DSM Spotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme June 2008

Calculating the Greenhouse Impact of DSM Measures

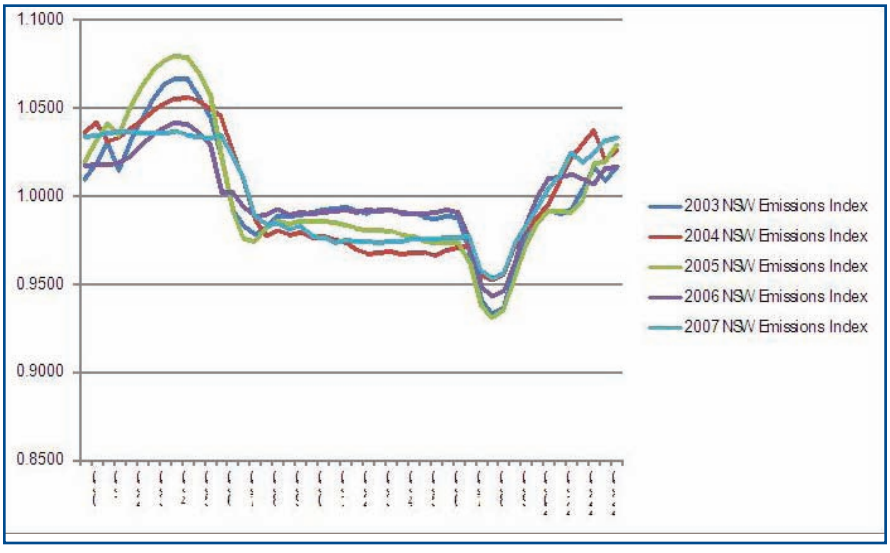
Calculating the reductions in greenhouse gas (GHG) emissions achieved through implementing energy efficiency DSM measures can be fairly complicated.

The standard method for calculating the GHG emissions produced during an energy-consuming activity comprises multiplying energy consumption figures by appropriate emission factors (tonnes of carbon dioxide equivalent emitted per unit of the relevant energy form). Therefore, it should be possible to calculate reductions in GHG emissions by comparing energy consumption figures before and after the implementation of an energy efficiency measure. This works well for all energy forms except for electricity.

The situation is complicated in the case of electricity. The GHG emissions intensity of supplied electricity varies as the generation mix of the supply system changes with the time of day. When the mix includes a larger proportion of high GHG-emitting generators (such as coal-fired power stations), the emissions intensity is higher than at times when the mix includes a larger proportion of lower GHG-emitting generators (such as gas-fired power stations, hydro power plants and wind turbines).

For electricity end-uses that take place predominantly at certain times of the day (for example, pumping for water supply systems) there is likely to be material differences between emissions calculated using standard emission factors ("time-static factors") as compared with using indices that recognise the variations in emissions intensity with time of day ("time-varying indices"). Similar material differences are likely to occur for electricity end-uses that take place predominantly on specific days of the week or during certain times of the year.

Figures 1 and 2 show annual and five-year average GHG emission indices for electricity supplied in the State of New South Wales (NSW) in Australia for each of the 48 half hour periods during the day over the five calendar years 2003 to 2007. Across the day, there is a variation of 12.1% between the lowest and highest five year average emission indices.



▲ **Figure 1. Annual Average GHG Emission Indices for Electricity Supplied in NSW, Calendar Years 2003 to 2007**

Figure 3 demonstrates how the emission indices for electricity supplied in NSW vary by days of the week (weekdays versus weekends and public holidays) and by season (summer versus winter). For the purposes

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PARTICIPATING COUNTRIES

Australia
Austria
Belgium
Canada
Denmark
Finland
France
Greece
India
Italy
Japan
South Korea
Netherlands
New Zealand
Norway
Spain
Sweden
United Kingdom
United States

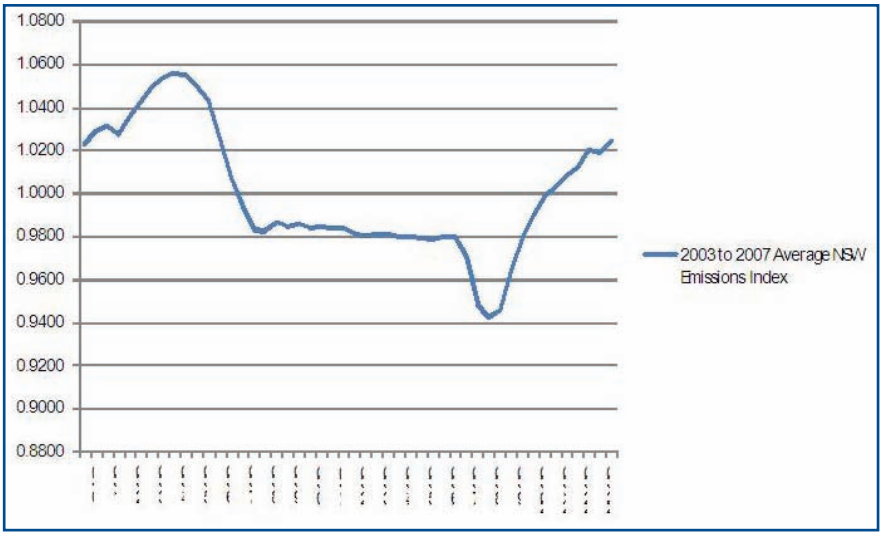


Figure 2. Five Year Average GHG Emission Index for Electricity Supplied in NSW, Calendar Years 2003 to 2007

of calculating the indices, the southern hemisphere 'summer' is defined as October to March and 'winter' is defined as April to September. Figure 3 demonstrates that there is also significant weekly and seasonal variation in the emissions intensity of electricity supplied in NSW.

These results demonstrate that the GHG emissions intensity of electricity supplied to end-users varies with the time of day, with the days of the week, and with the seasons. These variations are relatively small, but can be significant for facilities that use large quantities of electricity at particular times of the day (e.g., water supply pumping facilities), and/or on specific days of the week (e.g., sporting venues), and/or during certain times of the year (e.g., certain agricultural facilities such as cotton gins). Therefore, it is important that when DSM measures are implemented in these types of facilities, the emissions reductions attributed to the DSM measures should be calculated using time-variable emission indices.

This work is part of *IEA DSM Task XVIII, DSM and Climate Change*. Experts from four countries—Australia, France, India and Spain—are collaborating to investigate the potential contribution to mitigating GHG emissions that can be made by demand side management measures. They will also examine the extent to which GHG emissions mitigation measures can provide benefits to electricity systems.

This article was contributed by David Crossley, Operating Agent for DSM Task XVIII, DSM and Climate Change. For more information on this Task and how to participate visit the web site, http://www.ieadsm.org/ViewTask.aspx?ID=16&Task=18&Sort=0

TASK XVIII
New Participants Welcome

Countries and organisations participating will:

- Understand the interactions between DSM and climate change
- Develop methodologies for assessing the GHG emissions reductions available from specific DSM measures
- Gain information about using DSM programs to mitigate GHG emissions, and about using GHG emission mitigation programs to deliver benefits to electricity systems
- Identify opportunities for funding DSM programs with revenue from GHG emissions trading schemes
- Explore whether use time of use pricing can be used to achieve mitigation of GHG emissions
- Gather the information necessary to launch and participate in deployment programmes for demand-side technologies.

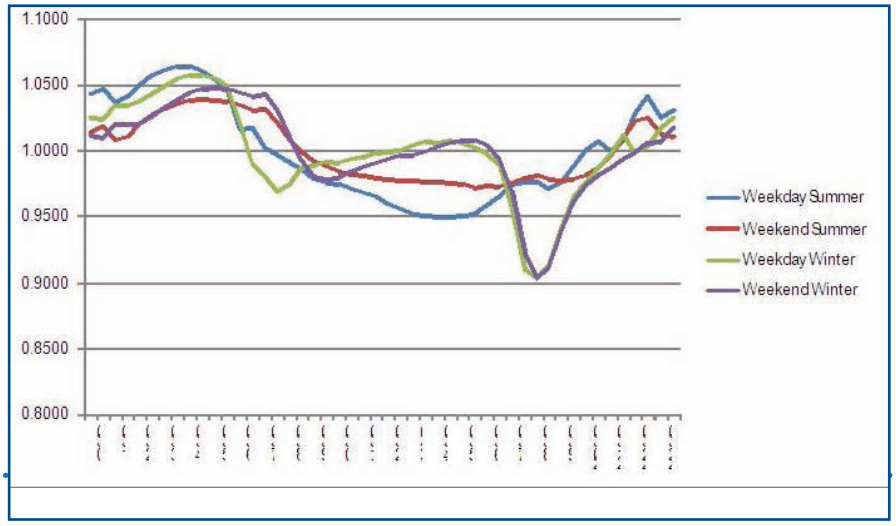


Figure 3. Five Year Average Weekly and Seasonal GHG Emission Indices for Electricity Supplied in NSW, Calendar Years 2003 to 2007

Energy Efficiency Needs To Be Commoditised

Anyone can tell you that energy supply has to be balanced with energy demand on the margin to give the optimal least-cost solution for an energy system. Tonnes of expert documents over the years have shown it: "Look, here is where the demand curve crosses the supply curve! The problem is solved."

When doubt has been expressed over how these insights can be applied in practice, since a kilowatt-hour is easily measurable but a "negawatt-hour" is not, the answer has been "energy services". People do not want energy, they want services: power, light and heating. Let energy service companies do the job and deal with the balancing.

A related argument has been that customer awareness should be raised and proper instruments developed to this end. Labels on equipment and meters should signal consumption and costs.

The curse of energy efficiency, however, is that it is delivered in small packages and requires permanent attention from the user to enable optimal action. The task is superhuman (or even non-human).

Then there are the counter arguments from the hardcore economists. They claim people are wasting in many other areas of their life. Why don't we require demand-side management for shoes or handbags? How many handbags do we actually need? Energy, they say, is just another commodity and should be treated as such.

But climate change is now evident for all, and the link to energy is obvious. Energy use is directly related to supply and therefore needs special attention. Less use means lower emissions. More importantly, it would be easier for renewable fuels to meet a smaller demand.

Energy efficiency is still not well defined. In fact, it does not exist! It is a characteristic and not a tangible good. Furthermore, it is a comparative characteristic. Product A uses less energy than product B – hence it delivers the service more efficiently.

But let us accept that energy is a commodity, even if a special one. What we then need to do is to commoditise its counterpart, energy efficiency, in a way that enables it to be handled on the market.

To this end, we also need energy services companies, performance contractors and labels, but we need more. The industry that provides the more efficient products needs to see itself as the energy efficiency industry. Not only identify itself with the product it sells but with the function (efficiency) the product provides: energy efficiency as a commodity.

Customers should be able to recognise the energy efficiency industry from its branding, from its commoditizing of the "efficiency" function.

This industry is a future core business for the entire world with a brighter future than energy-intensive sectors. The more traditional industries suffer from rising energy prices, but the energy efficiency industry profits from it!

This article contributed by Hans Nilsson, Chairman of the IEA DSM Programme. It was originally printed in the ENDS Report, May 2008, Issue 25. The monthly EU environmental policy briefing for business professionals, www.endseuropereport.com.

new work

Standarisation of Energy Savings Calculations

There are many policies and measures for improving energy efficiency, and efforts nationally and internationally are being made to standardize energy efficiency and savings calculations.

The IEA DSM Programme is considering a new Task in this area because although Europe will soon set energy savings standards and other countries, such as the United States, are working in this area there remains a need for broader agreement on standards. Agreement by IEA member countries would not only stimulate the development of these standards, but ensure global comparability of standards for energy savings calculations.

The proposed work would:

- Identify national and regional existing energy saving calculation (ESC) standards and standards under development.
- Identify what basic concept, calculation rules and systems are in use in ESC standards.
- Identify how and why these standards are or will be used in impact evaluation for policies and measures.
- Identify what organisations are responsible for the maintenance and future development of these standards.
- Explore to what extent the basic concepts, calculation rules and systems could be organised in such a way that (inter)national standards organisation can use these to improve international comparison.
- Explore how these standards can improve international comparable evaluation of policies and measures.
- Provide comments to ESC standards under development.

To learn more on the work and how to participate contact Harry Vreuls, SenterNovem, the Netherlands, email: h.vreuls@senternovem.nl.

taskXX

Branding of Energy Efficiency

Successful branding creates a "pull" for a product or service in the market. Products and services that lack a strong brand image fail to attract the attention and trust of consumers. Energy efficiency products and services fall in this latter category. The typical sales pitch for any energy efficiency product or service is some variation of the "Save money – Save the planet" cliché. As a result, energy efficiency has not been able to excite people to create brands that would bring a "lifestyle tag" to energy efficiency as organic food has succeeded in doing. This failure is even more significant when the positive economic impact of energy efficiency is taken into account.

This new *IEA DSM Task XX, Branding of Energy Efficiency*, will undertake work to develop a significant understanding of barriers associated with branding of energy efficiency, and strategies to overcome those barriers. The Task will build upon the achievements of *IEA DSM Task VII, Market Transformation*, which attempted to find a way to enhance the market share of the most energy efficient appliances and products in the marketplace. One of the most important products developed by Task VII was an extensive market research study, "*Branding Energy Efficiency - MT7 Market Report*" (http://www.ieadsm.org/ViewTask.aspx?ID=17&Task=7&Sort=1#ancPublications3) that focused on the issue of branding energy efficiency in connection with consumers' aspirations and values. The results of this multi-national research indicated that the marketing challenge for branding energy efficiency is not spreading knowledge, but establishing an image.

THE WORK

While DSM Task VII took the initial step towards the development of a framework for market transformation, a comprehensive framework that can be used by government and industry to develop the market for energy efficient products is still needed. Specifically, research is needed in the following areas:

- Knowledge and attitude of private households in developing electricity markets
- Capability of energy efficiency suppliers in the market
- Best practices in definition of suppliers of energy efficiency products and services
- Potential for energy efficiency products and services in other energy consuming sectors such as agriculture, industry and commercial
- Potential for a programmatic approach towards energy efficiency
- Barriers to branding of energy efficiency

Analysis of these issues is likely to throw light on the rather poor state of branding energy efficiency as it has yet to be penetrated by traditional sales and marketing approaches. While "branding" is certainly not the only answer for solving the problems facing energy efficiency, it is key to development of the energy efficiency market.

Objective

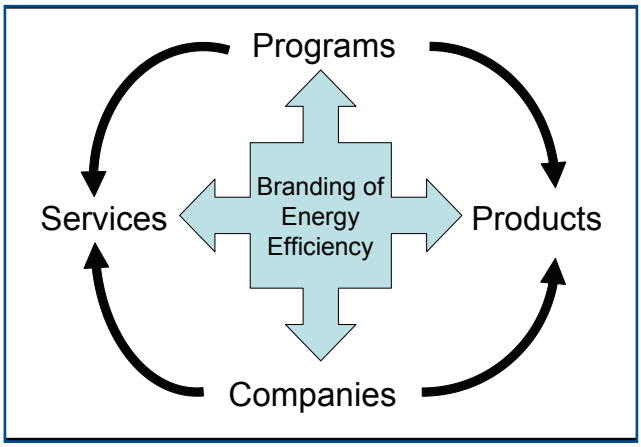
The primary objective of DSM Task XX is to develop a cogent and comprehensive framework for the promotion of branding of energy efficiency in electricity markets at different levels of maturity. To do this, the Task will work on three levels—products/services and suppliers, consumers, and strategic (development of solutions).

Subtasks

The work will be divided into three subtasks:

Energy Efficiency Offerings Analysis

To ensure comprehensive analysis an Energy Efficiency Branding framework will be used. This framework demonstrates that apart from products and services, two more potential avenues for branding also exist. It will be useful to explore these relationships while develop branding strategies and suitable institutional structures.



This subtask will:

- Identify aspects amenable to energy efficiency
- Identify barriers to development of brands for energy efficiency
- Identify special needs of developing countries
- Identify 'Best Practices' in definition of products and services
- Identify the relationship between the product offerings and maturity of the electricity market
- Identify products/ services suitable for branding

As a part of this subtask, a survey will be conducted of all the providers of products and services in the countries participating in the Task and a list will be produced of products and services that are most suitable for branding.

Energy Efficiency Consumer Analysis

As a part of this subtask, a survey will be conducted of consumers in the Task's participating countries. The survey will be carried out specifically for products and services identified in Subtask I to help ensure that the survey collects data on consumers' attitude towards the products and services that suppliers are in a position to provide in the market. This subtask will:

- Identify attitudes and behaviour of the consumers towards various aspects of energy efficiency
- Establish preferences for range of products and services
- Identify socio-cultural issues in selection of products and services
- Understand the pre-requisites for successful branding
- Develop statistical models to determine the relationship between electricity price and energy efficiency pricing
- Identify pre-requisites to ensure that 'brand' approach would focus more strongly on people as brand aware, self-conscious consumers

Appropriate methodologies such as socio-cultural value maps, cognitive information processing, emotion driven choices, etc. will be used. This work will identify products and services most suitable for branding in that particular market from the consumers' perspective.

Develop branding strategy

This subtask will develop branding strategies for products and services selected under Subtask II above. This subtask will:

- Synthesize information collected during Subtasks I & II
- Understand business enablers for branding in each case
- Develop appropriate business strategies
- Identify suitable institutional structures
- Identify roles and responsibilities of various stakeholders
- Design co-ordinated branding campaign to be supported by the Government and industry

Expected Results

The Task participants will develop a significant understanding of barriers associated with the branding of energy efficiency and of strategies to overcome those barriers. In addition, they will develop a strategy for branding a few products and services in participating countries.

For more information on DSM Task XX and how to participate, contact the Operating Agent Balawant Joshi of ABPS Infrastructure Private Limited, India, balawant.joshi@abpsinfra.com.

TASK XX
Reasons to Participate

- The market for energy efficiency will develop fast if we should be able to meet climate change. Commoditising and branding of energy efficiency is a necessary element to make energy efficiency visible.
- The efficiency business in all countries need to be recognized and to recognize each other on the market in order to distinguish themselves from business as usual companies.
- Development of new products is most likely to happen in the forefront of the market. Branding is a means to attract venture capital and innovations to this frontline

taskXIX

Micro Demand Response and Energy Saving

Energy plays a central role in each of our everyday lives. We use electricity for lighting our homes and offices, and for powering our refrigerators, ovens, televisions and computers. Most of the time, we don't even think about the energy we use—it's simply there allowing us to carry on with our everyday activities. However, our use of energy has significant impacts on the environment and global warming. The domestic and SME sectors alone consume up to 50% of the electricity generated in developed countries.

TASK XIX
Reasons to Participate

- Understand the advantages and disadvantages of TOU pricing, demand response and demand disaggregation and feedback for residential and SME customers in competitive energy markets.
- Gain an independent view of technology and benefits available for TOU pricing and demand disaggregation.
- Quantify the value and technologies for end use monitoring and feedback, Time of Use pricing and demand to customers and its potential for achieving DSM objectives.
- Develop national policies to encourage time of use metering, pricing and demand disaggregation within competitive energy markets.
- Understand the role of demand side participation in energy markets through the use of demand side bidding and demand response programmes and mechanisms.
- Quantify the need for time of use metering or developed profile metering in order to validate demand side bidding and demand response implementation.
- Quantify infrastructure needs for alternative load control options and savings calculations.
- Understand the contribution that dynamic demand response can have on improving the utilisation of wind generation capacity.

to focus on these two sectors. If the end use demand can be reduced and the profile shape changed for these customers then steps can be taken to reduce the peak generation capacity and spinning reserve. This would then enable demand participation in balancing and reserve markets and exploit the full potential for renewables, particularly in off-peak times.

To achieve these benefits though it is necessary to influence the millions of micro loads to save energy in buildings and to provide a fast response to price and control signals from the energy markets or system services markets.

The groundwork for this new Task was completed in *DSM Task XI, Time of Use Pricing and Energy Use for Demand Management Delivery*. Task XI showed that End Use Monitoring and Feedback (EUMF), Time of Use (TOU) pricing and Demand Side Bidding (DSB) all have the potential to deliver valuable demand profile change and financial benefits. It demonstrated that relatively small amounts of demand flexibility can have large benefits in reducing peak capacity requirements.

THE WORK

DSM Task XIX, Micro Demand Response and Energy Savings, will define Demand Response and energy saving products and how to actually deliver them into the residential and SME markets on a commercial basis. Funding mechanisms and the provision of information and controls infrastructure will also be studied and evaluated. Participants will evaluate the potential for these measures to be accredited either for financial support by governments and regulators or for suppliers to include demand response measures in meeting their energy saving targets (e.g., White Certificates, Carbon Emission Reduction Targets, etc.).

It is expected that residential and SME demand response services will offer Energy Saving Service Providers (ESSPs) and Demand Aggregators (DAGs) new business opportunities.

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Objective

The aim of DSM Task XIX is to investigate the implementation of TOU pricing, remote/automatic demand switching and energy end use monitoring for SME and residential customers. Participants will quantify the costs, benefits and business viability of such measures from the perspectives of the system operator, demand balancing and energy saving.

Specific Task objectives are to:

- Define demand response and Energy Saving products to meet system operator, supplier, government and customer requirements.
- Identify, develop and define packages of demand response and energy saving service products for residential and SME customers, based on EUMF, TOU pricing and demand control to meet the above requirements.
- Develop mechanisms to deliver demand response and energy saving service products.
- Evaluate how ESSP/DAG businesses can provide demand response and energy saving service products for residential and SME customers.
- Develop ESSP/DAG routes to market for residential and SME customers.
- Make an overall assessment of common ground and technologies to be shared with smart metering infrastructures.
- Estimate incremental costs of implementation of product delivery systems.
- Quantify the business case for the provision of demand response and Energy Saving products.

To address specific areas in depth, the Task is divided into six subtasks:

- DR and Energy Saving Products
- End Use Demand Changes
- DR and Energy Saving Delivery Mechanisms
- SME Customer Costs and Benefits
- Residential Customer Costs and Benefits
- Business Case Estimation

The Task is expected to begin mid-to-late 2008. Interested countries and organizations are welcome to discuss participation with the Operating Agents.

For more information on DSM Task XIX and how to participate, contact the Operating Agents, Richard Formby and John Baker of EA Technology, United Kingdom, richard.formby@eatechnology.com; john.baker@eatechnology.com. Also visit the Task web site, http://www.ieadsm.org/ViewTask.aspx?ID=16&Task=19&Sort=0.

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