 4, 7, 10, 11	
Program barriers addressed	1	
Who Promotes?	Government	
Who Initiates?	Government	
Who Develops?	Government	
Who Implements?	Government	
Who is Targeted?	Energy end-users	
Funding	Internal government funding for administrative costs	
Impacts on electricity businesses	Loss of revenue caused by reduced sales Possible loss of customers to other energy forms caused by increased prices Increased costs to administer the energy tax	
Previous experience	Denmark – carbon dioxide and energy tax Netherlands – environmental taxes on energy sources United Kingdom – levy on business use of energy	

1. MECHANISM OUTLINE

Energy taxes are imposed by government at some point in the energy supply chain. The effect of an energy tax is to increase the final price that end-users pay for each unit of energy purchased from their energy supplier, although the tax may be levied at any point in the supply chain. One effect of increased prices to the end user is to encourage more efficient use.

1.1 General Description

What the mechanism means in general terms.

Energy production and use result in environmental impacts and associated costs to society. The environmental impacts which are not reflected in market prices are referred to as environmental externalities. From the perspective of economic efficiency, the costing of these externalities and their incorporation into pricing structures leads to a better allocation of economic resources and to an improvement in the overall welfare of society. However governments tend to consider that fully cost-reflective energy prices are difficult to calculate and unpopular to implement. Moreover, it is widely recognised that price is not the only influence on the behaviour of energy market participants.

Energy taxes can be used to imply some financial cost to environmental externalities by increasing the price of energy to the end-user. In general, the direct impact of a tax on energy consumption will depend on the price increases experienced, and the elasticity of demand and price amongst the various customer groups affected.

Different types of energy taxes vary in how they are imposed:

- a **progressive** energy tax increases the charge per unit of energy as the level of energy consumption by the end-user increases;
- a **flat** energy tax has the same charge per unit of energy which does not vary with the level of energy consumption by the end-user;
- a **regressive** energy tax decreases the charge per unit of energy as the level of energy consumption by the end-user increases.

Progressive energy taxes may be effective in encouraging end-users to be more efficient in the way they use electricity, whereas regressive energy taxes are likely to have the opposite effect.

The following issues need to be considered in relation to implementing an energy tax:

- **the objective of the tax** – a general energy tax is quite distinct from a carbon tax or other environmental taxes. If the desired policy outcome is a direct reduction of carbon dioxide emissions, then charges should be levied directly on the production of carbon fuels. Tradeable emission permit regimes are often seen as a policy alternative to taxation. However, there are certain circumstances under which taxation is more appropriate. For example, taxation may be more suitable in cases where over-control of carbon dioxide emissions could result in large commercial impacts, as a tax does not dictate a specific outcome. In some cases the prime objective may be the general reform of the taxation system to produce more economically rational consumption patterns, eg in the use of energy.

- **the scope of the tax –** it is unlikely that an energy tax could be applied across the board, for political reasons, especially if it adds to an existing consumption tax. Exemptions to an energy tax may be appropriate for a variety of end-users including low income domestic customers (who pay proportionately more to meet their energy needs than higher income customers), end-users living in harsher climatic conditions and energy intensive industries (which may have to compete with foreign industries not subject to comparable taxes). Ideally, for those paying the tax, offsets should be available so that the impact on businesses is not regressive and compliance is encouraged. Tax neutrality for businesses will also cushion any inflationary effects of the energy tax.
- **the relationship between the tax and the level of energy use –**if the objective of the tax is to increase energy efficiency through higher energy prices, then a progressive tax would be most effective.
- **the level of the tax –** the level at which the tax is set will be the major factor which determines its acceptability to the public. If the objective of the tax is to increase energy efficiency through higher energy prices, the level should be set at a point which will cause significant price rises without causing too much adverse public reaction.
- **the administration of the tax –** where the tax is collected, and by whom, are significant issues. It could be collected by the energy supplier through the billing process, on behalf of the government. Alternatively, customers could be taxed directly. Avoidance and evasion of the energy tax will be more likely with increasing complexity of compliance. The tax may be levied "upstream" in the energy supply chain (eg on energy purchased by the retailer) or "downstream" (eg on energy purchased by end-users), with different implications. For example an upstream tax will make exemptions more complicated to address. For taxes levied at the point of end-use there will be an incentive for customers to seek energy services rather than simply energy supply so as to reduce the amount of tax payable. As the market for competitive energy services develops this may provide a further incentive to pursue energy efficiency.

Implementation of an energy tax will require the definition and legal ratification of what exactly is to be taxed, who are the parties liable for payment of the tax, the rate(s) at which the tax will be levied, and provisions for tax neutrality. Further, any tax incentives or exemptions that may be introduced in conjunction with the energy tax should be designed so that they do not distort existing or planned competition in the economy. Energy taxes should be pre-announced and introduced in stages to facilitate smooth adjustment in the market.

Does this mechanism depend on or overlap with other mechanisms described?

Taxes on energy are unlikely, by themselves, to significantly promote energy efficiency activities. They can however raise the customers' levels of interest in energy efficiency which, in conjunction with a number of the other mechanisms, could achieve energy efficiency outcomes. Compatible other mechanisms include those that emphasise customer-driven energy efficiency: *M3 Providing consumption information on customers' electricity bills; M4 Communicating pricing and other information for energy efficiency; S3 Creating entrepreneurial energy organisations;* and *S7 Voluntary agreements for energy efficiency*.

Other public funding mechanisms that would have varying degrees of overlap with taxes on energy are: *F1 Public benefits charge for energy efficiency;* and *M2 Tax exemptions and incentives for energy efficiency*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
4. Pricing
7. Imperfect information (restricted access to customer information)
10. Lack of adequate paradigm (for evaluating the value of EE)
11. Separation of energy policy process (from environment & social policy)

Program Barriers

1. Low cost of energy to end-users

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is not affected by any of the three aspects of electricity industry restructuring because taxes on energy can be implemented irrespective of the electricity industry structure. The effectiveness of taxes on energy in promoting DSM and energy efficiency is determined by the effect of increased electricity prices in reducing electricity demand, rather than on any aspect of electricity industry restructuring.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

An energy tax simply raises energy prices. This, by itself, may not be sufficient to promote energy efficiency activities though it can contribute to achieving energy efficiency outcomes by raising the customers' levels of interest in saving money through increasing energy efficiency. Unless the tax raises electricity prices at different times of the day, an energy tax will not promote load shifting.

Is the mechanism indirectly supporting the above by some means?

Whether the mechanism is indirectly supporting or actively promoting the above will depend on the relative price increase that results from the tax and end-users' responses to these price increases.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

Denmark

Denmark has a carbon dioxide and energy tax, and the government has a system where industry can obtain a reduction in this tax if a voluntary agreement with the state is entered into to reduce energy consumption. The voluntary agreement includes a detailed energy audit of the facilities and preparation of an energy saving action plan by an authorised energy consultant. The proceeds from the taxation scheme are used to support investment in energy efficiency within the sector. An industrial company can then apply for financial support to implement some of the energy saving actions identified in the company energy plan.

The Netherlands

The Netherlands introduced environmental taxes on energy sources in 1988 to raise revenue to cover the costs of government environmental policy expenditure. The Environment Ministry is required by law to raise a portion of its expenditure on environmental activities from special environmental taxes. In 1990 this tax system was changed to focus on energy use. In 1992 the tax was transformed to reflect carbon dioxide emissions by being based 50% on carbon content and 50% on energy content.

Distribution companies collect the energy tax on behalf of the Government, and can claim exemptions from paying the energy tax for the amount spent by them on renewable energy.

The taxes are primarily aimed at raising revenue, with market signals regarded as an added bonus. A tax based solely on the carbon content of fuel was rejected because this would act counter to the policy of promoting diversity in energy sources.

United Kingdom

The United Kingdom Government has announced a levy on the business use of energy to be introduced from April 2001. It is planned that the levy will play a significant role in helping to meet the United Kingdom's targets for reducing greenhouse gas emissions. The levy will apply to gas (natural gas and LPG), coal and electricity used by business, agriculture and the public sector for energy uses. It will not apply to fuels used by the residential or transport sectors, or to fuels used for generation or non-energy purposes.

There will not be an 'across the board' approach to setting the level of this tax. Energy intensive industries will receive special consideration due to both their energy usage and their exposure to international competition. It is intended to set significantly lower rates for these industries providing they agree to targets for improving their energy efficiency.

The Government intends to ensure tax neutrality for businesses by cutting other business tax rates.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

The level of government responsible for the tax system, possibly in response to:

- the need for a 'simple' mechanism to demonstrate a policy response to an environmental issue;
- proposals for a public benefits charge which may be under the control of another jurisdiction;
- overall reforms of the taxation system.

Who would initiate the development of this mechanism?

The government's financial policy agency.

Who would actually design and develop the mechanism?

The government through taxation legislation.

Which parties are responsible for carrying out activities arising from this mechanism?

The government's taxation office.

Which parties actually realise the DSM and energy efficiency outcomes?

Depending on the level of the tax, end-users of energy may be stimulated to reduce energy consumption in order to reduce their energy bills.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

To succeed, this mechanism would need to be implemented in conjunction with other mechanisms that promote energy efficient activities by customers.

What are the basic institutional/market requirements?

The political will of the government.

An appropriate tax system that can incorporate taxes on energy.

An administrative system capable of collecting and monitoring tax revenue.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal funding of the government's financial policy agency.

How are activities arising from this mechanism funded?

The government's taxation office oversees the collection of the tax, and some administrative resources may be required at the point of collection (eg relevant electricity businesses).

6. IMPACTS ON ELECTRICITY BUSINESSES

The impacts of an energy tax on electricity businesses will vary depending on where the energy tax is applied in the electricity market, the energy intensity of the business, and, if applicable, the amount of fossil fuels used to generate the purchased energy. If electricity businesses pass these costs on to customers, the high prices may result in a loss of customers and/or reduced sales (and income).

In the longer term electricity businesses would experience some reduction in sales due to the effects of increased prices and customer implementation of energy efficiency. Increased prices may result in the loss of large customers who are relatively mobile, and highly sensitive to electricity prices.

There is also likely to be a non-recoverable cost to electricity businesses associated with any administration or collection of the energy tax.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government policy.** Specific consideration should be given to the potential policy impacts of the following issues before the final policy decision is made:
  - ♦ is an energy tax consistent with broader government policies – fiscal, environmental, energy etc?;
  - ♦ what degree of energy savings, if any, is being pursued – an absolute amount or only that which is cost-effective from the government's perspective?;
  - ♦ which customer classes should be targeted – business, residential etc.?
  - ♦ is the administrative burden more substantial if an energy tax is introduced across the board?;
  - ♦ what are the policy implications of introducing a 'flat tax' versus a 'carbon or pollution-type' energy tax?
- **Legislative requirements.** Legislation must be passed authorising an energy tax and possibly earmarking use of some of the revenue raised by the tax for specific energy purposes (such as energy efficiency).
- **Establishment of an administrative system.** An administrative system capable of collecting and monitoring tax revenue must be established. Adequate resources must be provided to implement, operate and maintain this administration system.
- **Promotion of energy efficiency**. Since an energy tax, by itself, does not address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits. The revenue from the energy tax may provide the funding for one or more of the additional mechanisms and/or the public information programs.
- **Periodic evaluation.** The effectiveness of the energy tax in actually achieving energy efficiency should be periodically evaluated to ensure that the tax is efficiently and effectively achieving the government's policy objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

If not properly designed, taxation mechanisms have the potential to be administratively unwieldy and not cost-effective with respect to the energy efficiency outcomes achieved. The mechanism in itself does not directly promote energy efficiency, and will only be effective to the extent that energy consumption is reduced because of increased energy prices. Where revenue from the energy tax is used to fund other energy efficiency mechanisms, the effectiveness of the tax in achieving energy efficiency outcomes may be increased.

Increases in energy prices for selected customers may be an issue in some jurisdictions and may be regarded as counter to the outcomes being promoted by industry restructuring and market reform.

The exemptions that may be applied to energy taxes could have significant implications for its effectiveness in promoting energy efficiency. Large industry could claim exemption on the basis of maintaining international competitiveness. Low income households would be disproportionately affected by such taxes, and it may be administratively difficult to identify such households and provide them with exemptions therefore raising difficult social equity issues.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity customers and sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Some customer classes may be burdened more heavily than other customers, eg low income households, energy-intensive industries that compete internationally. Exemptions or incentives could be provided to these parties to offset the tax burden. However, this will increase the administrative complexity of this mechanism.
- Consumers are very sensitive about the introduction of new taxes. The benefits of the energy tax must be clearly identified for each customer class, together with a comparison of the costs and benefits for each class.

10. EVALUATION

10.1 Evaluation Issues

Energy taxes necessarily have social and political impacts, and their promotion, development and operation are likely to be strongly influenced by the existing social and political framework. For these reasons, the mechanism is not readily transferable between different jurisdictions. However, where energy taxes are targeted to achieve specific policy goals, they can be very effective.

Identified barriers to energy efficiency are not clearly addressed by energy taxes. Therefore, energy efficiency outcomes, especially within an acceptable time-frame, can only be achieved in conjunction with more targeted mechanisms for which energy taxes may provide the funding.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★ ★ ★
Barriers addressed	Low number … High number ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★
Transferability	Low … High ★ ★
Flexibility	Low … High ★ ★ ★
Potential for market transformation	Low … High ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★
Social and environmental impacts	High … Low ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Danish Ministry of Energy (1993), *Energy 2000 - Follow Up*, Copenhagen, Denmark.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M2

Tax Exemptions and Incentives for Energy Efficiency

Mechanism Type: Market

Outline	This mechanism uses tax exemptions and incentives to provide signals promoting investment in energy efficiency to end use customers.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X No change
	Commercialisation/ Privatisation	X No change
	Competition	X No change
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 6, 7, 10, 11	
Program barriers addressed	6	
Who Promotes?	Government	
Who Initiates?	Government	
Who Develops?	Government	
Who Implements?	Government	
Who is Targeted?	Taxpayers (individuals and businesses)	
Funding	Government budget for administrative costs	
Impacts on electricity businesses	Loss of revenue caused by reduced sales Possible new commercial opportunity for the electricity business	
Previous experience	France – fiscal measures to promote energy efficiency in specific sectors Japan - – tax exemption for energy efficient equipment Korea – tax incentives for energy efficiency Netherlands – targeted fiscal instruments for ecologically sustainable equipment and investments	

1. MECHANISM OUTLINE

This mechanism uses tax exemptions and incentives to provide signals promoting investment in energy efficiency to end use customers.

1.1 General Description

What the mechanism means in general terms.

For many customers the electricity bill is a relatively low expense item, and their sensitivity to minor changes (increases or decreases) in the amount they pay for electricity is negligible. On the other hand, tax paid to the government is a more significant expense and seems to attract disproportionately more attention from individuals and businesses. Any potential to minimise a tax bill usually attracts some interest and it is possible to capitalise on this heightened interest to provide signals promoting investment in energy efficiency.

From the government's perspective, tax policy should reflect broader public interest goals in addition to raising revenue. In jurisdictions where excessive energy consumption is perceived as being undesirable, the taxation system can be used to influence end users to use energy more efficiently. Similarly, investments or behaviour that reduce profligate energy use may be rewarded, by means of incentives through the tax system.

Using the taxation system to encourage energy efficiency typically involves tax payers receiving a reduction in the amount of tax they have to pay when they invest money in, or carry out activities aimed at, achieving energy savings.

Providing a financial incentive for energy efficiency through the existing tax system can be an effective mechanism for government to financially interact directly with energy end users as the required administrative framework is already in place.

While the number and type of possible tax incentives for energy efficiency are many and varied, most focus on industrial and commercial users of energy and include the following:

- tax exemptions to encourage the purchase/lease of energy efficient equipment, including:
  - regimes to allow favourable depreciation of energy efficient equipment;
  - reduction in sales, VAT or other government-imposed taxes on energy efficient or environmentally friendly equipment;
- tax exemptions for the design and construction of energy efficient buildings (residential or commercial/industrial);
- energy or environmental tax exemptions if certain energy saving activities are undertaken, for example, receiving a reduction in the amount of an existing energy tax (eg a carbon tax), if energy efficiency equipment is installed.
- investment and income tax exemptions, for example:
  - exemption from tax on the interest earned on money invested in 'green funds' or funds created to develop energy efficiency,
  - exemption from tax for the proportion of income (either personal income or corporate income) which is invested in activities which promote energy efficient technologies or practices;
- tax exemptions given to companies which provide finance for energy saving projects.

Does this mechanism depend on or overlap with other mechanisms described?

Tax exemptions and incentives can raise the customers' levels of interest in energy efficiency, which in conjunction with a number of the other mechanisms could achieve energy efficiency outcomes. Compatible other mechanisms include those that emphasise customer driven energy efficiency: *S3 Creating entrepreneurial energy organisations; M3 Providing consumption information on customers' electricity bills; S7 Voluntary agreements for energy efficiency;* and *M4 Communicating pricing and other information for energy efficiency*.

The other public funding mechanism which has a degree of overlap with tax exemptions and incentives is *F1 Public benefits charge for energy efficiency.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
10. Lack of adequate paradigm (for evaluating the value of EE)
11. Separation of energy policy process (from environment & social policy)

Program Barriers

6. Financial barriers

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is not affected by any of the three aspects of electricity industry restructuring because tax exemptions and incentives for energy efficiency can be implemented irrespective of the electricity industry structure.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Tax exemprions and incentives could be used to directly promote either or both of the above outcomes.

Is the mechanism indirectly supporting the above by some means?

Tax exemptions and incentives for energy efficiency are usually directly targeted to achieve a specific outcome.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

France

The French government has fiscal mechanisms to promote energy efficiency in the following areas.

Industrial sector

- Fiscal advantages are given to authorised companies which implement energy savings. Such companies are exempted from tax under certain conditions and they benefit from a special depreciation system. (Enacted in 1980).
- A special regime for depreciation of energy efficient equipment (Laws of 1991 and 1997).
- A 50% reduction in the tax on energy efficient or environmentally friendly equipment purchased between 1992 and 1998.

Building renovation

Since 1974, tax reductions for energy efficiency investments in the residential sector have been provided. Initially, fiscal deductions were accepted for energy efficiency investments up to a certain amount. Since 1985, however, no distinction is made between ‘energy efficiency works’ and ‘important repair works’. This change has prevented evaluation of the impact of the tax on energy savings in recent years.

Overseas territories

In order to support the economic development of overseas territories, a law targeting high income tax payers allows the share of income which is invested in ‘productive activities’ in the overseas territories to be exempt from taxation. This scheme has been used to promote the increased sale and use of solar water heaters.

Japan

Under the Japanese Energy Reform Tax Credit Program, where a business acquires equipment which improves energy efficiency, and it is utilised within one year, either of the following exemptions/incentives can be applied:

- tax exemption equivalent to 7% of the equipment capital cost (as long as this is not more than 20% of the income or corporate tax payable);
- special depreciation of 30% of the equipment capital cost in the year of purchase, in addition to ordinary depreciation.

Korea

The Korean Government provides a tax incentive for energy efficiency investments based upon the Article 26 of the 'Regulation of Restriction in Exceptional Taxation'. Before 1997, the replacement or installation of the following facilities and equipment qualified for a 10% income tax credit for Korean products and a 3% credit for foreign products. From 1997, a 5% income tax credit is provided without discrimination on the basis of the country of origin of the product.

- Replacement of old boilers, furnaces and kilns for industrial use
- Installation of energy-saving facilities, including cogeneration facilities, heat supply facilities, energy-saving equipment
- Alternative fuel using-facilities
- Other facilities which are assessed as achieving at least a 10% energy saving

The tax credit comprises a deferral of the tax payable on income equivalent to 15% of the total funds invested in energy efficiency. The deferral is for three years, including the year when the investment was made, ie tax will not be levied until two years after the completion of the investment.

Applications for tax credits for the replacement of old boilers, and installation of energy-saving facilities and alternative fuel using facilities are processed directly by the tax office. Applications for tax credits for the other facilities mentioned above are processed by the Korean Energy Management Corporation (KEMCO). KEMCO issues a confirmation of the completion of the investment after examining the application and inspecting the installation site. The applicant then submits an application for tax credit with the KEMCO confirmation to the tax office.

The Netherlands

The Netherlands uses a variety of fiscal instruments including:

- **green investments** – residents who invest in a Green Fund have exemption from tax on the interest;
- **green VAT** – where the standard VAT (17.5%) is reduced to 6% if sustainable energy appliances are bought;
- **green mortgage** – lower interest rates for ecologically sustainable buildings;
- **exemption from energy tax for the distribution companies** – distribution companies collect the energy tax on behalf of the Treasury. However they are exempt from paying energy tax for the amount spent by them on renewable energy;
- **deduction of investment costs** – where investments are in energy efficiency and renewable energy, investment costs can be deducted from the taxable profit.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

The level of government with responsibility for the tax system, possibly in response to:

- plans to introduce an energy or environmental tax;
- proposals for a public benefits charge which may be under the control of another jurisdiction;
- overall reforms of the taxation system.

Who would initiate the development of this mechanism?

The government's financial policy agency.

Who would actually design and develop the mechanism?

The government through taxation legislation.

Which parties are responsible for carrying out activities arising from this mechanism?

The government's taxation office.

Which parties actually realise the DSM and energy efficiency outcomes?

Taxpayers (either individuals or businesses), because they carry out the tax deductible activity in order to receive financial benefits each year when they prepare their taxes.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

This mechanism can stand alone. It would also benefit from being implemented in conjunction with other mechanisms that promote energy efficient activities by customers.

What are the basic institutional/market requirements?

The political will of the government.

An appropriate tax system that can address energy efficiency exemptions and incentives.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal funding of the government's financial policy agency.

How are activities arising from this mechanism funded?

The government's taxation office manages the collection and rebating of tax from consolidated revenue.

6. IMPACTS ON ELECTRICITY BUSINESSES

If electricity businesses are required to promote energy efficiency and DSM, tax exemptions and incentives may encourage electricity customers to participate more readily in energy saving activities. As a consequence, electricity businesses may lose some income from their customers through reduced energy sales.

Some businesses may develop opportunities for new energy service business to counteract these losses. However if the energy efficiency activities are carried out by third parties, or by the customers themselves, this benefit is lost.

In the longer term the electricity businesses would simply experience reduced sales due to the implementation of energy efficiency by their customers.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government policy.** Specific consideration should be given to the potential policy impacts of the following issues before the final policy decision is made:
  - ♦ are tax exemptions and incentives for energy efficiency consistent with broader government policies – fiscal, environmental, energy etc?;
  - ♦ what degree of energy savings, if any, is being pursued – an absolute amount or only that which is cost-effective from the government's perspective?;
  - ♦ which specific energy saving outcomes are being targeted by this mechanism?
  - ♦ which customer classes should be targeted – business, residential etc.?
  - ♦ is the administrative burden more substantial if tax exemptions and incentives for energy efficiency are introduced across the board?
- **Legislative requirements.** Legislation must be passed authorising tax exemptions and incentives for energy efficiency.
- **Establishment of an administrative system.** An administrative system capable of implementing and monitoring tax exemptions and incentives for energy efficiency must be established. Adequate resources must be provided to implement, operate and maintain this administration system.
- **Promotion of energy efficiency**. Since tax exemptions and incentives for energy efficiency do not, by themselves, address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Periodic evaluation.** The effectiveness of tax exemptions and incentives for energy efficiency in actually achieving energy efficiency should be periodically evaluated to ensure that the measures are efficiently and effectively achieving the government's policy objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

If not properly designed, taxation mechanisms have the potential to be administratively unwieldy and not cost-effective with respect to the energy efficiency and DSM outcomes achieved.

Unless the mechanism is well-targeted, it is likely that a significant proportion of the people who take advantage of the tax exemptions and incentives would have implemented energy efficiency measures anyway, in the absence of such incentives. This is known as the "free-rider" effect.

If this mechanism is very successful, it could result in the government terminating the tax exemptions and incentives because too much tax revenue was being lost by the government.

If not properly integrated with other mechanisms, or if set at a relatively low level, taxation exemptions and incentives may not significantly promote energy efficiency activities by end-users.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).
- Impacts on electricity businesses will vary depending on the amount of tax exemptions and incentives, and which customer classes are targeted.

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Some customer classes may benefit more than other customers: e.g., higher-income households and businesses interested in investing in energy efficiency in their own buildings. Equity concerns may increase if, for example, only wealthy households benefit from tax exemptions and incentives. Special programs may need to be developed for targeting customers that are not responding to the improved economics for energy efficiency.

10. EVALUATION

10.1 Evaluation Issues

Tax exemptions and incentives for energy efficiency necessarily have social and political impacts, and their promotion, development and operation are likely to be strongly influenced by the existing social and political framework. For these reasons, the mechanism is not readily transferable between different jurisdictions.

This mechanism may be effective in transforming the market for energy efficient solutions, depending on how effectively the tax exemptions and incentives are targeted. However, the mechanism can be made more effective in achieving energy efficiency outcomes, especially within an acceptable time-frame, by linking the mechanism with other targeted mechanisms.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★ ★ ★
Barriers addressed	Low number … High number ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★
Transferability	Low … High ★ ★
Flexibility	Low … High ★ ★ ★
Potential for market transformation	Low … High ★ ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M3

Providing Consumption Information on Customers' Electricity Bills

Mechanism Type: Market

Outline	Under this mechanism, electricity businesses provide specific information about a customer's level of electricity consumption on that customer's electricity bills. This may encourage the customer to improve the efficiency with which they use electricity.	
Outcomes	☐ Load shifting ☐ Energy efficiency ☐ Direct effects ☑ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X No change
	Commercialisation/ Privatisation	↑ More useful and/or relevant
	Competition	↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 3, 7	
Program barriers addressed	2, 3, 4	
Who Promotes?	Governments, electricity businesses	
Who Initiates?	Governments, electricity businesses	
Who Develops?	Within electricity businesses	
Who Implements?	Within electricity businesses	
Who is Targeted?	End-use customers	
Funding	Internal funds of electricity businesses	
Impacts on electricity businesses	Significant increased costs to change billing systems Loss of revenue caused by reduced sales Possible new commercial opportunity for the electricity business in promoting energy efficiency	
Previous experience	Finland – feedback on electricity usage on bills Japan – provision of information on electricity usage to customers by TEPCO Norway – government regulation requiring all electricity businesses to include information on energy usage in the bill	

1. MECHANISM OUTLINE

Under this mechanism, electricity businesses provide specific information about a customer's level of electricity consumption on that customer's electricity bills. This may encourage the customer to improve the efficiency with which they use electricity.

1.1 General Description

What the mechanism means in general terms.

There are several different ways in which customers can receive feedback information about their electricity usage from their electricity retailer. This information may influence the customer's daily energy management behaviour or impact on their energy appliance/equipment investment decisions.

In one example, real-time displays of energy use in the home or industrial facility can be provided by meters set up in a highly visible place. Behavioural change is only likely if a time varying price is offered. In a second example, information on electricity consumption over the billing period can be displayed on the customer's electricity bills. In this case, behavioural change is only likely if the amount of the bill becomes an issue for the customer.

This mechanism addresses the feedback that can provided with electricity bills to promote energy efficiency, most frequently in the form of comparisons with past consumption.

Following are important characteristics of feedback information that should be considered:

- **frequency of information** – studies have shown that short feedback periods make electricity usage more visible and increase both the recipient's awareness and understanding of levels of usage and costs. Monthly, or bi-monthly bills have been shown to be effective;
- **information medium** – the information is most effective when it is presented in a document which someone in the household/company must read. Regular electricity bills are therefore an appropriate medium;
- **presentation of information** – the information is most effective when it is communicated in a format/fashion tailored to the customer and which is easy to understand. In particular, the translation of electricity usage into actual financial costs is considered useful;
- **comparative context** – for feedback to be meaningful, it should be related to a significant standard which gives a basis for comparison. In the case of electricity bills, this could be the level of electricity usage in a previous similar period, and/or the level of usage by similar households. A comparative framework stimulates the consumer to think about the reasons for any changes in their usage, or the difference between their usage and that of others, and encourages behavioural change.

Electricity bills will normally contain standard information such as: actual or estimated kilowatt-hours used; the financial cost of the electricity used; service charges and any relevant value added tax or similar taxation charge. In addition, information to promote energy efficient behaviour can be included as follows:

- past-use comparative feedback:
  - ♦ electricity usage patterns over the past one, two or more years;
  - ♦ electricity usage during the same month of the previous year(s) to help customers check their electricity usage by comparing monthly electricity usage data with that of the previous year;
- electricity usage by similar homes or businesses to help customers compare their electricity use and determine if it is unusually high;
- electricity usage by end-use within the home or commercial premises – ie a breakdown of how much electricity goes to space heating, water heating, appliances, lighting etc. (involves sophisticated, but available, metering);
- energy efficiency advice to provide customers with ideas about how to save both energy and money, and tailored to address the main areas of electricity use of that customer class.

In some countries weather adjustments to the electricity usage information can be important when comparing a previous year's usage.

The information on the bill can be presented in a number of ways to make it easy for customers to understand. It is best presented in graphs, tables and figures. Graphical comparisons are often most effective, because they provide customers with an easy to read, visual representation of their electricity use. The most common graphic used is a standard bar chart, with two simple bars for each month of the year, one representing electricity consumption for this year, and the other showing electricity consumption for the same month last year.

The major costs associated with this form of customer bill involve the graphic redesign of an existing billing system, and any expenses involved with more frequent meter reading and bill processing. Before changes are implemented across the board, a trial would be useful to 'tailor' the system to best suit the electricity use patterns of the particular utility customers, and to assess the behavioural response from different customers.

Where such forms of customer bill have been implemented, the indications are that:

- customers do think about their electricity consumption;
- behaviour does change toward reduced electricity usage – particularly in the areas of space heating, lighting and water use;
- customer opinion about the electricity retailer is improved.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism depends on the provider of electricity bills to customers (usually the retail electricity business) being motivated to promote energy efficiency, at least indirectly. Hence, other relevant mechanisms include: *C2 Energy efficiency licence conditions for electricity businesses; F2 Financing of energy efficiency by electricity businesses;* and *M4 Communicating pricing and other information for energy efficiency*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
3. Split (misplaced) incentives to energy providers
7. Imperfect information (restricted access to customer information)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)
4. End users do not invest in EE because of habits or custom

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because consumption information can be provided on customers' electricity bills irrespective of the electricity industry structure.

This mechanism is more useful under commercialisation/privatisation and under competition it is much more useful because electricity businesses can use the interest in energy efficiency generated by the provision of consumption information to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

With increased retail competition, and increased services provided by (and billed for) by the retailer, customer bills may need to change from the current model, eg toward direct debit of funds. In some cases, direct debit may not be accompanied by a paper-based bill or invoice. Where there is no physical bill, it could be a barrier to the effective implementation of this mechanism.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The mechanism does not directly promote any outcomes, it simply provides information. In the residential sector, this may lead to increased energy efficiency rather than load shifting. However it could lead to both outcomes with commercial/industrial customers.

Is the mechanism indirectly supporting the above by some means?

The mechanism is indirectly promoting the outcomes by providing information about electricity usage.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes; for example an assessment conducted in Norway demonstrated that groups who received an energy bill containing usage information saved on their energy costs compared to the general population. This survey also showed that the bill is popular among recipients and leads to greater awareness of energy use issues. In this study, it was found that changes in behaviour were not random, but resulted from an increase in either general awareness or specific knowledge or both. A major stimulus for behavioural change was the increased billing frequency.

What are key examples of the above?

Finland

Most Finnish energy and district heating companies have given feedback to their customers since the middle 1980s. About 85% of the Finnish district heating customers now receive feedback on their energy usage. An inquiry into customer information needs was made by the Finnish District Heating Association (FDHA) in late 1993. More than 60% of the customers who responded expected feedback on district heat consumption. In its report, the Association recommended that energy usage feedback be given to customers once or twice a year, included in the costs of district heating. More frequent feedback requests would have to be paid for by the customer.

Japan

The Tokyo Electric Power Company (TEPCO) carries out a number of energy usage information feedback campaigns.

- Electricity consumption during the same month of the previous year is indicated in a "notice of energy consumption" (receipt) to help customers check up on their electricity usage by comparing monthly consumption data with that of the previous year.
- In June 1998, TEPCO conducted a campaign under the theme of electrical safety and energy conservation. This campaign involved providing a 'Save Energy Clinical Chart' that graphically showed the customer's monthly electricity consumption data over the past year.
- TEPCO also sends an 'Energy Shape-up Chart' showing monthly electricity consumption figures over the past two years to all major customers.

Norway

Government regulations require all electricity businesses to change their billing systems by 1999, to provide electricity use information to customers.

The regulations require all electricity businesses to bill at least four times each year for actual usage (as opposed to once a year) and to include a graphic in the bill which compares usage in a given period this year with the same period for the previous year. The cost of implementing the new bills will be met by the electricity businesses.

Tests conducted on this billing system demonstrated that groups who received the new bill have saved around 9% on their energy bills compared to the general population. These tests were jointly funded by the government (the Ministry of Oil and Energy and NVE) and utilities, mainly Oslo Energi and Stavanger Energi.

Where can further information on these existing mechanisms be found?

Norwegian Water Resources and Energy Directorate: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Governments and electricity businesses with an interest in the passive promotion of energy efficiency.

Who would initiate the development of this mechanism?

The mechanism can be voluntarily developed and used by electricity businesses, or governments can create laws or electricity licence conditions which require energy providers to present the information on bills (or in other forms) to end users.

Who would actually design and develop the mechanism?

The customer accounts staff of the retail business.

Which parties are responsible for carrying out activities arising from this mechanism?

The customer accounts staff of the retail business.

Which parties actually realise the DSM and energy efficiency outcomes?

The mechanism targets end-use customers and works on the assumption that by providing detailed, personal information about energy use patterns, the end user has a better basis for decisions about how to use energy most efficiently.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism should be promoted in conjunction with other mechanisms that encourage retailer interest in energy efficiency.

What are the basic institutional/market requirements?

Willingness on the part of the retailer to amend bills, or willingness of government to pass a law prescribing that information be provided on bills.

Technological capability – in the form of appropriate computer software – is necessary to provide this information.

Possession of the resources required to read meters relatively frequently – eg six times each year. This can introduce additional labour costs for many utilities.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal resources of the retail electricity business; government funding may be available for a pilot project.

How are activities arising from this mechanism funded?

The customer accounts section of the retailer would incur extra costs associated with the reading of meters more frequently and the administration associated with sending out additional bills. This would be funded by the retailer.

6. IMPACTS ON ELECTRICITY BUSINESSES

In the near term, the costs to electricity businesses are likely to be minimal with respect to reduced sales to customers, but significant resources may be required to develop the required billing infrastructure. Initially there will be a cost to electricity businesses associated with the design and implementation of a changed billing format. There will also be an ongoing cost associated with increased billing frequency (if applicable) and administration.

However, the mechanism can also represent a commercial opportunity for electricity businesses to promote energy services that can be offered by the business. While promotion of energy efficiency services may reduce sales of kilowatt-hours it is anticipated that the loss of revenue would be offset by the returns generated by financing and energy service provision.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Commitment versus legislation.** Electricity businesses may be committed to promoting energy efficiency and willing to spend internal resources to make the appropriate changes in their bills and billing system. Alternatively, government can create laws or electricity license conditions that require energy providers to present the information on bills (or in other forms) to end users. Government funding available for pilot projects may be a useful adjunct to this activity.
- **Promotion of energy efficiency**. Since expanded information on electricity bills does not, by itself, address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Target group.** The demographic of the target group for this mechanism should be carefully considered to ensure that the information and overall strategy are targeted effectively. Studies in Norway showed that the highest level of savings was achieved by younger groups, those with greater than 12 years education (commencing in primary school), and those from higher income groups. Other mechanisms may be required to address other groups.
- **Estimated electricity bills.** To reduce operating costs, some electricity businesses may actually move away from having meters read regularly, and adopt systems where they invoice customers on estimated charges and then verify against actual usage once a year. It could be argued that such a move is counter to encouraging end use energy efficiency. Governments could require utilities to provide regular bills providing information about actual usage.

- **Periodic evaluation.** The effectiveness of expanding information on customers' electricity bills in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Retail businesses may believe that the extra cost involved in designing, developing and implementing this mechanism will not guarantee energy efficiency outcomes. This will be a problem for retailers required to achieve outcomes rather than those being encouraged to develop processes.

In larger electricity customers, it is possible that the information about electricity usage on the electricity bill may go to the wrong person. The bill is most likely to be read by an accountant responsible for paying the bill, rather than an energy manager who would be best placed to reduce costs through implementing energy efficiency measures.

In some jurisdictions, electricity bills are frequently provided with an estimate of electricity consumption over the billing period rather than with the actual consumption measured by a meter reading. To save costs, meters may be read only once a year when the estimates are adjusted.. Where this practice occurs, it will not be possible to implement this mechanism.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organizations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).
- Electricity businesses may incur significant costs in developing the required billing infrastructure.

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.

10. EVALUATION

10.1 Evaluation Issues

Significant energy efficiency and DSM outcomes are unlikely to be achieved within an acceptable time-frame through this mechanism

10.2 Evaluation Scores

Criterion	Scale	Score
Previously demonstrated effectiveness	None – High	★ ★ ★
Barriers addressed	Low number – High number	★ ★
Effects of restructuring on mechanism	Less useful – More useful	★ ★ ★ ★
Transferability	Low – High	★ ★ ★ ★
Flexibility	Low – High	★ ★ ★ ★
Potential for market transformation	Low – High	★ ★
Cost effectiveness	Low – High	★ ★ ★
Social and environmental impacts	High – Low	★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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Wolsink, M (1997) 'New Experimental Electricity Tariff Systems for Household End-Use' in *Sustainable Energy Opportunities for a Greater Europe: The Energy Efficiency Challenge*, ECEEE Conference Proceedings, Summer Study.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M4

Communicating Pricing and Other Information for Energy Efficiency

Mechanism Type: Market

Outline	This mechanism motivates customers to alter their electricity-using behaviour through the electricity retailer communicating strong pricing incentives and other information to change behaviour.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☐ Direct effects ☑ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑	More useful and/or relevant
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑↑	Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	4, 6, 7, 9, 13	
Program barriers addressed	2, 3, 4, 5, 6, 7	
Who Promotes?	Within electricity businesses	
Who Initiates?	Within electricity businesses	
Who Develops?	Within electricity businesses	
Who Implements?	Within electricity businesses	
Who is Targeted?	End-use customers	
Funding	Internal funds of electricity businesses	
Impacts on electricity businesses	New commercial opportunity for the electricity business in promoting energy efficiency Significant increased costs to implement new systems Loss of revenue caused by reduced sales which could be offset by revenue from new business	
Previous experience	Australia – time of use pricing in Western Australia	

1. MECHANISM OUTLINE

This mechanism motivates customers to alter their electricity-using behaviour through the electricity retailer communicating strong pricing incentives and other information to change behaviour.

1.1 General Description

What the mechanism means in general terms.

There are two main elements to this mechanism:

- communication between the electricity retailer and its customers;
- the information which is being communicated.

A common approach is for retailers to implement a time-of-use tariff structure. The retailer could also communicate pricing variations in real-time, and use the communications media to provide other information to the customer.

There are a number of technologies in use, or being developed, that provide the means for advancing the relationship between the electricity retailer and its customers beyond the simple provision of electricity on demand and payment of a regular bill. Electricity industry reform is providing competitive pressures on electricity businesses to adopt more of these customer-focused approaches.

In competitive electricity markets, retailers wish to avoid wholesale purchase of electricity at times of high cost. Whereas, in the past, some influence on customer demand could be exerted through fixed period time-of-use tariffs, the prospects for volatility in the wholesale electricity pool price will stimulate interest in more dynamic arrangements.

These may involve providing real-time pricing signals to customers with the intention of stimulating demand reduction. The electricity retailer may even bid demand reductions into a wholesale pool and source these demand reductions from its customers on the basis of commercial arrangements. These could include payments to customers for being available to reduce demand, being put on standby or being required to shed load, or lower prices for interruptible electricity. The common feature in all these arrangements is improved communication between the retailer and the customer.

Other factors driving electricity retailers to develop their customer communication capabilities include:

- requirements that may be imposed on them, such as through the mechanisms relating to energy efficiency licence conditions, mandated sourcing of sustainable energy, and voluntary agreements for energy efficiency;
- new business opportunities involving customer energy management (such as remote control of appliances and equipment), security services (involving sensors and alarms), metering and services such as television, telephone and internet access.

The communications technologies that may be available for electricity retailers to utilise include:

- the telephone networks – increased telecommunications competition is providing commercially attractive possibilities for electricity businesses;

- distribution line carrier – two way communication is technically and economically feasible with established electricity transmission and distribution systems;
- radio – remote communication options can be attractive eg remote meter reading;
- cables and optical fibres – synergy with a range of new services to customers.

The electricity retail business considering diversifying into value added services would need to assess its capabilities with regard to the following issues:

- does the business have an interest in, and information about, relevant technologies?
- is the business sufficiently resourced to support this interest?
- can the business access the technologies?
- does the business possess sufficient knowledge about applications, and the market for new services?
- is there sufficient organisational depth to pursue new business interests?

With respect to energy management and energy efficiency, improved communication capabilities will enable electricity retailers to:

- identify load patterns, and target energy management programs more effectively;
- control distributed generation installed in customers' premises;
- provide advice to customers;
- enable two-way communication with customers regarding load control;
- control interruptible loads on customers' premises;
- provide time-of-use pricing details to customers in real time.

If the electricity retailer chooses the more passive approach of only providing time-of-use pricing to selected customers, market experiences suggest that a wide range of outcomes are possible. It may be more cost-effective in this case for the retailer to influence customers' daily electricity usage behaviour or impact on their energy appliance/equipment investment decisions, by displaying information on electricity consumption over the billing period on the customer's electricity bills.

An important issue for electricity retailers considering developing their customer communications abilities is to what degree smaller customers (residential and commercial) will actually provide a market for new services and functions based on communications. Electricity market reforms may lead to the replacement of metering with estimated electricity bills and/or assumptions that all small customers of a particular type have the same electricity consumption profile. Where this occurs, there may be no market for communications-related services for smaller customers.

On the other hand, larger commercial and industrial customers may well have the motivation and capability to respond particularly to price-sensitive information provided by electricity retailers, particularly if electricity costs are a significant proportion of the customers' business expenses.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism depends on the electricity retail business being motivated to promote DSM and energy efficiency, at least indirectly. If there is a commercial incentive for the retail business to pursue economic energy efficiency opportunities other mechanisms that encourage retailers to pursue energy efficiency may become redundant. These include: *C1 Mandatory sourcing of energy efficiency; C2 Energy efficiency licence conditions for electricity businesses;* and *S7 Voluntary agreements for energy efficiency*.

However, this mechanism does not guarantee energy efficiency outcomes. Retailers may simply choose to pursue other commercial opportunities.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

4. Pricing
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
9. Customer instability (problem for energy providers)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
6. Financial barriers
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because communication of pricing and other information can promote DSM and energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the interest in energy efficiency generated by communication of pricing and other information to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

A move to full competition at the retail level will remove the potential for regulatory involvement in new business activities, in particular, the ability to influence the prices to be paid by participating customers. However there is still likely to be competition regulation that could influence the range of services that the retail business considers. This may present a barrier to the implementation of this mechanism.

1.4 Potential Outcome

Is the mechanism promoting load shifting and/or increased energy efficiency?

The mechanism is primarily promoting the commercial interests of the retailer and customer. Outcomes are likely to vary enormously between retailers because of differing management philosophies toward the development of new business, and the variations between retailers in how they communicate with customers. The most significant outcome is likely to be load shifting. There is also a potential to achieve increased energy efficiency.

Is the mechanism indirectly supporting the above by some means?

The mechanism is indirectly promoting the outcomes by providing information.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

There is considerable experience worldwide with the application of time of use pricing, although this only represents a potentially small component of this mechanism. Examples of enhanced communication between electricity retailers and customers achieving DSM and energy efficiency are not common.

What are key examples of the above?

Australia

In Western Australia, Western Power provides “SmartPower”, an innovative time-of-use pricing system for residential customers. The SmartPower concept is relatively unique with its seasonal pricing structure and four energy prices. It offers off-peak and shoulder prices during low demand periods, and peak prices which match the periods of high demand. Customers are now provided with greater choice, being able to control their power bill by changing their household appliance electricity use to take advantage of cheaper off-peak prices. Appliances such as electric storage hot water systems, pool pumps, reticulation pumps, dishwashers and washing machines can be easily set to operate during shoulder and off-peak periods, thus providing significant cost savings of up to 30%.

SmartPower’s seasonal pricing structure reflects the change in the peak electricity demands between summer and winter weekdays (midday peak versus morning and evening peaks) and differentiates the lower load periods during weekends and overnight.

SmartPower’s cost reflective prices are expected to encourage two demand management impacts. Firstly, customers are expected to shift a proportion of their existing electricity consumption from high to low periods of demand. Customers will also have greater incentive to focus on energy efficiency options which reduce consumption during peak periods. The second anticipated impact is a refocussing of building and appliance design on peak period energy efficiency and storage options together with increased development of smart timer-based appliances.

The anticipated moderation of peak loads and increased off-peak usage has the potential to reduce Western Power's costs and increase its competitiveness through:

- delaying the requirement for additional generation, transmission and distribution plant through improved system utilisation
- reducing the operation of high cost peaking plant and reducing peak line losses

Western Power has contributed to the design and the development of the SmartPower meter, manufactured by Email. A special timed circuit for off-peak appliances is incorporated into the meter, with future options to include remote communications and prepayment capability.

Where can further information on these existing mechanisms be found?

IEA DSM Programme Task II Communications Technologies for DSM: http://dsm.iea.org

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Staff of retail electricity businesses with an interest in the promotion of energy efficiency and load management, and those with an interest in creating new business for profit. The key party would probably be the business development group within the electricity business.

Who would initiate the development of this mechanism?

An electricity retailer would make a commercial decision whether to develop enhanced communication with target customers.

Who would actually design and develop the mechanism?

The business development group within the retail business.

Which parties are responsible for carrying out activities arising from this mechanism?

Customer service staff would package the business' communications options and associated services, and market these to the target customer group.

Which parties actually realise the DSM and energy efficiency outcomes?

The electricity retailer's customers realise the DSM and energy efficiency outcomes.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism should be promoted in conjunction with other mechanisms that encourage retailer interest in energy efficiency.

What are the basic institutional/market requirements?

Electricity businesses must have the legislative and regulatory ability to build new business, must be committed to promoting energy efficiency and load management, must have the technological capacity, and must be willing to spend internal resources to make the appropriate changes for enhancing their communication systems.

There must be staff in the business development group of the electricity business with the necessary expertise to be able to analyse the commercial viability of proposals to develop enhanced communications with customers.

The market has to be sophisticated enough for customers to be willing and able to respond to communication from the retailer

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal corporate funding by the electricity retail business of business development work.

How are activities arising from this mechanism funded?

Enhanced communications would operate as part of the retailer's supply business, with the work of customer service staff funded by the revenue of the business.

6. IMPACTS ON ELECTRICITY BUSINESSES

In the near term, the costs to electricity businesses are likely to be minimal with respect to reduced sales to customers, but significant resources may be required to promote the required metering infrastructure.

The mechanism represents a significant commercial opportunity for electricity businesses to bundle a range of new services for customers. While promotion of energy efficiency services may reduce sales of kilowatt-hours, it is anticipated that the loss of revenue would be more than offset by the returns generated by new products and services that could be offered.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative and regulatory requirements.** Government may need to create laws or electricity license conditions that require energy providers to provide enhanced communication systems to end users. Government funding should be available for pilot projects. Regulatory barriers preventing electricity businesses from entering this kind of business may need to be modified.
- **Promotion of energy efficiency**. Since enhanced communication systems do not, by themselves, address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Deemed profiling of electricity use.** To reduce operating costs in competitive electricity markets, there may be a move away from metering of actual electricity usage toward deemed profiling, where all customers of a particular type are assumed to have the same level and pattern of electricity usage. It could be argued that such a move is counter to encouraging end use energy efficiency. Governments could require metering of all

customers and the provision of bills based on actual metered electricity usage not less than four tomes a year.

- **Periodic evaluation.** The effectiveness of enhanced communication systems in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Retail businesses may conclude that the extra cost involved in designing, developing and implementing this mechanism may not guarantee new business or energy efficiency outcomes. This will be a problem for retailers required to achieve outcomes rather than those being encouraged to develop processes.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).
- Electricity business may incur significant costs in developing the enhanced communication systems. In fact, the costs may be sufficiently high to limit the participation of electricity businesses in this mechanism.

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Some customer classes may benefit more than other customers: e.g., better educated and wealthier households and businesses interested in investing in energy efficiency in their own buildings. Equity concerns may increase if, for example, only wealthy households benefit from enhanced communication systems. Special programs need to be developed for targeting customers that are not responding to the improved communication system.

10. EVALUATION

10.1 Evaluation Issues

Significant energy efficiency outcomes are unlikely to be achieved within an acceptable time-frame.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★ ★ ★ ★
Barriers addressed	Low number … High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★ ★
Transferability	Low … High ★ ★ ★ ★
Flexibility	Low … High ★ ★ ★ ★
Potential for market transformation	Low … High ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Schaub, T (1996) 'DLMS: The Device Language for Multi-Media Communication and for Multi-Functional Applications', *MATES '96*.

Office of Electricity Regulation (1992) *Energy Efficiency: The Way Forward*, Birmingham, United Kingdom.

Office of Electricity Regulation (1992) *Energy Efficiency: Consultation Paper*, Birmingham, United Kingdom.

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Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M5

Energy Performance Labelling

Mechanism Type: Market

Outline	Energy performance labelling provides information to end users about the energy-using performance of products such as electrical appliances and equipment, and even buildings.	
Outcomes	☐ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑	More useful and/or relevant
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑	More useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☐ Large industrial	
Policy barriers addressed	2, 6, 7, 10, 11, 12, 13	
Program barriers addressed	2, 3, 4, 5, 7	
Who Promotes?	Government	
Who Initiates?	Government	
Who Develops?	Government with assistance from appliance manufacturers and retailers and the building industry	
Who Implements?	Appliance manufacturers and retailers, builders	
Who is Targeted?	Purchasers of appliances, equipment and buildings	
Funding	Government budget funds the design of the program Manufacturers and builders pay for the physical labeling of appliances and equipment and the energy rating of individual buildings	
Impacts on electricity businesses	Loss of revenue caused by reduced sales	
Previous experience	Many countries – energy performance labelling programs	

1. MECHANISM OUTLINE

Energy performance labelling provides information to end users about the energy-using performance of products such as electrical appliances and equipment, and even buildings.

1.1 General Description

What the mechanism means in general terms.

In traditional electricity markets, purchasing energy efficient appliances, equipment and buildings is the key mechanism for end-users to achieve energy efficient outcomes. As the electricity market becomes more competitive, end-users can be provided with energy services by electricity businesses which may result in significant energy efficiency improvements. However, poor investment decisions by end-users with respect to energy efficiency may still undermine many of the benefits that can be achieved through a competitive energy services market.

Energy performance labelling programs for appliances involve attaching small, easy-to-read information labels on appliances so that consumers can read about their energy-performance at the point of sale. Labelling schemes have existed in a number of countries since the 1970's and 1980s, and an increasing number have been implemented during the 1990s.

There are two basic types of energy performance labels:

- endorsement labels – these provide an assurance from a reputable body that the product conforms to or exceeds some standard of energy efficiency, which may or may not be stated on the label;
- comparison labels – these provide an indication of the level of energy efficiency of the product as compared with similar products. The comparison is usually indicated visually, eg by an increasing number of 'stars' for increasing levels of energy efficiency. An indication of the actual quantity of energy typically used by the product may also be included in the label.

Energy performance labelling programs typically aim to reduce the demand for energy in the residential sector and involve several strategies to achieve this goal.

The first strategy is to provide information to consumers about the amount of energy used by products, as well as the associated environmental and financial costs. The intention is to influence consumers' decision making and encourage the purchase and use of energy efficient products. This information can be conveyed by either endorsement or comparison labels.

The second strategy is to use the fact that comparison labels reveal the relative energy performance of competing products to put market pressure on manufacturers to quickly improve the energy efficiency of the products they offer consumers.

A third strategy which has emerged in a small number of markets in recent years, is the involvement of the retailing sector as potential 'promoters' of energy efficient products, using the energy performance labelling program as a sales and marketing tool.

Designing an effective energy performance labelling scheme involves a range of technical, social and cultural issues. Studies have shown the importance of considering all the economic actors involved (ie manufacturers, retailers and consumers) and seeking to use the potential motivations of each to design the most effective scheme. The final design of a labelling program will take into account a full range of cultural issues specific to the country or state that is designing the program.

Key considerations in designing a labelling program include:

- who will create, manage and fund it? This may in turn raise, or influence, decisions about whether it will be a mandatory or voluntary scheme;
- an assessment of the consumers in the jurisdiction, to identify the most effective way to present information to them;
- an assessment of appliance manufacturers, including consultation with them about a proposed scheme and determining what type of activities will motivate and encourage them to improve the energy-related performance of their products;
- determining the information the labels will disseminate. There are a range of technical and social issues to resolve before effective labels can be designed;
- designing other 'back up' information to complement the labelling program - eg product lists; information/promotion programs, training programs for retailers;
- an appropriate verification scheme, to ensure the labelling scheme is credible;
- monitoring of energy efficiency outcomes.

Traditionally, labelling programs have been developed for products such as refrigerators, freezers, dishwashers and clothes dryers and other electrical appliances. Increasingly however, energy performance labelling programs are being applied to a wide range of activities. For example, home energy rating 'labels' or certificates provide energy performance information about a dwelling to prospective buyers or renters prior to them purchasing or renting the dwelling. The overall objective of energy performance labelling for homes is similar to that for appliances, in that they aim to reduce the demand for energy in the residential sector, by improving the energy performance of dwellings.

Typically, such a label or certificate would be prepared by the builder or designer and approved by an appropriate authority, such as a local council or independent assessor, before being provided to the consumer. The label or certificate information can include a comparative thermal rating, information about the dwelling's greenhouse gas emissions and/or details about the financial costs of operating the dwelling over an annual or longer time span.

As the building sector in most countries is a complex market to influence, to achieve this goal, a home energy performance labelling scheme would involve a number of strategies, including:

- raising awareness among consumers about the energy use and associated costs of their homes, in order to create demand for more efficient dwellings;
- influencing the design and construction of dwellings, to improve the minimum energy performance of all properties;
- ensuring that all approving authorities (such as local councils) include energy efficiency in their building approval processes;

- raising awareness among real estate agents and other 'retailers' of properties about energy efficiency issues and benefits.

Does this mechanism depend on or overlap with other mechanisms described?

Energy performance labelling can largely stand by itself although it would benefit from mechanisms that can promote the merit of labelling schemes such as: *S2 Energy centres;* and *S3 Creating entrepreneurial energy organisations*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
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)

Program Barriers

2. Lack of information to end users
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
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because energy performance labelling can promote energy efficiency, irrespective of the electricity industry structure.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Energy performance labelling directly promotes increased energy efficiency.

Is the mechanism indirectly supporting the above by some means?

The mechanism directly supports increased energy efficiency.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

Australia

The Australian Energy Rating Scheme, the ‘Star Rating’ program, was launched in 1986 for refrigerators and freezers, and then later included dishwashers, air conditioners, clothes dryers and other appliances. The labels provide comparative information, with an energy efficiency rating from 1 to 6 stars (6 stars being the highest efficiency available).

In 1992, a study was undertaken to assess the costs and benefits of the scheme to date, particularly in the state of Victoria. With respect to refrigerators and freezers, there had been a rapid improvement in energy efficiency during 1986 and 1987 and a more steady improvement from then up to 1992.

In 1992, there were reports of diminishing commercial pressures on manufacturers to improve products as more of their models reached the five star level (at that stage, five was the maximum number of stars). Nonetheless, it was estimated in that year that labelling had reduced the annual consumption of new refrigerators and freezers by 12 per cent and the annual consumption of the entire household refrigeration stock by around three per cent.

Labelling has been associated with a 16 per cent reduction in average cycle energy consumption of new dishwashers sold in Australia in 1992. With air conditioners, the proportion of one star models dropped from 14 per cent to 10 per cent of the total available models, while models with four stars or better increased from 20 per cent to 35 per cent of those available.

In 1993, nearly 90 per cent of intending appliance purchasers said they were aware of the energy label and 45 per cent said they used the information to compare appliances prior to purchasing. About 42 per cent of customers reported energy efficiency or related factors (such as running costs) as being the most important consideration in appliance purchasing.

A ten year review of the scheme was conducted during 1997/98, primarily to address the ‘bunching at the top’ issue - ie the fact that improvement of product efficiency since the program commenced in 1986, had meant that more appliances were receiving five and six star ratings (the highest). The result of this was that manufacturers had less incentive to improve efficiencies and the labelling information was becoming less useful to consumers.

In 1998, legislation was passed in the Australian Capital requiring that all houses sold in the national capital, Canberra, must include a certificate showing the building's energy rating. The rating is from 1 to 5 stars. The Act makes it illegal to advertise a house for sale without including its energy rating.

It is the first scheme in Australia to require energy ratings to be applied retrospectively. The certificate will be a vital part of the sale contract process and will have to be provided to the buyer before sale contracts are exchanged. The legislation means that if the seller or agent fail to provide the energy certificate, the purchaser will be able to pull out of the deal at any time before its completion.

Houses built in the Australian Capital Territory before July 1995 will have to be assessed and receive certification before they can be offered for sale. Houses built since 1995 must be designed to have a pre-construction rating of at least four stars as part of the permit approval process. Houses advertised for lease will have to include the energy rating information, but this will not apply to rental properties that have never been rated. However, such a house would need an energy certification if it is sold.

Where can further information on these existing mechanisms be found?

Energy performance labelling lists for appliances in Australia: http://www.greenhouse.gov.au/energyefficiency/appliances/index.html

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Government agencies with responsibility for promoting increased energy efficiency.

Who would initiate the development of this mechanism?

Usually, but not exclusively, the government body with interests in promoting market transformation for energy efficient products. The origins and proponents of a labelling program will play a part in determining whether it will be a mandatory scheme - created and enforced by legislation or regulations - or a voluntary scheme (eg sponsored by industry).

Who would actually design and develop the mechanism?

Government with assistance from manufacturers, building industry.

Which parties are responsible for carrying out activities arising from this mechanism?

Appliance manufacturers and retailers, builders, developers etc. under guidance from the government body with interests in promoting market transformation for energy efficient products.

Which parties actually realise the DSM and energy efficiency outcomes?

The end-users of the energy efficient products that have been developed.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

This mechanism can largely stand by itself.

What are the basic institutional/market requirements?

Ability and willingness on the part of government to involve all the relevant economic actors (ie manufacturers, retailers and consumers).

Implementation of a comprehensive public education campaign about the energy performance labelling program.

Establishment of an appropriate authority to generally administer the scheme, including:

- developing guidelines for labels;
- testing and verifying compliance with labels;
- monitoring the application of labels;
- imposing sanctions when labels are not applied when required or are applied inappropriately.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Government would fund the design of the program/enactment of legislation; as well as general information and promotional campaigns, and verification studies

How are activities arising from this mechanism funded?

Manufacturers, builders etc pay for the physical labelling of appliances or issuing of building certificates.

6. IMPACTS ON ELECTRICITY BUSINESSES

The main impact of this mechanism on electricity businesses will be some reduction in electricity sales if a sufficiently large number of consumers purchase energy efficient appliances and equipment.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government commitment.** Government must be committed to promoting energy efficiency and must be willing to spend internal resources to implement energy performance labelling. Government must also be willing to encourage the participation of all key stakeholders in the implementation of energy performance labelling: e.g., consumers, architects and engineers, home builders, ESCOs, building owners, real estate agents, industry associations, trade associations, electricity businesses, and appliance and equipment manufacturers and retailers.
- **Government policy.** Government should consider the following issues before making the final policy decision:
  - ♦ should the label cover only with energy usage or a broad range of ecological sustainability issues (eg multi criteria, cradle-to-grave analyses)?;
  - ♦ should there be comparison or endorsement labels or both?;
  - ♦ should there be an emphasis on energy usage or cost indicators (ie just set out how much energy an appliance uses, or try to show its running costs)?;

- ♦ should the labelling program require a relationship between appliance performance and energy rating?;
- ♦ what assumptions will be made in calculating the energy usage and related performance data shown on the label?;
- ♦ how should energy efficiency criteria be updated to account for market changes (eg progressive increases in the energy efficiency of appliances)?;
- ♦ should consumer protection features be built into the labelling regime?:
- ♦ should the format of the label emphasis accuracy of the information or clarity of presentation?

- **Legislative requirements.** Legislation may be required to ensure participation by manufacturers in the labelling scheme and credible measurements of energy usage. Alternatively, an accreditation scheme could be implemented to ensure that the energy label is credible.
- **Promotion of energy efficiency**. Since energy performance labelling does not, by itself, address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Periodic evaluation.** The effectiveness of energy performance labelling in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Experience has shown that where labelling is not mandatory or where mandatory provisions are not enforced, energy labels on appliances with lower ratings are actively removed by retailers to improve their chances of selling the product.

Further, it has been argued that labels do not actually influence large sectors of the purchasing market, as consumers who use labels are generally interested enough in product information to do their own research. It is argued that it is not clear whether labels actually have any impact on consumers who buy on impulse or who traditionally rely on salespeople to influence their purchasing decisions. However, there is strong evidence that when mandatory energy performance labelling is introduced, manufacturers do increase the energy efficiency of their products and the average energy efficiency of labelled products increases over time.

In some circumstances, manufacturers are able to modify their products to ‘enhance’ their energy rating in a way that can be misleading to consumers. For example, the energy used to perform a certain task can appear to be reduced by increasing the capacity of the appliance.

It is also argued that, whereas labels are very efficient in visual and textual description of the product performance, they disregard two simple facts:

- people are very seldom interested in energy performance by itself;
- a sizeable part of the population in many countries are functionally illiterate, which means that complex descriptions are not understood.

It could be difficult to show average running costs of appliances in restructured electricity industries where customers can choose between a range of electricity retailers, each with different prices for electricity.

The rating scales on energy labels will require re-calibrating as the overall energy efficiency of appliances gradually increases. This could cause confusion amongst purchasers during the transition period as appliances with labels rated according to both the old scale and the new scale may appear together in retail shops.

Finally, not all products are suitable for energy performance labelling.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- When mandatory energy performance labelling is introduced, manufacturers may increase the energy efficiency of their products and the average energy efficiency of labelled products may increase over time.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Some customer classes may benefit more than other customers: e.g., better educated and wealthier households and businesses interested in investing in energy efficiency in their own buildings. Equity concerns may increase if, for example, only wealthy households benefit from energy performance labelling. Special programs need to be developed for targeting customers that are not responding to energy performance labelling.

10. EVALUATION

10.1 Evaluation Issues

A clear link between public expenditure on labelling schemes and energy efficiency outcomes is likely to be difficult to establish, and consequently it would be difficult for government to determine how efficiently public resources are being used.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None — High ★ ★ ★ ★
Barriers addressed	Low number — High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful — More useful ★ ★ ★ ★
Transferability	Low — High ★ ★ ★ ★ ★
Flexibility	Low — High ★ ★ ★ ★ ★
Potential for market transformation	Low — High ★ ★ ★ ★
Cost effectiveness	Low — High ★ ★ ★
Social and environmental impacts	High — Low ★ ★ ★ ★

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M6

Developing an Energy Efficiency Brand

Mechanism Type: Market

Outline	This mechanism involves increasing awareness of efficiency products and services by means of a marketing campaign focussed around a specific product brand. Branding usually involves the development of a clearly identifiable graphic image or logo which is applied to all qualifying products and services. Products and services may require accreditation by a recognised authority before they qualify for the brand.	
Outcomes	☐ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** ↑	More useful and/or relevant
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑↑	Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	2, 6, 7, 8, 9, 10, 12, 13	
Program barriers addressed	2, 3, 4, 5, 7	
Who Promotes?	Within electricity businesses	
Who Initiates?	Within electricity businesses	
Who Develops?	Within electricity businesses	
Who Implements?	Within electricity businesses	
Who is Targeted?	End-use customers	
Funding	Internal funds of electricity businesses possibly with some funding from trade allies	
Impacts on electricity businesses	New commercial opportunity for the electricity business Possible loss of revenue caused by reduced sales which could be offset by revenue from the new business	
Previous experience	Canada – BC Hydro's PowerSmart program Switzerland – "green" electricity	

1. MECHANISM OUTLINE

This mechanism involves increasing awareness of efficiency products and services by means of a marketing campaign focussed around a specific product brand. Branding usually involves the development of a clearly identifiable graphic image or logo which is applied to all qualifying products and services. Products and services may require accreditation by a recognised authority before they qualify for the brand.

1.1 General Description

What the mechanism means in general terms.

A competitive electricity market where all customers are able to choose their supplier will encourage customers to pursue various means of satisfying their energy requirements rather than simply purchasing electricity from the local electricity retailer. Some customers may be interested in different approaches to meeting their energy needs, and may seek new energy efficiency services and products. Branding is a mechanism designed to make it easier for customers to identify energy efficiency services and products. If there is an accreditation process, branding will also help to raise consumer confidence in the branded products and services.

Following are some of the issues which should be considered in developing an energy efficiency brand:

- **scope of the branding program** – which particular energy efficiency services and products are to be included. A narrow range may exclude some products and services which are attractive to customers, while a wide range may dilute the identifying power of the brand;
- **target audience for the brand** – while the target audience may be defined generally as electricity customers, the brand may be more effective if several marketing campaigns using the brand are targeted at specific groups within the general target audience;
- **message conveyed by the brand** – for example the brand may be designed to emphasise saving money or protecting the environment. Whatever message is chosen, it should be credibly relevant to energy efficiency and capable of easy and powerful communication to the target audience(s);
- **design of the graphic image** – the image or logo should be as simple as possible while also powerfully communicating the chosen message to the target audience(s);
- **accreditation process** – if products and services have to be accredited by an appropriate authority before they can use the brand, this can greatly increase the credibility of the brand. Suitable accreditation authorities may include: government agencies, industry associations, trade associations, consumer associations and special interest groups such as environmental groups.

The development of the brand and the implementation of the marketing campaign associated with it can be carried out by a range of organisations, including electricity businesses, government agencies, industry associations, and trade associations. It is desirable that the organisation responsible for developing and marketing the brand is not the same as the organisation which carries out accreditation.

It will also be important to involve trade allies in the marketing campaign. Trade allies may include all interested bodies who are not actually running the marketing campaign, including: appliance and equipment manufacturers and retailers, ESCOs, electricity businesses, and government agencies.

There are no guarantees that electricity businesses will choose to compete in the market for energy efficiency products and services. However, should they choose to do so, an energy efficiency brand will greatly assist electricity businesses in marketing their new business ventures.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism depends on the developer of the energy efficiency brand (eg the retail electricity business) being motivated to promote energy efficiency, at least indirectly. Hence, other relevant mechanisms include: *C2 Energy efficiency licence conditions for electricity businesses; F2 Financing of energy efficiency by electricity businesses; M3 Providing consumption information on customers' electricity bills;* and *M4 Communicating pricing and other information for energy efficiency*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
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)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

This mechanism is more useful and/or relevant under all three aspects of electricity industry restructuring because developing an energy efficiency brand can promote energy efficiency, irrespective of the electricity industry structure. The mechanism is much more useful under competition because electricity businesses can use the interest in energy efficiency generated by developing an energy efficiency brand to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

This mechanism is well placed to deal with the transition since its method of application does not change across all electricity industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

An energy efficiency brand will directly achieve increased energy efficiency through increased penetration of energy efficient technologies in the market.

Is the mechanism indirectly supporting the above by some means?

This mechanism achieves the above outcome by motivating end users to increase the efficiency with which they use energy.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

Canada

BC Hydro introduced Power Smart as the brand covering their industrial and commercial energy efficiency programs. The components of Power Smart include: high efficiency motors, efficient pumps, efficient fans, efficient compressors, new plant design, process improvements, employee involvement, building improvements and new building design. Power Smart engages customers through financial incentives, information, co-funding of studies, financing arrangements etc.

Switzerland

In Switzerland 'green' production of electricity is subject to accreditation, which is under surveillance of a neutral private organisation (consisting of the Worldwide Fund for Nature, consumer protection organisations, generators, suppliers). This branded product "green electricity" is then distributed by utilities who sell it on a commercial basis. These utilities have to also demonstrate activities and investments in energy efficiency to qualify for distribution rights.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

This mechanism could be promoted within any electricity business (eg an electricity retail business) as a means of creating new business for profit. The key party promoting the mechanism would probably be the business development group within the electricity business.

Who would initiate the development of this mechanism?

An electricity retailer would make a commercial decision whether to develop an energy efficiency brand. Typically, a business plan for the proposed business would be prepared by the retailer's business development group and submitted to the Board for endorsement.

Who would actually design and develop the mechanism?

Within the electricity retailer, the commercial and financial groups would probably carry out the work required, in conjunction with the relevant trade allies. Ideally accreditation of the brand would be sought from an organisation separate from the electricity business, either a government agency or a credible independent body.

Which parties are responsible for carrying out activities arising from this mechanism?

Electricity business customer service staff would use the energy efficiency brand to "package" the business' energy efficiency products and energy management services, and market these to the target customer group.

Which parties actually realise the DSM and energy efficiency outcomes?

The electricity retailer's customers realise the DSM and energy efficiency outcomes.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism should be promoted in conjunction with other mechanisms that encourage retailer interest in energy efficiency.

What are the basic institutional/market requirements?

The electricity business must have the legislative and regulatory ability to build new business, must be committed to promoting energy efficiency and must be willing to spend internal resources to design and implement an energy efficiency brand and to mount a promotional campaign to increase customers' awareness of the brand.

In addition, the electricity business must also be willing to encourage the participation of all key stakeholders in the implementation of the energy efficiency brand: e.g., industry associations, trade associations, appliance and equipment manufacturers and retailers, ESCOs, retail marketers, and government agencies.

There must be staff in the business development group of the electricity business with the necessary expertise to be able to analyse the commercial viability of proposals to develop an energy efficiency brand.

There should be a government agency or credible independent body prepared to carry out accreditation of the energy efficiency brand.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal resources of the retail business and contributions/partnerships with trade allies; government funding may be available for a pilot project.

How are activities arising from this mechanism funded?

Developing an energy efficiency brand could operate as part of the retailer's energy services business, with the work of customer service staff funded by the revenue from the sale of products.

6. IMPACTS ON ELECTRICITY BUSINESSES

This mechanism represents a commercial opportunity for electricity businesses. Any expenditure to promote the mechanism will be entirely voluntary and will be based on a commercial assessment of the potential returns from new business. In the near term, the costs to electricity businesses are likely to be minimal with respect to reduced energy sales to customers, but significant resources may be required to develop the product infrastructure.

In the longer term the electricity business could develop a profitable business based on a successful energy efficiency brand.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Accreditation scheme.** It is important to have an accreditation scheme to make sure the energy efficiency brand is credible. The accreditation scheme should include sanctions for parties who attempt to apply the brand inappropriately.
- **Promotion of energy efficiency**. Since energy efficiency branding does not, by itself, address many of the barriers to energy efficiency, there must also be a commitment to explicitly identify, implement and support other mechanisms which specifically promote energy efficiency. In addition, it will be necessary to develop public information programs about energy efficiency, promoting the environmental, financial and sustainability benefits.
- **Periodic evaluation.** The effectiveness of energy efficiency branding in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Whereas selling energy efficiency services and products can provide a new business opportunity for electricity businesses, it also brings with it new risks that the business may be unwilling or unable to accept. Uptake of an energy efficiency brand would be entirely dependent on the commercial attitudes of electricity businesses, which could be expected to vary widely both within and between countries. Consequently, it is difficult to estimate the extent to which energy efficiency outcomes may be realised.

Once an energy efficiency brand has been in place for some time, it may begin to lose its effectiveness as the target audiences become used to a proliferation of branded products and services. Therefore, it is important to develop a strategy about which products and services are to be branded and how they are to be marketed so as to prevent "brand fatigue" in the target audiences.

A related problem is that there is currently extensive branding of "environmental" products in many countries. The various brands are mostly individual initiatives and there is usually no central coordination of brands. The resulting proliferation of similar brands may make it very difficult fir the target audience to recognise an energy efficiency brand.

A further problem may occur if products are branded on the basis of their achieving a set energy efficiency standard. The brand may lose meaning over time as the average energy efficiency of products increases. Therefore, it is important to review the standard from time to time and, if necessary, to increase the performance level required to achieve eligibility to use the brand.

Finally, not all products are suitable for branding.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from energy efficiency activities implemented by an electricity business may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The electricity business may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Some customer classes may benefit more than other customers: e.g., better educated and wealthier households and businesses interested in investing in energy efficiency in their own buildings. Equity concerns may increase if, for example, only wealthy households benefit from energy labelling. Special programs need to be developed for targeting customers that are not responding to energy labelling.

10. EVALUATION

10.1 Evaluation Issues

It will be difficult to quantify the energy efficiency and DSM outcomes achieved by expenditure on this mechanism.

The mechanism will be difficult to implement in a political framework that discourages or prohibits electricity businesses from engaging in new businesses in addition to supplying electricity.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None	★ ★ ★	High
Barriers addressed	Low number	★ ★ ★ ★ ★	High number
Effects of restructuring on mechanism	Less useful	★ ★ ★ ★	More useful
Transferability	Low	★ ★ ★ ★	High
Flexibility	Low	★ ★ ★ ★	High
Potential for market transformation	Low	★ ★ ★	High
Cost effectiveness	Low	★ ★ ★	High
Social and environmental impacts	High	★ ★ ★ ★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Nil.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M7

Cooperative Procurement of Energy Efficient Appliances and Equipment

Mechanism Type: Market

Outline	In this mechanism, buyers who purchase large quantities of energy-using appliances and equipment cooperate to define their requirements, invite proposals from manufacturers and suppliers, evaluate the results, and actually buy the products. The buyer's requirements may include energy efficiency specifications which are equal to, or in advance of, world best practice.	
Outcomes	☐ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** X	No change
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑	More useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☐ Large industrial	
Policy barriers addressed **Program barriers addressed**	2, 6, 7, 9, 11, 12, 13 2, 3, 5, 6, 7	
Who Promotes?	Government, electricity businesses, community groups	
Who Initiates?	Government, electricity businesses, community groups	
Who Develops?	Prospective purchasers	
Who Implements?	Buyers group	
Who is Targeted?	End-users of the developed energy efficient products	
Funding	Government, electricity businesses, prospective purchasers	
Impacts on electricity businesses	Loss of revenue caused by reduced sales	
Previous experience	Germany – ventilation and cooling equipment Sweden – variety of appliances and equipment United States – refrigerators	

1. MECHANISM OUTLINE

In this mechanism, buyers who purchase large quantities of energy-using appliances and equipment cooperate to define their requirements, invite proposals from manufacturers and suppliers, evaluate the results, and actually buy the products. The buyer's requirements may include energy efficiency specifications which are equal to, or in advance of, world best practice.

1.1 General Description

What the mechanism means in general terms.

Analyses of many technology development projects support the conclusion that competition plus good prospects for future demand are important preconditions for stimulating technology development by manufacturers and suppliers. Cooperative procurement is a formal process which enables manufacturers and suppliers to see increased business opportunities and reduced risks in technology development.

The first activity for a government agency, electricity businesses, community groups or other organisation wishing to sponsor cooperative procurement is to gather together parties who are likely to be interested in purchasing large numbers of energy efficiency products. These parties should then be invited to form a consortium or informal group, known as the buyer group. This can be a time consuming activity and, where possible, should make use of existing networks. The work of the group includes activities in addition to the actual "buying", and it is essential that the members of the group are able to work cohesively through the problems that will inevitably arise in a technology development project.

A cooperative procurement process for an energy efficient product should address all the following issues:

- a market for the product must be made visible through the collective actions of the buyer group. The buyer group itself should be able to demonstrate high-level support, cooperation within itself and with authorities, and involvement of key end-users of the proposed product;
- the particular requirements of the buyer group must be clearly defined, possibly supported by studies of problems and needs, to produce precise and comprehensive product specifications with the potential for increased energy efficiency highlighted;
- a project management structure should be established with dedicated individuals and clear leadership;
- the required technology development tasks should proceed in parallel to shorten the considerable time required for this phase, including competitive tendering, influence of international considerations, existence or development of measurement methods in conjunction with authorities and testing organisations, and prototype testing;
- guaranteed funding of seed-money for first series purchases is critical to reduce risks for both the buyers and the manufacturers;
- indicative commitment by the buyer group members to continue purchasing the product after the first series purchases and over the long term will be necessary to provide assurance to potential manufacturers that a long term market exists for the product.

Funding from the sponsor of the cooperative procurement project is likely to be required for a number of activities, including:

- project management – this could be from within the sponsor body or from within the buyer group;
- general administration of the buyer group;
- information development and dissemination;
- engagement of technical specialists to carry out testing and evaluation;
- possible payment of premiums to all tenderers fulfilling mandatory requirements, to encourage industry participation;
- grants to buyers to purchase the winning product.

Two legally-oriented policy issues should also be considered by the sponsor:

- while extensive collaboration (even internationally) enhances potential markets, different requirements for tendering between jurisdictions could make the process unworkable;
- agreements for cooperative procurement, even within a single jurisdiction, can be impacted by company law, competition legislation etc.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism can operate completely separately from all the other mechanisms, as it is creating products for customers, independent of any electricity market participants or processes.

Mechanism *S3 Creating entrepreneurial energy organisations* may be relevant because an entrepreneurial energy organisation could be the body which manages cooperative procurement on behalf of government.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
9. Customer instability (problem for energy providers)
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)

Program Barriers

2. Lack of information to end users
3. Information/search costs (to end users & other actors)

5. Lack of end-user and other market actor's experience impacts
6. Financial barriers
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because cooperative procurement of energy efficient appliances and equipment can be carried out irrespective of the electricity industry structure.

This mechanism is more useful under commercialisation/privatisation and competition because electricity businesses can participate in the cooperative process and gain a competitive advantage by supplying energy efficient appliances and equipment to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The mechanism is well placed to deal with the transition since its method of application does not change across all industry structures.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Cooperative procurement of energy efficient appliances and equipment leads to increased energy efficiency.

Is the mechanism indirectly supporting the above by some means?

Where the primary objective of cooperative procurement is to increase the energy efficiency of products, the mechanism directly supports the above outcomes. Where cooperative procurement is being carried out primarily to achieve a different objective, it may still be possible to include energy efficiency goals in the product specifications developed by the buyer group.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

Germany

Deutsche Telekom (the German Telecommunications Administration) was, by itself, able to demonstrate a large market – several thousand units – for energy efficient ventilation and cooling equipment. Following the cooperative procurement process, the energy usage of such units has been reduced by 60%.

Sweden

The City of Stockholm began a procurement project for LEDs (light emitting diodes) in 1996 with the aim of purchasing 20 000 LED lamps before the end of 1999 for traffic lights. Results so far show a 71% savings in electricity costs, estimated 75% savings in maintenance costs and 88% savings in annual electricity used.

The Swedish National Energy Administration (STEM), a government body that is responsible for promoting energy efficiency, has carried out a range of technology procurement projects, including refrigerator/freezers, clothes washers and dryers, residential ventilation fans, high-frequency ballasts for lighting, windows, and heat pumps, with energy reductions achieved ranging from 20% to 70%.

United States

In the "Golden Carrot" programs, electricity businesses offer financial incentives to manufacturers to make major advances in energy efficiency and product performance. In the Super Efficient Refrigerator Program (SERP) 24 electricity businesses pooled $US30 million, and offered the manufacturer who could build the lowest cost, energy efficient, CFC free refrigerator guaranteed rebates from the pool of funds to offset the incremental product development cost. Parties involved in the promotion, creation and implementation of the program include electricity businesses, the National Resources Defense Council, the Environment Protection Authority and the Council for an Energy Efficient Economy.

Where can further information on these existing mechanisms be found?

IEA DSM Programme-Task III Cooperative Procurement of Innovative Technologies for DSM: http://dsm.iea.org

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Governments, electricity businesses and community groups are likely to be the main parties involved in promoting and sponsoring cooperative procurement of energy efficiency appliances and equipment.

Who would initiate the development of this mechanism?

Governments, electricity businesses and community groups are also likely to be the main parties involved in initiating the development of cooperative procurement.

Who would actually design and develop the mechanism?

Dedicated project management team with representatives from prospective purchasers.

Which parties are responsible for carrying out activities arising from this mechanism?

The buyer group.

Which parties actually realise the DSM and energy efficiency outcomes?

The end-users of the energy efficient products that have been developed.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism can stand alone

What are the basic institutional/market requirements?

Demonstrated high-level support from government and the electricity industry.

The ability to cooperate effectively on the part of members of the buyers group, the manufacturer(s) and government agencies.

Involvement of key end-users of the proposed product.

The ability to establish the appropriate project management structure.

Guaranteed funding from the sponsor(s) of the cooperative procurement project.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Sponsor funding for formation and activities of the project management team.

How are activities arising from this mechanism funded?

Funds provided by the project sponsor(s) and/or prospective purchasers to support:

- general administration of the buyer group;
- information development and dissemination;
- technical specialists, testing and evaluation;
- possible payment of premiums to all tenders fulfilling mandatory requirements, to encourage industry participation;
- grants to buyers to purchase the winning product.

6. IMPACTS ON ELECTRICITY BUSINESSES

The main impact of this mechanism on electricity businesses will be some reduction in electricity sales if a sufficiently large number of energy efficient products are manufactured and purchased by end users.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government commitment.** If a government is a sponsor of a cooperative procurement project, it must be committed to promoting energy efficiency and must be willing to spend significant internal resources to develop a cooperative procurement process. The government must also be willing to encourage the participation of all key stakeholders in the development and implementation of a cooperative procurement process: e.g., industry associations, electricity businesses, trade associations, appliance and equipment manufacturers and retailers, ESCOs, and government agencies. It will be easier where one level of government (central or regional) has key responsibility for the relevant areas (energy, environment, manufacturing and consumer issues), rather than where these are separated.

- **Legislative and regulatory requirements.** New legislation and changes to existing legislation and regulations may be required (eg public procurement and tendering regulations, company law and taxation issues, executive or administrative orders, and competition legislation) to ensure that competitive procurement can take place.
- **Resource requirements.** Plenty of time and resources should be allocated to developing a cooperative procurement process. If possible, making use of existing networks can reduce the time and resources required.
- **Buyers group cooperation.** The buyers group must be willing to cooperate effectively with manufacturer(s) and government agencies.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency.
- **Periodic evaluation.** The effectiveness of cooperative procurement in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

The creation of a project management organisation and development teams and the establishment of buyer groups are time and resource consuming.

Not all products are suitable for the cooperative procurement process.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

This mechanism may not be easy to implement in jurisdictions where governments favour strong control of industry and where integration of policies is not well developed.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None — High ★ ★ ★ ★
Barriers addressed	Low number — High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful — More useful ★ ★ ★ ★
Transferability	Low — High ★ ★ ★ ★
Flexibility	Low — High ★ ★ ★ ★
Potential for market transformation	Low — High ★ ★ ★ ★ ★
Cost effectiveness	Low — High ★ ★ ★ ★
Social and environmental impacts	High — Low ★ ★ ★ ★ ★

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M8

Energy Performance Contracting

Mechanism Type: Market

Outline	Energy performance contracting involves a contractor (typically an ESCO) guaranteeing energy savings for a site over a specified period; carrying out the appropriate energy efficiency improvements and receiving payment from the actual cost reductions achieved through the energy savings.		
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects		
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X	No change
	Commercialisation/ Privatisation	↑	More useful and/or relevant
	Competition	↑	More useful and/or relevant
Addressed Customers	☐ Residential ☑ Commercial and small industrial ☑ Large industrial		
Policy barriers addressed	2, 6, 7, 8, 9, 10, 12, 13		
Program barriers addressed	2, 3, 4, 5, 6, 7		
Who Promotes?	Government, ESCOs		
Who Initiates?	Government, industry associations		
Who Develops?	ESCOs		
Who Implements?	ESCOs		
Who is Targeted?	ESCOs		
Funding	ESCOs fund the development of the concept Projects may be financed directly by the client, or by the ESCO, or through a third party financier		
Impacts on electricity businesses	New commercial opportunity for the electricity business if it owns an ESCO Possible loss of revenue caused by reduced sales which could be offset by revenue from the new business		
Previous experience	Started in Europe 50 years ago, is widespread in the United States and Canada; and is emerging in New Zealand and Australia		

1. MECHANISM OUTLINE

1.1 General Description

Energy performance contracting involves a contractor (typically an ESCO) guaranteeing energy savings for a site over a specified period; carrying out the appropriate energy efficiency improvements and receiving payment from the actual cost reductions achieved through the energy savings.

What the mechanism means in general terms.

With increasing pressure on public and private sector organisations to reduce operating costs and increase productivity, energy performance contracting offers a way for governments and private organisations to reduce both their operating costs and resource consumption, particularly in a competitive energy market.

An energy performance contract works on the basis that the installation of more efficient equipment results in energy savings and reduced operational costs. The cost savings are then used to fund the capital equipment upgrades. The contract includes a performance guarantee, which means the contractor takes on the project risk as well.

Energy performance contracting differs from outsourcing in that energy efficiency gains are central to energy performance contracting and are used to finance projects which may not otherwise be undertaken. Outsourcing, on the other hand, usually involves ongoing activities which are regularly carried out. Outsourcing emphasises cost cutting, eg through economies of scale, rather than increased efficiency.

In energy performance contracting, the project scope is defined by the amount of annual energy savings. Traditionally, energy performance contracts involved primarily the provision of energy efficient products and technologies. Increasingly, they involve companies handing over responsibility for their energy performance and equipment upgrades to an ESCO, which provides a complete service, including ongoing maintenance. Payment for this service depends on the energy savings achieved.

Typical clients for energy performance contracts include: industrial or manufacturing facilities, schools, universities, hospitals and government institutions, and commercial buildings. The benefits for the client are:

- capital savings from not having to pay up front for the investment in energy efficient improvements;
- minimisation of major equipment failure;
- a positive environmental impact.

Performance contracts can take many forms, including:

- **first out** – the contractor retains 100 per cent of the energy savings until all project costs, including an agreed profit, are paid out;
- **shared savings** – the contractor and the client each receive a fixed percentage or dollar value of the energy savings over the life of the agreement;

- **contracted energy service or 'chauffage'** – the client pays the contractor a fee equal to its energy bills before the project, less an agreed-upon discount of five to ten percent. The contractor pays the energy user's energy bills over the life of the agreement and receives any cost savings above the discount;
- **supply-side contracts** – these are closely related to the chauffage contract but cover the provision of derivative forms of energy rather than energy services. A typical arrangement would be the sale of steam from a boiler house at a fixed cost per unit;
- **guaranteed savings** – the contractor guarantees a cash flow to the client and retains all savings until the total project costs, including contractor margins, are recovered. The client repays project loan repayments directly to the (usually) third party lender. The contractor and third party financier usually have a working relationship which is recognised in the contract, but have no direct financial relationship.

There are advantages and disadvantages with the different approaches.

First out and shared savings contracts are 'traditional' energy performance contracting approaches, and have two main problems identified with them. The first is that they are based primarily on replacing equipment, and often don't look at energy use at the overall site. In other words, they may replace equipment in one part of the site, but energy wasting practices may continue elsewhere. Secondly, these traditional contracts don't provide a bankable investment. If the equipment doesn't perform, the client is compensated by the contractor for undelivered savings, but is left with the cost of having set up the contract with nothing to show for it.

Guaranteed savings and chauffage contracts address both these issues. Both contract types can be applied to whole sites and the client can invest in the establishment of the contract knowing that they are guaranteed a return on their investment.

Additional costs mean that a performance contract is a more expensive means of implementing a given set of efficiency measures than client implementation. Clearly, clients must perceive – and receive – additional value from this extra cost. The key elements of additional value normally include:

- **management of risk** – energy efficiency is not core business for clients, and they are justifiably risk-averse in this area;
- **improved service** – additional expense can be justified if the level of savings is higher than could be achieved by the client;
- **decreased costs** – performance contracts encourage ESCOs to minimise capital costs as well as maximise benefits;
- **reduced transaction costs** – the transaction costs for client-implemented energy efficiency may be high, particularly for organisations with few resources available for the administration of projects.

The item absent from this list is project financing. At first glance, this seems a significant omission, as many clients would perceive the primary value of a performance contract to be the access to finance. However, this perception is misguided, because if the project is worth financing then, in theory at least, it would be possible for the client to gain financing to implement the project by themselves. Thus the above list correctly omits financing as a core service of performance contracting.

Governments can encourage performance contracting in two main ways:

- enacting laws and regulations requiring end-use customers (eg industrial and commercial energy users) to improve their energy performance by meeting energy efficiency standards. This creates a demand for energy services such as performance contracting. Without such standards, some practitioners have stated that far fewer companies will have the incentive to become more energy efficient and to seek out services such as performance contracting;
- allowing government agencies to use performance contracts. This assists with the growth of the energy services industry by creating demand. If finance laws and regulations prevent government agencies from using performance contracting, the market place is smaller and the industry may not develop as smoothly as it might otherwise have done.

Government programs which support the ESCO industry will also encourage the development of energy performance contracting. Actions which could be taken by governmentto support ESCOs include:

- providing standard business development support services targeted directly at ESCOs (e.g., start-up grants, subsidies, and rebates; and assistance in developing business plans) to encourage the use of energy performance contracting;
- licensing or certifying ESCOs for consumer protection and to boost public confidence in ESCOs and the use of performance contracting. Accreditation of ESCOs can be done by industry associations with oversight by a government agency or by a government or quasi-government agency;
- encouraging the streamlining of the procurement process by standardising documentation and procedures for selecting and contracting with ESCOs. This could be done by government or by an ESCO Association;
- providing financial support for establishing an ESCO Association and the use of energy performance contracting;
- developing a third-party financing network to coordinate and promote the efforts of the various and diverse actors, including ESCOs, for financing energy performance contracting;
- establishing an equipment leasing organisation for use in energy performance contracting.

Issues of risk are fundamental to performance contracts (and financing). If this mechanism is being actively promoted by government, it then becomes a matter for public policy as to how these issues are properly managed. There are two forms of risk to address:

- **technical risk –** the risk that energy efficiency measures will fail to perform to the expected level. Elements that introduce technical risk include management of capital costs, management of ESCO time input, delays in implementation of energy efficiency measures, initial performance of energy efficiency measures, maintenance of initial performance levels, energy costs, equipment failures, measurements of savings and changes in energy due to factors outside the control of the contract. Each of these elements can be controlled within the scope of a performance contract and can operate to the benefit or detriment of the ESCO, or the client, dependent upon the formulation of the contract.
- **credit risk –** the risk that either client or ESCO will default on finance payments. It is only weakly linked to technical risk, via the possibility that failure to manage technical risks leads to financial collapse of either party. Financing of the contract is largely dependent upon this credit risk.

Does this mechanism depend on or overlap with other mechanisms described?

Development of a commercial market for energy services rather than simply energy supply represents a paradigm shift in the way that most energy markets are currently operating.

Successful implementation of this mechanism would remove the need to create funding for energy efficiency through: *F1 Public benefits charge for energy efficiency; M1 Taxes on energy;* and *M2 Tax exemptions and incentives for energy efficiency*.

Mechanisms which could help ESCOs to better serve their customers should be pursued in conjunction with this mechanism to increase the potential for success. These include: *S1 Sustainable energy training schemes for practitioners; S3 Creating entrepreneurial energy organisations; S5 Promotion of energy efficiency by industry associations; S6 Aggregating electricity purchasers to achieve energy efficiency;* and *M7 Cooperative procurement of energy efficient appliances and equipment*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

2. Short-term perspective
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)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
6. Financial barriers
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because energy performance contracting can be carried out irrespective of the electricity industry structure.

This mechanism is more useful under commercialisation/privatisation and competition because electricity businesses can use the interest in energy efficiency generated by energy performance contracting to gain a competitive advantage by offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

It is unlikely that this mechanism would become significant until retail competition deepens and a number of electricity businesses are offering customers energy services.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

By linking the contracted payment price to the energy savings that will be made, the contractors have a very strong incentive to find and achieve all energy savings that are possible. Consequently a performance contract will almost always lead to increased energy efficiency.

The energy services provided by ESCOs to their customers could also achieve load management improvements through the installation of two-way metering and submetering and other improvements in energy management.

Is the mechanism indirectly supporting the above by some means?

This mechanism achieves the above outcomes directly.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Energy performance contracting started in Europe 50 years ago, is widespread in the United States and Canada; and is emerging in New Zealand and Australia.

What are key examples of the above?

Australia

Australian Energy Solutions (AES), a subsidiary of the electricity retailer/distributor EnergyAustralia, signed a performance contract with the Australian Museum, guaranteeing energy savings of at least 25% over the next seven years. The energy efficiency improvements will save 9 million kilowatt-hours of electricity annually, reducing carbon dioxide emissions by 9,000 tonnes.

Under the deal, AES designed, constructed and arranged funding for $375,000 worth of improvements to the Museum's lighting and air conditioning system, reducing operating costs by $94,000 annually. AES guarantees the savings through the performance contract, and will recover its costs through a share of the savings over the next seven years.

In New South Wales, Australia, where the ESCO and performance contracting industry is just emerging, the State Government, through its Department of Public Works and Services, has created an 'accreditation' process to assist government agencies with selecting an energy performance contractor. There is a debate at present about the suitability of the accreditation process, however it demonstrates the government's commitment to promoting performance contracting as a viable option for achieving a reduction in energy consumption and expenditure.

Canada

Recent market studies conducted in Canada for the federal government show that in 1991 the value of performance contracts in Canada was $41 million. This number increased to $278 million by 1995, an annual increase of 50 percent. EPC projects are becoming larger in the institutional sector. The single largest EPC contract in North America thus far is the four phase $200 million contract with the Metropolitan Toronto School Board for the retrofitting of 570 schools.

United States

In the United States, the Department of Energy has a 'Super ESPC' initiative whereby the Federal Government is using performance contracting to upgrade its own buildings and make them more efficient. The Department developed a range of information and promotional materials for both their own government departments and the wider energy services industry, including: model procurement documents, guidelines for performance contracts and a range of educational projects such as videos, for both government departments and potential contractors. The Department of Energy claims that one of the benefits of EPC is that it 'stimulates the economy by allowing energy service companies to profit from their up-front investments in federally owned buildings by receiving a share of the utility bill savings'.

Where can further information on these existing mechanisms be found?

National Association of Energy Services Companies (NAESCO) – United States: http://www.naesco.org/meminfo.htm

Canadian Association of Energy Services Companies (CAESCO): http://www.ardron.com/caesco/esco.htm

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Energy performance contracting is likely to be promoted by government agencies with responsibility for promoting a competitive energy services market. The ESCO industry will also actively promote energy performance contracting since they gain revenue from using this method for operating their businesses.

Who would initiate the development of this mechanism?

Government agencies in conjunction with relevant industry associations.

Who would actually design and develop the mechanism?

ESCOs are the key developers of performance contracting. Performance contracting is an important part of ESCO 'core business' and as electricity industry structures change and become more competitive, 'traditional' energy suppliers are finding that creating ESCOs, and providing performance contracting, can provide a competitive edge in the market place.

Which parties are responsible for carrying out activities arising from this mechanism?

ESCOs.

Which parties actually realise the DSM and energy efficiency outcomes?

Performance contracting is an unusual mechanism in that the creators of the mechanism, ESCOs, are also the 'targeted actors'. By installing technology to reduce energy use at a site, the ESCO is both promoting the saving of energy, and achieving it.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone.

What are the basic institutional/market requirements?

The market has to be sophisticated enough for customers to be willing and able to seek energy services rather than simply being supplied with energy.

The ESCO industry must be able to do business through the support of sympathetic government policies. For example, in New Zealand, under the *Public Finance Act*, government departments are at present precluded from borrowing money from external sources and cannot enter into performance contracts.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

The work would be carried out as a part of the development of a business plan by an ESCO, and may be able to attract some government support targeted at promoting new enterprises.

How are activities arising from this mechanism funded?

The client may choose to directly finance a project themselves. This is appropriate where a client has access to capital or capital financing for their work and is seeking to gain a guaranteed return on investment. The ESCO's role in this situation is to guarantee and improve that return.

The performance contract in this situation becomes a guaranteed cashflow. For an efficiency investment that delivers no downstream service benefits, it is reasonable for the client to expect savings to compensate not only capital costs but lost interest on the capital that otherwise would have been available to the client.

The client may organise financing via a third party lender. This can occur in a number of ways, including:

- a direct loan at the commencement of the contract;
- repayment of construction financing provided by the ESCO once the energy efficiency measures have been implemented;
- a capital lease for the equipment, in which the client takes risks and benefits of ownership, which it then shares via the performance contract with the ESCO.

Alternatively, the ESCO can arrange financing in a number of ways, including:

- taking out a third party loan and assigning fixed payments from the performance contract to the lender. Under this arrangement, the lender will often seek to protect itself by ensuring that the financing component of payments to the ESCO are continued independently of the performance of the contract or any associated disputes;
- taking out third party finance with no assignment of fixed contract payments. In this situation the lender is exposed to a greater component of the performance risk and will charge a higher interest rate as a result;
- internal ESCO financing. Under this arrangement the ESCO uses internal funds to pay for the project. This arrangement can be used to effectively hide capital payments and give the appearance of a service-only contract, making it attractive to clients who are unable to access capital financing. However, it has the disadvantage for the ESCO of bringing debt onto its own balance sheet. As most ESCOs are not financial institutions, accumulation of such debt may rapidly restrict business opportunities.

6. IMPACTS ON ELECTRICITY BUSINESSES

Energy performance contracting via an ESCO owned by an electricity business can provide an attractive business proposition, particularly if the electricity business is subject to regulatory requirements in relation to implementing DSM and energy efficiency. This activity can also be used to add value to existing customers, or to attract new customers in a competitive market.

However, energy performance contracting in competition to services offered by the electricity business will reduce energy sales and revenues, particularly in the commercial and industrial markets.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government and ESCO commitment.** Government and ESCOs must be committed to promoting energy efficiency and must be willing to allocate significant internal resources to promote energy performance contracting.
- **Legislative and regulatory requirements.** New legislation and changes to existing legislation and regulations may be required to establish energy performance contracting in government, where needed. A legal system which supports enforcement of performance contracts will also be required.
- **Establishment of funding mechanisms.** Funding options need to be assessed. Most of the funding will occur through private channels. However, government funding may be needed for demonstrations of energy performance contracting, for instance, among government buildings. Funding sources specifically for ESCOs to provide working capital for marketing and project preparation and development will be required.

- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency. Information programs will also be required to educate key stakeholders (the financing community, government officials, ESCOs) about the benefits and costs of energy performance contracting.
- **Periodic evaluation.** The effectiveness of energy performance contracting in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

The time and energy expended to procure a contract can be an issue. It can sometimes take long periods of time for an ESCO to find clients/customers, and to establish the contract in the first place, particularly in the government/institutional sector. Equally, it is time consuming for customers to identify an ESCO appropriate for their energy services needs and to develop and enter into a contract for energy services. Accurate development of a contract may also be difficult if quantitative data on the energy saving outcomes of specific energy efficiency measures are not readily available. Transaction costs can be significant. These issues make working with ESCOs and implementing an energy performance contract complex undertakings.

In North America, both the Canadian and United States ESCO industries are actively involved in efforts to streamline the procurement process through standardisation of procedures and documentation for selecting and contracting with ESCOs.

It could be difficult to set standard prices in an energy performance contract in restructured electricity industries where customers can choose between a range of electricity retailers, each with different prices for electricity, and where prices from the same retailer may vary substantially over time.

Where customers are able to choose their electricity retailer, and the retailer provides energy services through an ESCO under an energy performance contract it may be difficult for a retailer to recover the cost of energy efficiency measures implemented by the ESCO in a customer’s premises if that customer moves to another retailer soon after the measures are implemented.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).
- Smaller economies, such as Australia and New Zealand, may experience far slower growth in the provision of performance contracting than that experienced in larger economies.

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from ESCO energy efficiency activities may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The ESCO may well be able to develop the trading of "negawatts" as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

- A low price for energy is a disincentive for energy performance contracting. Low costs mean it takes longer to repay capital works out of energy savings, the contract is riskier for the financier and less imperative for the client. However proponents of energy performance contracting don't see low energy prices as a barrier – they argue that if utility costs are lowered as a result of a restructured electricity industry, they can further reduce their costs through energy efficiency actions.

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

The political framework is likely to be a significant determinant in the acceptability of this mechanism. Consequently, the concept is not readily transferable between jurisdictions.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None – High ★★★★
Barriers addressed	Low number – High number ★★★★
Effects of restructuring on mechanism	Less useful – More useful ★★★★
Transferability	Low – High ★★
Flexibility	Low – High ★★★
Potential for market transformation	Low – High ★★★★
Cost effectiveness	Low – High ★★★★
Social and environmental impacts	High – Low ★★★★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Aspen Systems Corporation (1998) *Status of Commercial Mechanisms for Energy Efficiency in Use or Contemplated by US Utilities*, IEA DSM Programme, Task VI Working Paper No 1

Eto J, Destribats, A and Schultz, D (1992) *Sharing the Savings to Promote Energy Efficiency*, Lawrence Berkeley Laboratory, Berkeley, California, USA.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M9

Competitive Sourcing of Energy Services

Mechanism Type: Market

Outline	In this mechanism, proponents specify their requirements for energy services to several providers such as electricity businesses and ESCOs. The responses to the specification are then evaluated on a competitive basis and commercial arrangements implemented with the selected providers.	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling** X	No change
	Commercialisation/ Privatisation ↑	More useful and/or relevant
	Competition ↑↑	Much more useful and/or relevant
Addressed Customers	☐ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	6, 7, 8, 10, 12, 13	
Program barriers addressed	2, 3, 4, 5, 7	
Who Promotes?	Governments	
Who Initiates?	Governments, prospective purchasers	
Who Develops?	Prospective purchasers assisted by government	
Who Implements?	Prospective purchasers	
Who is Targeted?	Energy services providers	
Funding	Prospective purchasers fund the development of the concept Projects may be financed directly by the purchaser, or by the energy service provider, or through a third party financier	
Impacts on electricity businesses	New commercial opportunity for the electricity business if it becomes an energy service provider Possible loss of revenue caused by reduced sales which could be offset by revenue from the new business	
Previous experience	United States – competitive sourcing of energy services by commercial businesses	

1. MECHANISM OUTLINE

In this mechanism, proponents specify their requirements for energy services to several providers such as electricity businesses and ESCOs. The responses to the specification are then evaluated on a competitive basis and commercial arrangements implemented with the selected providers.

1.1 General Description

What the mechanism means in general terms.

Competitive sourcing of energy services simply involves a proponent:

- specifying exactly what services are required to several providers, such as electricity businesses and ESCOs;
- selecting, on a competitive basis, those proposals that best satisfy their requirements.

Proponents could be a variety of end-use customers or other vested interests, for example:

- a large energy user such as a paper mill, that may be considering cogeneration as an alternative to separate supply of electricity and heat;
- a local government seeking to reduce the costs of supplying electricity to its aggregated loads, and source a portion of its energy supply from renewables;
- institutions such as hospitals wishing to increase supply reliability, achieve cost savings and tailor energy services more closely to their end-use needs;
- a chain of retail stores seeking to reduce the number of their energy suppliers in a competitive retail environment to reduce costs and simplify administration.

The common features for proponents would be significant interest in their arrangements for energy supply and their energy usage pattern, and the motivation and resources to evaluate their options. In some cases the information gathered may be used to simply leverage a better deal from the customer's existing energy supplier.

Essentially competitive sourcing functions like an auction for specified proposals. The decision to respond is entirely voluntary, and is open to all participants (eg electricity businesses and ESCOs) in competition with each other.

Competitive sourcing of energy services would most likely be used on a purely commercial basis and may form part of a broader sustainable energy program that could involve requesting proposals from providers of both supply and demand-side resources. Typically the competitive sourcing process would involve:

- the preparation of the specification, carried out by the proponent or a contractor;
- the response from providers of energy services, in the form of proposals from, for example, a number of electricity businesses and ESCOs;
- evaluation of the proposals by the proponent;
- negotiation of contracts for successful proposals;
- implementation of the energy services;
- ongoing monitoring and evaluation to satisfy agreed performance criteria.

The contract development costs and risk costs associated with the third party provision of energy services make this a more expensive means of implementing a given set of efficiency measures than their implementation by the proponent. Clearly, the customer must see added value for this extra cost. The key elements of additional value normally include:

- **management of risk** – where energy services are not core business for the proponent, and they are justifiably risk-averse in this area;
- **improved service** – additional expense can be justified if the level of savings is higher than could be achieved by the proponent;
- **decreased costs** – third parties may be in a better position to minimise capital costs of equipment required;
- **reduced transaction costs** – the transaction costs for energy services implemented by the proponent may be high, particularly for organisations without appropriate administrative support.

Some important issues for a competitive sourcing proponent to consider include:

- the relative merits of restricting or expanding the scope of the specification;
- the evaluation criteria to be used;
- a least cost versus an integrated approach to energy services;
- the allocation of performance and development risks;
- provisions for monitoring the results of the energy services.

Competitive sourcing of energy services will be attractive to prospective purchasers if it results in a lower cost solution to the meeting the purchaser's energy services needs. If it does provide a lower cost solution, the mechanism should be implemented by large numbers of purchasers. However, the main barrier to the implementation of this mechanism is lack of knowledge and experience on the part of purchasers. Governments can encourage competitive sourcing of energy services in two main ways:

- providing support to private sector organisations wishing to use competitive sourcing of energy services. The government could set up an information centre on competitive sourcing to encourage possible users by providing information about successful competitive sourcing projects, standard forms of contracts, lists of energy services providers, and so on;
- allowing government agencies to use competitive sourcing of energy services. This assists with the growth of the energy services industry by creating demand. If finance laws and regulations prevent government agencies from using competitive sourcing of energy services, the market place is smaller and the industry may not develop as smoothly as it might otherwise have done.

Government programs which support the ESCO industry will also encourage the development of competitive sourcing of energy services. Actions which could be taken by government include:

- providing standard business development support services targeted directly at ESCOs (e.g., start-up grants, subsidies, and rebates; and assistance in developing business plans) to encourage the use of energy performance contracting;

- licensing or certifying ESCOs for consumer protection and to boost public confidence in ESCOs and the use of performance contracting. Accreditation of ESCOs can be done by industry associations with oversight by a government agency or by a government or quasi-government agency;
- encouraging the streamlining of the procurement process by standardising documentation and procedures for selecting and contracting with ESCOs. This could be done by government or by an ESCO Association;
- providing financial support for establishing an ESCO Association and the use of energy performance contracting;
- developing a third-party financing network to coordinate and promote the efforts of the various and diverse actors, including ESCOs, for financing energy performance contracting.

Issues of risk are fundamental to the performance contracting and financing that are likely to result from competitive sourcing of energy services. If this mechanism is being actively promoted by government, it then becomes a matter for public policy as to how these issues are properly managed. There are two forms of risk to address:

- **technical risk –** the risk that energy efficiency measures will fail to perform to the expected level. Elements that introduce technical risk include management of capital costs, management of ESCO time input, delays in implementation of energy efficiency measures, initial performance of energy efficiency measures, maintenance of initial performance levels, energy costs, equipment failures, measurements of savings and changes in energy due to factors outside the control of the contract. Each of these elements can be controlled within the scope of a performance contract and can operate to the benefit or detriment of the ESCO, or the client, dependent upon the formulation of the contract.
- **credit risk –** the risk that either client or ESCO will default on finance payments. It is only weakly linked to technical risk, via the possibility that failure to manage technical risks leads to financial collapse of either party. Financing of the contract is largely dependent upon this credit risk.

Does this mechanism depend on or overlap with other mechanisms described?

Development of a commercial market for energy services, driven by customer demands, represents a paradigm shift in the way that most energy markets are currently operating.

Mechanisms which could help electricity businesses and ESCOs to better respond to their customers' needs should be pursued in conjunction with this mechanism to increase the potential for success. These include: *F2 Financing of energy efficiency by electricity businesses; S4 Developing the ESCO industry; M4 Communicating pricing and other information for energy efficiency;* and *M8 Energy performance contracting*.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)

8. Inadequate competition (market power problems)
10. Lack of adequate paradigm (for evaluating the value of EE)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
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
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because competitive sourcing of energy services can be carried out irrespective of the electricity industry structure.

This mechanism is more useful under commercialisation/privatisation and under competition it is much more useful because electricity businesses can gain a competitive advantage by participating in the competitive sourcing of energy services and offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

It is unlikely that this mechanism would become significant until retail competition deepens and a number of electricity businesses are offering customers energy services.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The mechanism would directly promote any of these outcomes which are of sufficient importance to the customer that they are included in the specification for the supply of energy services.

Is the mechanism indirectly supporting the above by some means?

The customer determines the outcomes to be achieved through the specification for the supply of energy services.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes.

What are key examples of the above?

United States

Health care provider Partners HealthCare System has entered into a three year agreement with the electricity business Energy Vision. Partner HealthCare's main goal is to lower the cost of energy at all its facilities. Energy Vision will provide end-use analysis, energy efficiency services and preparation for forthcoming market restructuring. Energy Vision will be the retail supplier for all the Partners HealthCare facilities regardless of where they are located..

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Competitive sourcing of energy services by customers is likely to be promoted by government agencies responsible for promoting a competitive energy services market.

Who would initiate the development of this mechanism?

Government agencies in conjunction with key groups of prospective purchasers.

Who would actually design and develop the mechanism?

The relevant prospective purchasers, with initial support from government for developing standardised contracts, for example.

Which parties are responsible for carrying out activities arising from this mechanism?

The relevant prospective purchasers.

Which parties actually realise the DSM and energy efficiency outcomes?

The successful energy service provider would carry out the DSM and energy efficiency activities on behalf of the customer.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism could stand alone however, to increase the potential for success, mechanisms which may help electricity businesses and ESCOs to better respond to their customers' needs could also be pursued.

What are the basic institutional/market requirements?

The market has to be sophisticated enough for customers to be willing and able to seek energy services rather than simply being supplied with energy.

The energy services industry (electricity businesses and ESCOs) must be enabled to do business through the support of sympathetic government policies.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

The resources would largely be provided by the relevant groups of prospective purchasers, in anticipation of longer term financial benefits. Some support may be forthcoming from government programs concerned with supporting environmental initiatives in a competitive energy market.

How are activities arising from this mechanism funded?

The purchaser may choose to directly finance a project themselves. This is appropriate where a purchaser has access to capital or capital financing for their work and is seeking to gain a guaranteed return on investment. The energy service provider's role in this situation is to guarantee and improve that return.

The purchaser may organise financing via a third party lender. Alternatively, the energy service provider can arrange financing in a number of ways, including:

- taking out a third party loan and assigning fixed payments from a performance contract to the lender;
- taking out third party finance with no assignment of fixed contract payments;
- internal financing from the energy service provider.

6. IMPACTS ON ELECTRICITY BUSINESSES

If the electricity business is successful in winning contracts to provide energy services to large commercial and industrial customers (by adding value for existing customers and attracting new customers in a competitive market) this activity will be an attractive business proposition. The benefits will be enhanced if the electricity business is also subject to regulatory requirements in relation to DSM and energy efficiency.

However, electricity businesses that do not successfully respond to their customer's requirements for energy services are likely to experience a dramatic reduction in their sales if they lose a number of significant customers.

While promotion of energy efficiency services may reduce sales of kilowatt-hours, it is anticipated that the loss of revenue would be offset by the returns to the electricity business generated by financing and energy service provision.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government commitment.** Government and ESCOs must be committed to promoting energy efficiency and a competitive energy services market and must be willing to allocate significant internal resources to promote competitive sourcing of energy services.
- **Legislative and regulatory requirements.** New legislation and changes to existing legislation and regulations may be required to enable and/or encourage the competitive sourcing of energy services. A key decision will be whether to allow only providers of demand-side resources to compete among themselves or to also include providers of supply-side resources in the competitive market for energy services.

- **Establishment of funding mechanisms.** Funding options need to be assessed. Most of the funding will occur through private channels. However, government funding may be needed for demonstrations of competitive sourcing of energy services, for instance, among government buildings.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency. Information programs will also be required to educate key stakeholders (electricity businesses, customers and ESCOs) about the benefits and costs of competitive sourcing of energy services.
- **Periodic evaluation.** The effectiveness of competitive sourcing of energy services in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

It is time consuming for customers to develop a specification for energy services, to identify a provider (such as an ESCO) appropriate for their energy services needs and to develop and enter into a contract for energy services.

Accurate development of a specification may also be difficult if quantitative data on the energy saving outcomes of specific energy efficiency measures are not readily available.

Transaction costs for this mechanism can be onerous.

These issues make implementing competitive sourcing of energy services and working with an energy service provider complex undertakings which may be too complicated for many customers.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from ESCO energy efficiency activities may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The ESCO may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- ESCOs and electricity businesses participating in the competitive sourcing of energy services should target all customer classes. If one customer class benefits to the detriment

of others, then a governing body or the sponsor of the competitive sourcing of energy services will need to review the policies surrounding the activity: eg encourage the competitive sourcing of energy services in neglected areas, or reduce competitive sourcing in areas already covered.

- Monitoring of competition among ESCOs and electricity businesses is needed to make sure market power is distributed evenly. This could be done by oversight of a government agency.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage competition among ESCOs and electricity businesses.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

The political framework is likely to be a significant determinant in the acceptability of this mechanism. Consequently, the mechanism is not readily transferable between jurisdictions.

It will be difficult to quantify the energy efficiency and DSM outcomes achieved by expenditure on this mechanism (although this will only be an issue for government if any public money is proposed to be spent).

10.2 Evaluation Scores

Previously demonstrated effectiveness	None ★ ★ ★	High
Barriers addressed	Low number ★ ★ ★ ★	High number
Effects of restructuring on mechanism	Less useful ★ ★ ★ ★	More useful
Transferability	Low ★ ★	High
Flexibility	Low ★ ★ ★	High
Potential for market transformation	Low ★ ★ ★ ★	High
Cost effectiveness	Low ★ ★ ★ ★	High
Social and environmental impacts	High ★ ★ ★ ★	Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Nil.

International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M10

Competitive Sourcing of Demand-side Resources

Mechanism Type: Market

Outline	In this mechanism, electricity businesses and/or other parties specify their requirements for DSM and energy efficiency in a public Request for Proposals (RFP). The responses to the RFP are then evaluated on a competitive basis and commercial arrangements implemented with the selected respondents. In North America this mechanism is called "demand bidding".	
Outcomes	☑ Load shifting ☑ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X No change
	Commercialisation/ Privatisation	↑ More useful and/or relevant
	Competition	↑↑ Much more useful and/or relevant
Addressed Customers	☑ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	3, 6, 7, 8, 10, 12, 13	
Program barriers addressed	2, 5, 7	
Who Promotes?	Government	
Who Initiates?	Government	
Who Develops?	Electricity business and government regulator	
Who Implements?	Electricity business and government regulator	
Who is Targeted?	Electricity businesses, end-users, ESCOs	
Funding	Electricity business funds for commercial programs Government budget for societal benefits	
Impacts on electricity businesses	New commercial opportunity for the electricity business Loss of revenue caused by reduced sales Increased costs to administer the sourcing program	
Previous experience	Australia – tendering for reserve capacity in Victoria Japan – sourcing of DSM proposals for thermal storage air conditioning systems by TEPCO United States – regulatory-driven sourcing of DSM	

1. MECHANISM OUTLINE

In this mechanism, electricity businesses and/or other parties specify their requirements for DSM and energy efficiency in a public Request for Proposals (RFP). The responses to the RFP are then evaluated on a competitive basis and commercial arrangements implemented with the selected respondents. In North America this mechanism is called "demand bidding".

1.1 General Description

What the mechanism means in general terms.

Competitive sourcing of demand-side resources[16] simply involves a proponent (ie the party seeking the resources):

- specifying exactly what resources are required;
- initiating a Request for Proposals (RFP) to those most able to provide the resources; and
- selecting, on a competitive basis, those proposals that best satisfy the requirements.

Essentially competitive sourcing functions like an auction for specified proposals. Proposals could offer demand reductions, energy savings or a combination of both, at a particular price for a fixed period of time.

Proponents in a competitive sourcing process are usually electricity businesses. Those responding to RFPs may be end-users, ESCOs or energy centres. The decision to respond is entirely voluntary, and is open to all participants in competition with each other.

Competitive sourcing can be used on a purely commercial basis to select the most cost-effective demand-side option, possibly in direct competition with supply-side options. For example, proposals may be requested from providers of both supply and demand-side resources. These proposals may be:

- competing equally and evaluated using the same criteria; or
- sought at the same time, but evaluated separately using different criteria; or
- sought and evaluated separately.

Alternatively, where pricing regulation of electricity businesses currently exists (eg in the retail franchise component of competitive markets), the most simple and efficient approach to funding this mechanism would be for the regulator to allow the business to recover costs associated with competitive sourcing of demand-side resources. The costs involved can be passed through to customers and this process can be designed to provide a ceiling for the amount of energy to be provided by a given competitively sourced option, at an agreed price for that option. The agreed price may be established at a level commensurate with an acceptable impact on prices to retail franchise customers.

[16] In North America, this mechanism is called "demand bidding". The mechanism should be distinguished from demand-side bidding in competitive markets (Mechanism M11) which is a quite different process.

Typically the competitive sourcing process will involve:

- the design of the Request for Proposals, carried out by the competitive sourcing proponent or subcontractor;
- the response from providers of demand-side resources, in the form of proposals from, for example, a number of customers and ESCOs;
- evaluation of the proposals by the competitive sourcing proponent;
- determination of program size and scope by the proponent (and the funding body where applicable);
- negotiation of contracts for successful proposals;
- implementation of demand-side measures;
- monitoring and evaluation.

Competitive sourcing provides similar outcomes to a least cost or integrated resource planning approach, with the following advantages:

- the outcome is implemented demand-side projects rather than plans;
- a process is established for engaging various market participants that is consistent with competitive reform of the market;
- the approach is flexible and can be used in the transition phases of electricity industry restructuring;
- the process promotes economically efficient outcomes;
- regulatory requirements are minimised;
- incentives to the competitive sourcing proponents are readily made equal across the board.

Some important issues for a competitive sourcing proponent to consider include:

- the relative merits of restricting or expanding the scope of the Request for Proposals;
- the evaluation criteria to be used;
- a least cost versus an integrated approach to measures;
- the allocation of performance and development risks;
- provisions for monitoring the results of the demand-side programs.

Competitive sourcing of demand-side resources will be attractive to electricity businesses if it results in a lower cost solution to the meeting the energy resource needs of the business. If it does provide a lower cost solution, the mechanism should be implemented by large numbers of electricity businesses. However, the main barrier to the implementation of this mechanism is lack of knowledge and experience on the part of electricity businesses.

Governments can encourage competitive sourcing of demand-side resources by providing support to prospective purchasers wishing to use competitive sourcing of energy services. The government could set up an information centre on competitive sourcing to encourage possible users by providing information about successful competitive sourcing projects, standard forms of contracts, lists of energy services providers, and so on.

The government could also provide financial incentives to electricity businesses which undertake competitive sourcing of demand-side resources, in recognition of the societal benefits (eg reduced environmental impacts) which would result from sourcing demand-side rather than supply-side resources. For example, government could make an amount of money available, conditional on competitive sourcing being implemented. Various government funding mechanisms could be considered, including the public benefits charge and the revenue from energy taxes.

Government programs which support the ESCO industry will also encourage the development of competitive sourcing of demand-side resources. Actions which could be taken by government include:

- providing standard business development support services targeted directly at ESCOs (e.g., start-up grants, subsidies, and rebates; and assistance in developing business plans) to encourage the use of energy performance contracting;
- licensing or certifying ESCOs for consumer protection and to boost public confidence in ESCOs and the use of performance contracting. Accreditation of ESCOs can be done by industry associations with oversight by a government agency or by a government or quasi-government agency;
- encouraging the streamlining of the procurement process by standardising documentation and procedures for selecting and contracting with ESCOs. This could be done by government or by an ESCO Association;
- providing financial support for establishing an ESCO Association and the use of energy performance contracting;
- developing a third-party financing network to coordinate and promote the efforts of the various and diverse actors, including ESCOs, for financing energy performance contracting.

Does this mechanism depend on or overlap with other mechanisms described?

Competitive sourcing of demand-side resources would operate in support of mechanisms that impose a requirement for energy efficiency activity, such as *C1 Mandatory sourcing of energy efficiency; C2 Energy efficiency licence conditions for electricity businesses; C4 DSM and energy efficiency as alternatives to network expansion;* and *S7 Voluntary agreements for energy efficiency*.

Competitive sourcing of demand-side resources would complement *M11 Demand-side bidding in competitive markets* where the demand bidder into the pool is an electricity retailer sourcing the demand reductions from its customers.

Competitive sourcing would also assist *S4 Developing the ESCO industry;* and *M8 Energy performance contracting*.

This mechanism also overlaps with mechanisms that emphasise promotion of energy efficiency, such as *F2 Financing of energy efficiency by electricity businesses.*

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

3. Split (misplaced) incentives to energy providers
6. Lack of awareness by policy makers (of EE opportunities)
7. Imperfect information (restricted access to customer information)
8. Inadequate competition (market power problems)
10. Lack of adequate paradigm (for evaluating the value of EE)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because competitive sourcing of demand-side services can be carried out irrespective of the electricity industry structure.

This mechanism is more useful under commercialisation/privatisation and under competition it is much more useful because electricity businesses can gain a competitive advantage by initiating competitive sourcing of demand-side resources and offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The mechanism is generally well placed to deal with transition issues as it is operating 'outside' the market. However, long term contracts may be difficult to promote if industry structure and ownership is changing.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

Competitive sourcing of demand-side resources promotes both or either of load shifting and increased energy efficiency, depending the outcomes determined by the proponent to be achieved on the specifications in the Request for Proposals.

Is the mechanism indirectly supporting the above by some means?

The mechanism directly achieves the outcomes specified in the Request for Proposals.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Yes, particularly in the United States where this mechanism is called “demand bidding”. Since 1987, about 30 utilities in 14 US states have competitively sourced demand-side resources from both ESCOs and the customers themselves in industrial, commercial and residential premises.

What are key examples of the above?

Australia

The Victorian Power Exchange (VPX) tendered for supply of reserve capacity and demand-side options in late 1997 to ensure system reliability over the 1997/98 summer. Two retailers secured contracts with VPX to make customers available to shed load. These customers received an availability payment, but were not required to reduce demand because the supply system capacity was sufficient to meet demand over the summer.

Japan

The utility TEPCO sources DSM proposals for thermal storage air conditioning systems from building designers who make proposals to building owners planning new buildings or those planning to retrofit existing buildings. For proposals that meet the program criteria, TEPCO provides a financial incentive to applicants according to the load shifted by the thermal storage system proposed for the customers. In 1997, TEPCO sourced 13,743 kW of peak load shifting (the initial target was 10,000 kW).

United States

The New England Electric System Performance Contracting program has used ESCOs, selected mainly on price and qualifications, to deliver demand reductions sourced from large commercial and industrial customers. The program included once-only up-front payments to ESCOs, based on engineering estimates of demand reduction, and performance bond requirements.

The Boston Edison Company Encore Program involves ESCOs competitively bidding prices for measured energy savings on a project by project basis.

Central Maine Power has issued integrated requests for proposals in which supply and demand-side projects compete.

In the state of New York, the Public Service Commission ordered that the utilities develop competitive sourcing programs, and established minimum requirements for the initial auctions that supply and demand-side options be included, and environmental externalities considered.

Examples of competitive sourcing of demand-side resources are also reported from California, Colorado, Washington and New Jersey.

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Governments in general would promote competitive sourcing as a mechanism that helps achieve energy efficiency policy goals, promotes a competitive energy services market and does not significantly interfere with electricity industry restructuring and market reforms.

Who would initiate the development of this mechanism?

The government agency or regulator with responsibility for administering any 'mandated' energy efficiency and/or the government agency with responsibility for achieving energy efficiency outcomes.

Who would actually design and develop the mechanism?

Electricity businesses, particularly those with mandates to achieve energy efficiency outcomes, with assistance from relevant government regulatory agencies.

Which parties are responsible for carrying out activities arising from this mechanism?

Electricity businesses.

Which parties actually realise the DSM and energy efficiency outcomes?

Electricity businesses, end-users, ESCOs and energy centres.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism provides a means for achieving an end. Other mechanisms are required to provide the motivation and funding support to carry out competitive sourcing of demand-side resources.

What are the basic institutional/market requirements?

Legislative or regulatory requirements to achieve energy efficiency outcomes.

A degree of customer sophistication, and a developed ESCO industry.

Legal framework to support performance contracting etc.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

The work would be carried out as part of the competitive sourcing proponents' business activities.

How are activities arising from this mechanism funded?

Purely commercial competitive sourcing activities would be funded entirely by the proponents.

Where societal benefit funding is available, competitive sourcing proponents should be allowed to recover a portion of their costs from government through a funding mechanism.

6. IMPACTS ON ELECTRICITY BUSINESSES

If an electricity business is seeking demand-side resources, possibly in response to regulatory requirements, some additional expenditure and staff time are likely to be required from the business, although these are not likely to be significant. Failure to make adequate use of this mechanism is likely to make the required demand-side resources slightly more expensive for the electricity business.

On the other hand, the electricity business may seek to supply the demand-side resources, from its customers, in response to a request from another party. In this case the mechanism represents a commercial opportunity for the electricity business. Any expenditure to promote the mechanism will be entirely voluntary and will be based on a commercial assessment of the potential returns from new business.

Over the longer term, the costs to electricity businesses from reduced energy sales to customers may become significant. However, electricity businesses will have the opportunity to mitigate these costs by developing new business opportunities in supplying energy services to customers.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Government commitment.** Government and ESCOs must be committed to promoting energy efficiency and a competitive energy services market and must be willing to allocate significant internal resources to promote competitive sourcing of demand-side resources.
- **Legislative and regulatory requirements.** New legislation and changes to existing legislation and regulations may be required to enable and/or encourage the competitive sourcing of demand-side resources. A key decision will be whether to allow only providers of demand-side resources to compete among themselves or to also include providers of supply-side resources in the competitive market for demand-side resources.
- **Establishment of funding mechanisms.** Funding options need to be assessed. Most of the funding will occur through internal funding by electricity businesses. However, government funding may be needed for demonstrations of competitive sourcing of demand-side resources by electricity businesses. Other funding mechanisms should be explored, such as cost recovery and a public benefits charge.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency. Information programs will also be required to educate key stakeholders (electricity businesses, customers and ESCOs) about the benefits and costs of competitive sourcing of demand-side resources.
- **Periodic evaluation.** The effectiveness of competitive sourcing of demand-side resources in actually achieving energy efficiency should be periodically evaluated to ensure that the mechanism is efficiently and effectively achieving its objectives.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

It is time consuming for an electricity business to develop a request for Proposal for demand-side resources, to identify providers (such as ESCOs) and to develop and enter into contracts for demand-side resources.

Accurate development of an RFP may also be difficult if quantitative data on the energy saving outcomes of specific energy efficiency measures are not readily available.

The transaction costs involved in implementing this mechanism could be onerous.

If public funds are used to cover part of the costs of competitive sourcing, these costs would be passed on to customers in the form of higher prices. This may cause an adverse public reaction to this mechanism.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The demand for energy efficiency may increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community).

9.2 Trading/Financial Impacts

- The increased demand for energy efficiency from electricity business energy efficiency activities may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. The electricity business may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Reduced electricity sales (and income) might affect the competitive position of electricity businesses. However, the loss of revenue may be offset by the returns generated by increased opportunities to provide energy efficiency services and financing.
- ESCOs and electricity businesses participating in the competitive sourcing of demand-side resources should target all customer classes. If one customer class benefits to the detriment of others, then a governing body or the sponsor of the competitive sourcing of demand-side resources will need to review the policies surrounding the activity: eg encourage the competitive sourcing of demand-side resources in neglected areas, or reduce competitive sourcing in areas already covered.
- Monitoring of competition among ESCOs and electricity businesses is needed to make sure market power is distributed evenly. This could be done by oversight of a government agency.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage competition among ESCOs and electricity businesses.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

Evaluation of this mechanism should be relatively straightforward. There could be difficulties in measuring the energy efficiency and DSM outcomes actually achieved through a competitive sourcing process.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None ★ ★ ★ ★ High
Barriers addressed	Low number ★ ★ ★ ★ High number
Effects of restructuring on mechanism	Less useful ★ ★ ★ ★ More useful
Transferability	Low ★ ★ ★ ★ High
Flexibility	Low ★ ★ ★ ★ High
Potential for market transformation	Low ★ ★ ★ ★ High
Cost effectiveness	Low ★ ★ ★ ★ High
Social and environmental impacts	High ★ ★ ★ ★ Low

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

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International Energy Agency
Demand Side Management Programme

Task VI: Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Developed Mechanism No: M11

Demand-side Bidding in Competitive Markets

Mechanism Type: Market

Outline	Demand bidding schemes provide the opportunity for a customer's offer of electricity demand reduction to offset the requirement for either increased generation of electricity or increased purchase of wholesale electricity by electricity retailers. Typically, this opportunity is realised by the customer bidding into a wholesale electricity pool a price level above which the customer will reduce their demand for electricity.	
Outcomes	☑ Load shifting ☐ Energy efficiency ☑ Direct effects ☐ Indirect effects	
Effects of Aspects of Electricity Industry Restructuring on the Mechanism	**Unbundling**	X No change
	Commercialisation/ Privatisation	↑ More useful and/or relevant
	Competition	↑↑ Much more useful and/or relevant
Addressed Customers	☐ Residential ☑ Commercial and small industrial ☑ Large industrial	
Policy barriers addressed	4, 6, 7, 8, 10, 12, 13	
Program barriers addressed	2, 5, 7	
Who Promotes?	Large end-users, electricity market operator	
Who Initiates?	Electricity market operator	
Who Develops?	Electricity market operator	
Who Implements?	Large end-users and retailers	
Who is Targeted?	Customers, especially large end-users	
Funding	Internal resources of market operator for administrative costs Payments to demand side bidders from the pool and payments to customers by retailers	
Impacts on electricity businesses	New commercial opportunity for the electricity business Changes in the load profile of the electricity business	
Previous experience	Norway – proposals for demand-side bidding in the wholesale pool United Kingdom – trial of demand-side bidding in the wholesale pool	

1. MECHANISM OUTLINE

Demand bidding schemes provide the opportunity for a customer's offer of electricity demand reduction to offset the requirement for either increased generation of electricity or increased purchase of wholesale electricity by electricity retailers. Typically, this opportunity is realised by the customer bidding into a wholesale electricity pool a price level above which the customer will reduce their demand for electricity.

1.1 General Description

What the mechanism means in general terms.

In some competitive electricity markets, the balancing of supply and demand is achieved within a wholesale electricity 'pool'. A number of electricity generators compete by bidding price levels at which they are prepared to sell into the pool. Generators are "dispatched" (ie requested to generate), in the order of their bid prices (lowest priced generators first) until the electricity demand from customers is met. Retailers and large customers buy from the pool at the current pool price which is often set as the marginal price bid by the last generator dispatched.

In simple terms, economic theory suggests that as demand increases so does the pool price until either electricity bought from the pool becomes so expensive that demand for it reduces, or investment in new generation is made. The reality however is not so straightforward, for well documented reasons. For example pool customers (retailers and others) often 'hedge' their purchases to such a degree that they do not see pool price volatility. Many customers want constancy of price and service, and expect the retailer to address all other issues on their behalf. Further, the value of the highest price that can be reached in the pool is usually capped as a regulatory safety precaution.

Demand-side bidding[17] occurs when a party bids into a wholesale electricity pool a price level above which the bidder will reduce their demand for electricity. The bidder then receives a financial benefit for actually reducing demand if called to do so.

The demand-side bidder could be:

- a large customer purchasing electricity directly from the pool;
- a retailer purchasing from the pool, and sourcing demand reductions from its customers. Various commercial arrangements could be made between the retailer and customers including different payments for being available to reduce demand, being put on standby or being required to shed load, or lower prices could be negotiated for interruptible electricity.

While the demand-side bidder may or may not directly financially benefit from avoiding purchase of electricity at times of high prices, other customers benefit through the pool price not rising as much as it would have done without the demand reduction. This provides a rationale for a payment for the demand-side bid that must be greater than the demand-side bidder's value of their reduced load. If no direct payment is made and the demand-side bidder only benefits from avoided purchase costs, there is little incentive to submit bids – the potential bidder could simply reduce their load..

[17] This term is defined as it is used in Europe and Australia. It should be distinguished from the term "demand bidding" which is used in North America to refer to the competitive sourcing of demand-side resources (Mechanism M10).

Payment for demand-side bids could be based on the following:

- the product of pool price and the demand quantity of the bid, similar to generation bids;
- payments similar to the standby payments that generators receive for availability in some wholesale pools;
- some proportion of the difference between pool price without the bid, and pool price with the bid.

The customer will require the technical and administrative ability to participate in demand-side bidding. In addition, considerable complexity can be added to the market and trading arrangements, especially in the early stages of competitive market development. To what extent the benefits of demand-side bidding offset this complexity will depend on approaches adopted in the various markets.

The operator of the competitive electricity market will have to make decisions on the following issues:

- the criteria which prospective demand-side bidders will have to meet before they can operate in the market;
- the type of payment for demand-side bids;
- monitoring and verification systems for any demand reduction offered.

There are concerns about the ability to verify the amount of demand reduction that may be made available by end-use customers. Demand reduction by industrial and commercial customers may not be easily metered. A meter at the site boundary, giving total load for that customer, may not accurately indicate demand reduction below the normal level. Separate metering of different processes offered for demand reduction may not show load transfer on to an alternative feeder. An alternative approach to sourcing the load reductions is to remove control of switching and metering from the customers, and give this to the system operator.

Demand-side bidding does not promote energy efficiency. Its outcome is short-term load reduction with negligible or even negative energy efficiency implications for customers. Such negative outcomes can occur if, for example, generation into the pool by high efficiency gas turbines is replaced by old, inefficient on-site generation at the demand-side bidder's premises. However, the overall economic efficiency for society may be enhanced if demand-side bidding results in reduced investment in supply. Whereas demand-side bidding itself is very much an issue for electricity market and trading design, it is appropriate that governments oversight the process to ensure consistent public policy outcomes.

Does this mechanism depend on or overlap with other mechanisms described?

This mechanism has no dependence on or overlap with any of the other mechanisms.

1.2 Market Barriers Addressed

Which of the barriers identified in Appendix A of Task VI Research Report No 3 will this mechanism address?

Policy Barriers

4. Pricing
6. Lack of awareness by policy makers (of EE opportunities)

7. Imperfect information (restricted access to customer information)
8. Inadequate competition (market power problems)
10. Lack of adequate paradigm (for evaluating the value of EE)
12. Little market transformation experience (by end-users or others)
13. Lack of available expertise (in EE during transition periods)

Program Barriers

2. Lack of information to end users
5. Lack of end-user and other market actor's experience impacts
7. Product/service unavailability

1.3 Effects of Electricity Industry Restructuring

What are the effects on this mechanism of the three aspects of electricity industry restructuring – unbundling, commercialisation/privatisation and competition?

Unbundling has no effect on this mechanism because demand-side bidding can only be carried out when the electricity industry structure includes a competitive electricity market.

Provided that a competitive electricity market exists, this mechanism is more useful under commercialisation/privatisation and under competition it is much more useful because electricity businesses can gain a competitive advantage by participating in demand-side bidding and offering energy efficiency services to customers.

How is the mechanism placed to deal with the transition between electricity industry structures?

The mechanism would only be developed once the competitive wholesale electricity market became operational.

1.4 Potential Outcomes

Is the mechanism promoting load shifting and/or increased energy efficiency?

The mechanism promotes short term reductions in electricity use. The main outcome from the mechanism is likely to be load shifting. Depending on the bidding strategies adopted by customers, this mechanism could actually result in decreased customer energy efficiency.

Is the mechanism indirectly supporting the above by some means?

Demand-side bidders directly determine the outcomes actually achieved through the bidding strategies they adopt.

2. PREVIOUS EXPERIENCE WITH RELATED MECHANISMS

Are related mechanisms already achieving DSM and energy efficiency?

Forms of demand-side bidding have been trialed in some countries, and most countries have experience of interruptibility arrangements between utilities and customers.

What are key examples of the above?

Norway

Arrangements for demand-side bidding have been developed for the Norwegian power pool.

United Kingdom

In a trial of demand-side bidding into the UK electricity Pool, bidders offered prices, availability and scheduling each day, similar to generators. They received availability payments (only about 2% of the pool price) if they were not actually required to reduce demand. If they were scheduled to reduce demand they received no direct payments and only benefited from the lower pool price.

The wholesale electricity market in the United Kingdom will be significantly reformed during 2000. The Pool will be abolished and most electricity will be traded in bilateral contracts. The System Operator will use a 'Balancing Mechanism' four hours from real time for parties with expected generation or demand out of line with contractual positions. One of the declared aims of the reform is to encourage greater demand-side involvement in the market.

Where can further information on these existing mechanisms be found?

IEA DSM Programme Task VIII Demand Side Bidding in a Competitive Electricity Market: http://dsm.iea.org

Norwegian Water Resources and Energy Directorate: http://www.nve.no

3. DRIVING FORCES BEHIND MECHANISM DEVELOPMENT

Who would promote this mechanism, and why?

Large end-users may see a commercial opportunity from actively participating in the market; electricity market operators may see demand-side bidding as a means of increasing their options to balance supply/demand.

Who would initiate the development of this mechanism?

The organisation responsible for electricity market operation and management.

Who would actually design and develop the mechanism?

The organisation responsible for electricity market operation and management.

Which parties are responsible for carrying out activities arising from this mechanism?

Large end-users and electricity retailers who purchase directly from the wholesale pool.

Which parties actually realise the DSM and energy efficiency outcomes?

Large ens-users who make demand-side bids on their own behalf, and customers contracted by retailers to reduce load.

4. IMPORTANT CONDITIONS FOR EFFECTIVE IMPLEMENTATION

Can the mechanism stand alone, or does it need to be part of a package to succeed?

The mechanism can stand alone.

What are the basic institutional/market requirements?

A competitive electricity market that allows demand reduction bids to compete with generation bids.

A financial incentive for the demand-side bids to be offered.

Adequate monitoring and verification protocols for any demand reduction offered.

5. FUNDING REQUIREMENTS

What resources are required during the design and development phase?

Internal resources of the organisation which is responsible for electricity market operation and management.

How are activities arising from this mechanism funded?

Load reduction by customers could avoid the pool purchase price, be paid the product of pool price and the demand quantity of the bid, be paid for standby or be paid some proportion of the difference between the pool price without the bid, and pool price with the bid. Retailers could offer customers with whom they contract for load reduction payments for being available to reduce demand, being put on standby or being required to shed load, or lower prices could be negotiated for interruptible electricity.

6. IMPACTS ON ELECTRICITY BUSINESSES

Electricity businesses participating in demand-side bidding would only do so on the basis of being able to achieve cost savings in their wholesale electricity trading.

If demand-side bidding by large customers acting on their own behalf becomes widespread, there may be significant changes in the load profiles of electricity businesses. However, the volume of sales by electricity businesses is unlikely to be significantly affected.

7. INSTITUTIONAL AND POLICY FRAMEWORK

What are the public policy requirements?

- **Legislative and regulatory requirements.** New legislation and changes to existing legislation and regulations may be required to enable the establishment of a competitive electricity market which allows demand reduction bids to compete with generation bids.
- **Resource requirements.** The organisation operating the competitive electricity market must have adequate internal resources to address demand-side bidding.
- **Development and implementation of public information programs.** These programs will promote the environmental, financial and sustainability benefits of energy efficiency. Information programs will also be required to educate key stakeholders (electricity businesses, customers and ESCOs) about the benefits and costs of demand-side bidding.
- **Periodic evaluation.** Regular surveys should be carried out to investigate whether energy efficiency activities are negatively affected by demand-side bidding. If these activities are negatively affected, and demand-side bidding is allowed, then the organisation operating the competitive electricity market needs to notify the appropriate stakeholders.

8. IDENTIFIED PROBLEMS WITH THE MECHANISM

What are the real and perceived problems with this mechanism?

Demand-side bidding may result in outcomes that decrease overall energy efficiency.

Potential demand-side bidders require a great deal of information and understanding about the market before they are able to make a bid.

Demand-side bidding adds complexity to market and trading arrangements.

Verification of available demand reductions is difficult.

Agreement on what demand would have been without demand-side bids may be difficult to achieve.

9. PUBLIC POLICY IMPLICATIONS

9.1 Market Impacts

- The impact on energy efficiency is unclear. Demand-side bidding by electricity businesses and customers may promote load management (eg fuel switching) rather than promote energy efficiency.
- The demand for load management will increase, resulting in increased business activity for ESCOs and other private and public organisations (including the financial community) promoting load management.

9.2 Trading/Financial Impacts

- If there is an increased demand for energy efficiency from ESCO and customer energy efficiency activities, this may lead to the development of tradeable units of load reduction ("negawatts") that could be sold into power pools. ESCOs and customers may well be able to develop the trading of “negawatts” as a profitable commercial activity. A governing body will be required to coordinate this activity with the trading of electricity (eg with power pool and transmission grid operators).

9.3 Industry and Consumer Issues

- Since demand-side bidding, by itself, does not address the barriers to energy efficiency, other mechanisms must be implemented to promote energy efficiency.
- Monitoring of competition among ESCOs and electricity businesses is needed to make sure market power is distributed evenly. This could be done by oversight of a government agency.
- The implementation of this mechanism relies on some regulatory direction and oversight, but this should be minimised to allow the mechanism to work and to encourage competition among ESCOs and electricity businesses.
- Transaction costs should be minimised for all stakeholders.

10. EVALUATION

10.1 Evaluation Issues

Demand-side bidding cannot clearly demonstrate the achievement of any energy efficiency outcomes because the main outcome is load shifting.

The promotion, development and implementation of demand-side bidding are likely to be strongly influenced by the existing political framework. For these reasons, the mechanism is not readily transferable between jurisdictions.

Identified barriers to energy efficiency are not clearly addressed by demand bidding, and it is not clear to what degree the market will be transformed.

Established examples of the mechanism are not available for evaluation.

10.2 Evaluation Scores

Previously demonstrated effectiveness	None … High ★
Barriers addressed	Low number … High number ★ ★ ★ ★
Effects of restructuring on mechanism	Less useful … More useful ★ ★ ★ ★
Transferability	Low … High ★
Flexibility	Low … High ★
Potential for market transformation	Low … High ★ ★ ★
Cost effectiveness	Low … High ★ ★ ★ ★
Social and environmental impacts	High … Low ★ ★ ★ ★

11. SOURCES OF INFORMATION ABOUT THIS MECHANISM

Australia and New Zealand Minerals and Energy Council IRP Study Management Committee (1994) *Least Cost Energy Services for Australia: Demand Management and Integrated Resource Planning in a Competitive Electricity Market*, Canberra, Australia.

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