Final Report of Task 23

Task 23:
The Role of the Demand Side in Delivering Effective Smart Grids
Final Report of Task 23

July 2014

IEA Implementing Agreement on Demand Side Management Technologies and Programmes

Task 23 The Role of the Demand Side in Delivering Effective Smart Grids

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Participants

The participants in Task 23 are as follows:

- NL Agency, Netherlands
- Enova, Norway
- Korea Power Exchange (KPX), Republic of Korea
- Swedish Energy Agency, Sweden
- Department of Energy and Climate Change, UK

Contributors

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1 Introduction

This is the Final Report of Task 23 of the International Energy Agency Demand Side Management Programme. (An overview of the IEA and the DSM Programme is found in the Appendix I).

This international cooperative project commenced in June 2012 and was completed in June 2014. Five countries participated in the Task. Contact information for each country is found in Appendix II. Linda Hull, of EA Technology, UK served as Operating Agent. The overall objective of the Task was to identify the possible risks and rewards associated with Smart Meters and Smart Grids from the perspective of end-consumers.

This document provides a high level summary of the work performed during the Task and the main accomplishments. The document is structured as follows:

- Section 2 presents the background to the project, and explains the main drivers for the work undertaken.
- Section 3 sets out the organisation of the project, the project participants and provides brief descriptions of each of the five sub-tasks.
- Section 4 describes the work performed, the project deliverables and the dissemination activities undertaken by the project participants.
- Section 5 summarises the major accomplishments of the project
- Section 6 includes recommendations for further work
- Section 7 concludes by summarising the lessons learnt and the main conclusions from the project.

2 Background

The owners and operators of electricity systems are facing significant challenges due to the unprecedented changes in the way that electricity is generated and the demands for electricity. These changes are driven by a variety of factors, but especially important is the focus on reducing carbon emissions and the move towards a low carbon economy. Generation mix is becoming increasingly characterised as one with a significant amount of renewable generation which is less predictable and often less flexible than the large power stations more typical of current electricity systems. The move towards the de-carbonisation of end-use applications of energy, particularly heating and transport, is leading to the introduction of significant new electrical loads onto often already constrained networks. These effects combine to make the challenge of balancing the supply of demand for electricity increasingly challenging and complex.

No longer is it considered viable for electricity to be provided ‘on demand’ in reaction to the requirements of end-users. Rather, a co-ordinated approach is required whereby the actions of all energy producers and consumers (and those that do both) are integrated to ensure the use of renewables can be optimised, whilst also minimising the use of fossil fired generation and optimising the use of the existing networks. Such an approach is the essence of the Smart Grid Concept.

Whilst there is considerable focus on the technological aspects of delivering Smart Grids, little is understood of the extent to which consumers are willing and able to embrace new technologies and initiatives that lead to changes in the way that they consume electricity. Thus, there is a risk that Smart Grids may not be able to achieve their full potential if consumers do not adopt new approaches to the way they consume electricity. Not enough is known about how Smart Grid initiatives should be designed in order to make it more likely that consumers are willing and able to actively engage in them.
Therefore, this Task was set up to explore how consumers interact with Smart Grids and Smart Grid related initiatives.

3 Project Organisation

The Participants agreed that the scope of Task 23 would focus on end-consumers who are, or are expected to be, participants of a Smart Grid initiative. Specifically, the Task focussed on consumers with Smart Meters, or likely to have Smart Meters in the coming years, and are thus expected to play an important part in the future of Smart Grids as they become deployed. This therefore, included:

- Residential consumers (i.e. households)
- Small commercial and business consumers that are treated in a similar way to residential consumers (i.e. they have similar metering arrangements or have similar access to the energy market).

The Task was organised into five sub-tasks, as illustrated in Figure 1.

The following provides a brief description of each of the sub-tasks.

**Subtask 1: Impact of energy markets on the role of customers:** There are many stakeholders in the energy market with different interactions with consumers and different responsibilities. This sub-task examined the interactions of different stakeholders, with the consumer as the central focus.

**Subtask 2: Interaction between technology and customers:** The way that customers use and relate to technologies such as Smart Meters, electric vehicles, heat pumps and energy storage has a significant impact on their ability to contribute to an effective Smart Grid. This sub-task reviewed a number of Smart Grid related case studies in order to understand consumer attitudes towards Smart Grid related interventions.

**Subtask 3: Identification of Risks and Rewards associated with Smart Grids:** This subtask focussed on the risks and rewards associated with Smart Grids from a consumer perspective, and examined a range of factors that influence the decision making of individuals.

**Subtask 4: Defining offers and programmes to help ensure Smart Grids meet the needs of customers:** This sub task collated the results from sub-tasks 1 to 3 to produce guidance on how Smart Grid initiatives should be designed in order to make them more attractive to consumers.
Subtask 5: Helping customers to actively engage with Smart Grids – Synthesis and Dissemination of Findings: This sub task ensures that the learning points are disseminated amongst the key stakeholders within the participating countries.

3.1 Project participants

Five countries participated in this project, each nominating a ‘National Expert’ to lead and co-ordinate the work in their country, as shown in Figure 2.

![Project Participants](image)

Figure 2 Project Participants

4 Work Performed

The factors that influence the energy consumption within a Smart Grid context are wide ranging and complex. Task 23 specifically considered those factors that relate to the consumer, i.e. how individuals interact with Smart Grids. Specifically, the project examined how to ensure Smart Grids deliver energy efficiency and/or cost savings by enabling or stimulating certain energy behaviours. In order to do so, it was first necessary to define what is meant by energy behaviour. More generally, a ‘behaviour’ can be understood as any activity or decision described in terms of the following elements:

- the ‘actor/decision maker’ who decides/acts/perform the behaviour (in this context this is the consumer);
- a well-defined ‘outcome’ or action (i.e. switching off lights, installing a heat pump, keeping a comfortable indoor temperature or washing clothes);
- a ‘goal’ or object (in this context, this would be within the home or workplace);
- a point in time or a ‘time period’; and
- a specific ‘context’.

Based on this general concept of ‘behaviour’, the more specific concept of ‘energy behaviour’ can be defined as a behaviour that concerned with the energy use of the relevant actor/decision maker. By considering energy behaviour in this way, it was possible to use a behavioural model to help explain the factors that influence the decision maker’s choice over whether or not, or how, to perform the behaviour. It is important to stress here that it is always the individual who makes the decision and performs the behaviour. This approach to energy behaviour is wide, ranging from specific one-off

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1 Smaller businesses only within the scope of this document
behaviours (such as investment decisions) to habitual daily routines (such as television viewing and washing clothes, often referred to as energy practices).

A number of models or frameworks of understanding exist and these have been used with varying success in an array of situations. Some focus on individuals, whilst others focus on the individual in his/her social environment. Some focus only on behaviour whilst others also focus on the context impacting that behaviour. Some focus on one-off behaviours whilst others focus on habitual behaviours. Where some focus on discrete actions, others focus on a complex inter-related set of actions.

It was recognised that that no single model or framework is considered to be ideal. They are considered to be necessary tools to assist decision makers implement policies, and to support practitioners as they implement technologies and initiatives to help achieve an outcome that depends upon behaviour change. Importantly, these models do not attempt to predict an outcome, i.e. how individuals will behave. Rather, they are used to provide a perspective on energy behaviour and the aspects that influence an individual’s decision of whether or not to perform a specific behaviour.

The fundamental academic debate – as indicated above – is whether this choice is best understood by studying characteristics of the decision maker (individualistic approach) or by studying the physical, social and political context within which the decision is made (system approach). Some energy behaviours may be best discussed within the individualistic approach, while others are best understood within the system approach. The starting point for Task 23 was that valuable insights can be found within all of these approaches. Therefore, the model shown in Figure 3 was used to provide theoretical guidance for the research undertaken for this project.

![Figure 3 Theoretical model of energy behaviour](image)

The model shown in Figure 3 demonstrates that an individual’s behaviour is defined by their own attitudes, their own abilities and the social norms relevant to them. In addition, it is important to also take account of their context and the opportunities or barriers presented to them. Consequently, an initiative that is successful for one group of consumers may not necessarily be effective with another group of consumers in a similar context due to their differing views and beliefs. Likewise, what works for one group of consumers may not work for similar consumers in another context due to the opportunities and barriers that exist.

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3 Egmond, C., R. Bruel (2007) Nothing is as practical as a good theory. Analysis of theories and a tool for developing interventions to influence energy-related behaviour. Senter Novem, 16 September 2007
4.1 External facilitators and barriers

The drivers for the implementation of Smart Grids differ from one context to another. Therefore Smart Grid initiatives need to be designed with reference to the specific context within which they will be implemented. The project commenced by contrasting and comparing the drivers for Smart Grid development across the five countries participating in Task 23. Understanding these drivers provides a starting point for the design of the Smart Grid initiative; essentially, it defines the problem that needs to be solved.

Market maps, such as that illustrated in Figure 4, were prepared by each of the participating countries to define the various interactions between the market stakeholders. This is one of three market maps for GB that illustrates the interactions between stakeholders in the current market, and defines the flow of money associated with energy purchasing interactions. Other maps were also produced to show the physical flow of energy and network access charging arrangements. The needs of one stakeholder may not necessarily align with the needs of another. Whilst understanding the needs of a particular stakeholder is important, it is also important to ensure that potential conflicts are identified and managed.

Energy Purchasing (flow of money between stakeholders) in GB

![Diagram of Energy Purchasing](image)

Figure 4  Market Mapping to Understand the Interactions between Stakeholders and Consumers

Understanding these interactions, and the impact of the energy system as a whole, is an important first step in designing Smart Grid initiatives; as it defines the external barriers and facilitators (opportunities) in the energy behavioural model shown in Figure 3.

Managing potential conflicts between the various stakeholders will be an important element in the design of Smart Grid initiatives, particularly where the electricity market is unbundled. Although such conflicts are not well reported to date, they have the potential to become increasingly relevant in the future as renewable generation accounts for a greater proportion of overall generation capacity.

4.2 Smart Grid Case Studies

During the project, 23 case studies from around the world were used to explore consumer experiences with one or more Smart Grid related interventions. They provide valuable insights into the individualistic elements of the energy behavioural model presented in Figure 3.

The case studies selected included one or more of the following interventions:

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4  Although Northern Ireland is a part of the United Kingdom, it forms part of the Single Electricity Market with Ireland. Therefore, this example, considers the electricity market within Great Britain (GB) rather than the UK as a whole.
• Any **Tariff** or pricing incentive to reward consumers that change their pattern of demand. This includes static Time of Use tariffs, Critical Peak Pricing, Peak Time Rebates and Real Time Pricing.

• **Controls** to actively manage demand, including direct/automatic load control, home/building energy management systems, smart thermostats.

• **Feedback** of energy end use information relying on data collected from the smart meter. Includes in-home displays, web based feedback, billing information and feedback via mobile devices such as phones and tablets.

• **Advice** to help consumers deliver outcomes that support the effective delivery of Smart Grids, including advice targeted to an individual or general advice distributed to groups.

A map showing the location of the case studies is provided in Figure 5.

![Case Studies Reviewed](Image)

4.3 Exploring Risks and Rewards

A methodology for quantifying the losses and gains associated with Smart Grid implementation from the perspective of consumers, i.e. the end-uses of electricity, was investigated. The methodology was used to quantify the potential losses and gains for a case study relating to the offer of free loft insulation. The analysis demonstrates that a traditional neo-classical economic analysis does not provide a viable prediction of customer behaviour. In the example considered, the potential gains more than outweighed any potential losses, but still the offer was not taken up by a sizeable proportion of individuals.

The analysis was supplemented by an examination of the factors that influence the decision making of individuals. Here, the focus was on understanding how consumer attitudes, social norms and capabilities affect an individual’s intention (or not) to perform a specific energy behaviour.
This review highlighted that there are many different factors that influence the decision making of individuals. Understanding these helps to ensure that Smart Grid initiatives can be structured to make it more likely that consumers are willing to engage in them. Some examples are listed here:

- Risk aversion, which is the reluctance of a person to accept an offer with an uncertain payoff rather than an alternative with a more certain, but possibly lower, expected payoff. However, the reverse is true where losses are concerned, when individuals more likely to opt for a more risky outcome. This would suggest there may be merit in framing Smart Grid initiatives in terms of “how much is wasted” if a certain behaviour is not adopted, rather than in terms of “how much can be gained” if it is adopted.
- Faulty discounting, whereby an individual is impatient when it comes to decisions that involve benefits that are received in the future, but where the reverse is true where payments are made. Thus, there is a tendency for an individual to prefer to receive an immediate reward and defer any payment, rather than pay up-front and receive rewards at a later date.
- Different treatment of risks and rewards which implies that the pain of losing €1 is twice as great as the ‘pleasure’ of gaining €1, and therefore, gains need to significantly outweigh any losses.
- Difficulty estimating the probability of events which results in a skewing of the potential risks towards events with a high consequence but a very low probability of occurrence.

4.4 Project Dissemination
Each of the participating countries has implemented its own approach to disseminating the results of the project. This has largely focussed on dissemination to the key stakeholders who have funded the project, via a series of stakeholder workshops and meetings led and organised by the national participants. These have included a diverse range of stakeholders including:

- Distribution Network Operators
- Transmission System Operators
- Energy Suppliers
- A Electricity Market Operator
- National and Local Government
- Appliance Manufacturers

4.5 Project Outputs
The project outputs are contained in the following documents:

<table>
<thead>
<tr>
<th>Type of Document</th>
<th>Title</th>
<th>Date published</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Report</td>
<td>The Impact of Electricity Markets on Consumers</td>
<td>January 2013</td>
</tr>
<tr>
<td></td>
<td>Interaction between Customers and Smart Grid Related Initiatives</td>
<td>November 2013</td>
</tr>
<tr>
<td></td>
<td>How risks and rewards from the perspective of customers affects the</td>
<td>December 2013</td>
</tr>
<tr>
<td></td>
<td>decision to engage in Smart Grids</td>
<td></td>
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<tr>
<td>Guidance Document</td>
<td>Smart Grid Implementation: How to engage consumers</td>
<td>July 2014</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>Smart Grid Implementation: How to engage consumers</td>
<td>July 2014</td>
</tr>
</tbody>
</table>

5 Project Accomplishments
The results of the project have been collated to provide general guidance on how Smart Grid initiatives should be designed in order to make them more attractive to consumers.
The guidance document is written in the form of ‘step-by-step’ approach to implementing Smart Grid related initiatives that involve energy behaviour change. The step-by-step approach, which is described in Table 1, has been designed to ensure that all elements of the energy behavioural model (shown in Figure 3) are addressed in the design of the Smart Grid initiative. The guidance is intended for:

- Energy Suppliers, Distribution Network Operators and System Operators who are the main stakeholders responsible for the development of Smart Grids, and thus stand to directly benefit from the engagement of consumers. However, there are many aspects of the design of Smart Grid initiatives that can be directly influenced by other industry stakeholders. These include:
  - Government and Energy Regulators who are responsible for setting policy, legislation and the rules defining the way the energy market operates. There are a number of specific areas where they can directly influence the way Smart Grid initiatives evolve.
  - Third-party aggregators, who act as intermediaries between consumers and Smart Grid implementers. They have a pivotal role as facilitators, and co-ordinate between multiple Smart Grid implementers.
  - Energy service companies, who help consumers manage their electricity consumption, and can design initiatives specifically to meet the needs of the consumers themselves.
  - Technology developers / appliance manufacturers, who develop technical solutions that meet the needs of Smart Grid implementers, third party aggregators, energy service companies and the consumers themselves.

The guidance focusses specifically on the design of Smart Grid initiatives from the perspective of the consumers themselves.

Figure 6 provides a high level overview of the step by step approach.

If any one of the steps is omitted, there is a risk that the initiative will not deliver benefits to the energy system as a whole and/or will not be adopted by consumers.
A brief description of each of these steps is provided in Table 1.

### Table 1  High level overview of the step-by-step approach

<table>
<thead>
<tr>
<th>Step</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1. Understand the drivers</strong></td>
<td>This Step examines how the drivers for Smart Grids influence the design of the initiative. Whilst the needs of the industry stakeholders represent the primary drivers for Smart Grids, this Section outlines why identifying the needs of consumers is also important. The Section demonstrates how understanding the interactions between market stakeholders, and the context within which the Smart Grid initiative must be designed, is an important first step in designing Smart Grid initiatives. This defines the external barriers and facilitators (opportunities) in the energy behavioural model introduced in Figure 3.</td>
</tr>
<tr>
<td><strong>Step 2. Define Outcomes</strong></td>
<td>This Step illustrates the elements of the Smart Grid over which it is envisaged that consumers will retain control. It represents the ‘behaviour’ element of the energy behavioural model introduced in Figure 3. i.e. the elements over which individuals can make decisions as to whether (or not) to perform an action. Specifically, it considers how energy behaviour change can help to achieve certain outcomes required by industry stakeholders.</td>
</tr>
<tr>
<td><strong>Step 3. Target Consumers</strong></td>
<td>This Step describes how to identify potential consumers who may be able to deliver the outcomes identified in Step 2. The starting point for identifying potential consumers is to consider whether the drivers for Smart Grids (see Step 1) and/or the required outcomes (see Step 2) are directly linked to a specific end use. If so, then it would seem sensible to first look to targeting consumers with those loads. This Step also introduces the concept of Customer Segmentation, which uses lifestyle factors, attitudes and motivations to define groups of consumers so that offerings can be designed specifically to meet the needs of a particular group.</td>
</tr>
<tr>
<td><strong>Step 4. Design offering</strong></td>
<td>This step describes the key factors that need to be taken into consideration when designing the Smart Grid initiative to ensure that consumers are willing to ‘sign-up’ to the initiative. This Section focusses on the following elements of the behavioural model introduced in Figure 3, and how they influence the intention to perform an action: • Awareness • Attitude • Social Norms • Self-Efficacy(*)</td>
</tr>
<tr>
<td><strong>Step 5. On-going support</strong></td>
<td>Step 5 examines how to go about ensuring that consumers stay signed up to the initiative and deliver the required outcomes. In addition to the Awareness, Attitude, Social Norms, and Self-efficacy elements of the model, this Step also considers how the positive and negative feedback that an individual experiences once they are “signed up” influences the on-going intention to perform an action.</td>
</tr>
<tr>
<td><strong>Step 6. Assess benefits</strong></td>
<td>This Section of the document describes the potential benefits of Smart Grid initiatives for consumers, and also considers how the overall benefits are distributed amongst stakeholders.</td>
</tr>
<tr>
<td><strong>Step 7. Monitor and Evaluate</strong></td>
<td>In addition to measuring the impact on energy consumption, this Step explains the need to assess what elements of an initiative have been successful and for whom they have been successful.</td>
</tr>
</tbody>
</table>
6 Recommendations for Further Work

The review of case studies indicated that whilst a large number of trials and pilots have been undertaken, the majority have focussed on the technological aspects of Smart Grid deployment and on measuring any changes to energy consumption. At the time the Task 23 research was undertaken, very few had focussed on exploring the behavioural aspects in order to understand the elements that are liked and/or disliked by consumers. Those that did, were at their early stages, so results were not available for analysis within this project. In addition, further new trials and projects are being initiated, many of which have been designed specifically to look at consumer behavioural aspects. Therefore, it is recommended that work continue to collate evidence from trials and pilots to ensure that learning from these trials is used to update and refine the guidance document produced within Task 23.

It is believed that the step-by-step approach developed by Task 23 represents the elements that need to be addressed in order to ensure consumers are more willing to ‘sign-up’ to Smart Grid initiatives and deliver the expected outcomes. Each of the steps addresses different elements of the energy behavioural model introduced in Figure 3. In particular, they ensure that the Smart Grid initiative has been designed to ensure that:

- tangible benefits are delivered to consumers;
- specific needs of the relevant industry stakeholders are met;
- outcomes are monitored to evaluate what elements have been successful, why they have been successful and for whom they have been successful.

All that remains, therefore, is to put it all into practice. This could be undertaken as a future IEA DSM Task, or independently by Smart Grid implementers. However, it is recommended that the experiences and outcomes be reviewed and used, where appropriate, to update and refine the step-by-step process.

7 Lessons Learned and Conclusions

The top five findings from Task 23 are:

1. The impact of electricity markets on consumer engagement in Smart Grid activities is wide ranging and often poorly understood. There is rarely a one size fits all solution, with many elements of electricity markets representing both facilitators and barriers to participation.
2. Very little information is currently available on customer attitudes and experiences towards Smart Grids. Most of the published data focusses on measuring outcomes, with little data available to help with understanding what works and for whom it works.
3. Information collated from consumer surveys shows that consumers say they want a financial reward in return for actively engaging in Smart Grids. However, evidence from trials shows that there are many reasons that lead to consumers not engaging in Smart Grids.
4. Whilst significant progress has been made on the development of technologies, the market is not yet ‘ready’ to accept them. This is referred to as ‘crossing the chasm’ that exists between early adopters and the early majority.
Early adopters (see illustration) see new technology as a way to "beat the herd" and reap the advantages of the new technology/practice before it becomes common practice. The early majority, however, are hesitant to new technology, and choose to sit on the fence until it is proven.

5. Neo-classical economic analysis is not sufficient to predict whether or not a consumer will undertake a specific action. Ensuring that the benefits outweigh any costs does not guarantee energy behaviour change takes place. Non-financial influences are as important, if not more so.

The top five key messages for Smart Grid Stakeholders arising from Task 23 are:

1. Ensure the Smart Grid initiative provides direct, tangible benefits to consumers, and ensure the initiative is tailored to meet the specific needs of target consumers. Therefore it is essential to identify the needs of the target consumers - do not assume that providing a financial incentive is sufficient to persuade someone to participate.

2. Community engagement can be a powerful motivator for behaviour change, but only where there is already a ‘sense of community’. Therefore, consider tailoring the initiative to provide direct benefits to the community itself. Community champions could help with recruitment if they can convince others the technology has reached a stage of development where it actually can function as intended and provide benefits.

3. Provide an element of choice over every aspect of the initiative, from the type of interventions to the installation process. However, it is important to avoid too much choice. Therefore keep the number of choices to a minimum, and ensure the options are tailored to meet the needs of the target consumers.

4. Take care when framing the initiative, as this has a direct influence on consumer attitudes. For example:
   - Frame in terms of what is wasted if a behaviour is not adopted, rather than what is gained if it is adopted,
   - Frame benefits in terms of a meaningful reference point (i.e. against something valued to the consumers).

5. Understand customer concerns, and do not underestimate the strength of these concerns. Ensure there is a mechanism to deal with misunderstandings and ensure that when things go wrong they are put right quickly. Do not assume that what works for one group of consumers will also work with another group.
The International Energy Agency (IEA) is an autonomous agency established in 1974. The IEA carries out a comprehensive programme of energy co-operation among 28 advanced economies, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The aims of the IEA are to:

- Secure member countries’ access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

To attain these goals, increased co-operation between industries, businesses and government energy technology research is indispensable. The public and private sectors must work together, share burdens and resources, while at the same time multiplying results and outcomes.

The multilateral technology initiatives (Implementing Agreements) supported by the IEA are a flexible and effective framework for IEA member and non-member countries, businesses, industries, international organisations and non-government organisations to research breakthrough technologies, to fill existing research gaps, to build pilot plants, to carry out deployment or demonstration programmes – in short to encourage technology-related activities that support energy security, economic growth and environmental protection.

More than 6,000 specialists carry out a vast body of research through these various initiatives. To date, more than 1,000 projects have been completed. There are currently 41 Implementing Agreements (IA) working in the areas of:

- Cross-Cutting Activities (information exchange, modelling, technology transfer)
- End-Use (buildings, electricity, industry, transport)
- Fossil Fuels (greenhouse-gas mitigation, supply, transformation)
- Fusion Power (international experiments)
- Renewable Energies and Hydrogen (technologies and deployment)

The IAs are at the core of a network of senior experts consisting of the Committee on Energy Research and Technology (CERT), four working parties and three expert groups. A key role of the CERT is to provide leadership by guiding the IAs to shape work programmes that address current energy issues productively, by regularly reviewing their accomplishments, and suggesting reinforced efforts where needed. For further information on the IEA, the CERT and the IAs, please consult www.iea.org/techinitiatives.

The Implementing Agreement on Demand Side Management Technologies and Programmes belongs to the End-Use category above.
IEA Demand Side Management Programme

The Demand-Side Management (DSM) Programme is one of more than 40 co-operative energy technology programmes within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Programme, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM:

- Austria
- Belgium
- Finland
- India
- Italy
- Republic of Korea
- Netherlands
- New Zealand
- Norway
- Spain
- Sweden
- Switzerland
- United Kingdom
- United States
- ECI (sponsor)
- RAP (sponsor)

Programme Vision during the period: Demand side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems.

Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations.

The Programme’s work is organized into two clusters:

- The load shape cluster, and
- The load level cluster.

The “load shape” cluster will include Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. Work within this cluster primarily increases the reliability of systems. The “load level” will include Tasks that seek to shift the load curve to lower demand levels or shift between loads from one energy system to another. Work within this cluster primarily targets the reduction of emissions.

A total of 24 projects or “Tasks” have been initiated since the beginning of the DSM Programme. The overall program is monitored by an Executive Committee consisting of representatives from each contracting party to the Implementing Agreement. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective Operating Agents are:

- Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto’s GHG Targets – Completed
  Harry Vreuls, NOVEM, the Netherlands
- Task 2 Communications Technologies for Demand-Side Management – Completed
  Richard Formby, EA Technology, United Kingdom
- Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – Completed
  Hans Westling, Promandat AB, Sweden
- Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – Completed
  Grayson Heffner, EPRI, United States
- Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace – Completed
  Juan Comas, FECSA, Spain
• Task 6 DSM and Energy Efficiency in Changing Electricity Business Environments – Completed
  David Crossley, Energy Futures, Australia Pty. Ltd., Australia

• Task 7 International Collaboration on Market Transformation – Completed
  Verney Ryan, BRE, United Kingdom

• Task 8 Demand-Side Bidding in a Competitive Electricity Market – Completed
  Linda Hull, EA Technology Ltd, United Kingdom

• Task 9 The Role of Municipalities in a Liberalised System – Completed
  Martin Cahn, Energie Cites, France

• Task 10 Performance Contracting – Completed
  Hans Westling, Promandat AB, Sweden

• Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery- Completed
  Richard Formby, EA Technology Ltd, United Kingdom

• Task 12 Energy Standards
  To be determined

• Task 13 Demand Response Resources - Completed
  Ross Malme, RETX, United States

• Task 14 White Certificates – Completed
  Antonio Capozza, CESI, Italy

• Task 15 Network-Driven DSM - Completed
  David Crossley, Energy Futures Australia Pty. Ltd, Australia

• Task 16 Competitive Energy Services
  Jan W. Bleyl, Graz Energy Agency, Austria / Seppo Silvonen/Pertti Koski, Motiva, Finland

• Task 17 Integration of Demand Side Management, Distributed Generation, Renewable
  Energy Sources and Energy Storages
  Seppo Kärkkäinen, Elektraflex Oy, Finland

• Task 18 Demand Side Management and Climate Change - Completed
  David Crossley, Energy Futures Australia Pty. Ltd, Australia

• Task 19 Micro Demand Response and Energy Saving - Completed
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• Task 20 Branding of Energy Efficiency
  Balawant Joshi, ABPS Infrastructure Private Limited, India

• Task 21 Standardisation of Energy Savings Calculations
  Harry Vreuls, SenterNovem, Netherlands

• Task 22 Energy Efficiency Portfolio Standards - Completed
  Balawant Joshi, ABPS Infrastructure Private Limited, India

• Task 23 The Role of Customers in Delivering Effective Smart Grids
  Linda Hull. EA Technology Ltd, United Kingdom

• Task 24 Closing the loop - Behaviour change in DSM, from theory to policies and practice
  Sea Rotmann, SEA, New Zealand and Ruth Mourik DuneWorks, Netherlands

• Task 25 Business Models for a more Effective Market Uptake of DSM Energy Services
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