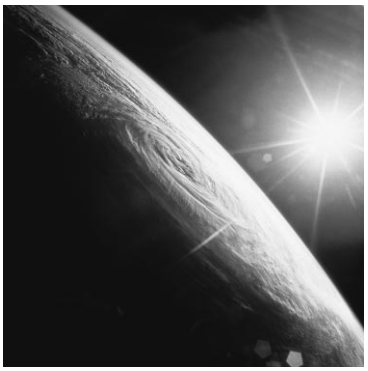
DSM spotlight
April 1999
The Newsletter of the International Energy Agency Demand-Side Management Programme



Efficient Electric Technologies Can Help Mitigate Global Climate Change

Between 1990 and 2010 some 1.5 million MW of new electricity capacity will be needed and the global gross national product will have almost doubled. In order to meet these growing demands, countries will be required to make decisions on the types of new power stations and equipment that will be built and how to use existing power plants and equipment. The choice we are faced with is to pursue either a high or a low carbon intensity future. To ensure that we follow a path of low carbon intensity, a great deal of work is needed.

One means for achieving a low carbon intensity future is to use effective and appropriate electric end-use technologies. These technologies can do much to reduce greenhouse gas emissions, even taking into account emissions related to generation, because invariably electricity replaces primary fossil fuels more efficiently. As a guide, efficient lighting and appliances can reduce residential electricity use in developing countries by as much as one-third.

Another means to reduce greenhouse gas emissions and improve energy efficiency is to improve electricity supply efficiency (generation, transmission, distribution and supply). In developing countries as much as 30 % of electricity generated is lost through the transmission and distribution system, and so the installation of effective networks can do much to reduce greenhouse gas emissions. The challenge that this poses is well known in developing countries and many national and international agencies are working together to increase supply and improve supply efficiency.

But, more effort is needed to improve end-use efficiency in all sectors in many developing countries, as well as developed countries. The Kyoto Protocol's flexibility mechanisms offer opportunities to improve supply and end-use efficiency. These mechanisms include the Clean Development Mechanism for developing countries, Joint Implementation for economies in transition, and Emissions Trading for developed countries. Care is needed, however, to ensure that the use of these mechanisms delivers a pathway to sustainable development acceptable to developing economies, and not just greenhouse benefits to developed economies as part of their Kyoto obligations.

Much can and is being done to use these and other mechanisms effectively for the benefit of all nations. The International Energy Agency's Demand Side Management Programme has developed a range of tools that are valuable in advancing energy efficiency programs in developing countries. These tools include market transformation and market penetration mechanisms, the use of communication technologies and effective policy instruments, and on-line catalogues of efficient appliances, power plants and equipment. The DSM Programme's web site (http://dsm.iea.org) provides a useful entry point for individuals wishing to further explore energy efficiency opportunities.

In addition, the IEA DSM Programme Executive Committee is currently exploring further avenues to advance electricity end-use efficiency in developing countries.

Harry Schaap is the IEA DSM Executive Committee member from Australia.

The DSM Spotlight is published four times a year to keep readers abreast of recent results of the IEA Demand-Side Management Programme and of related DSM issues. The viewpoints or policies expressed in this newsletter do not necessarily reflect those of the International Energy Agency, the IEA Demand-Side Management Programme member countries, or the participating researchers.

For more information on the Programme, its work and contact addresses, please visit our web site at ***http://dsm.iea.org***

Narrowband vs. Wideband Communication Systems

Experts of Task II, *Communications Technologies for Demand-Side Management*, recently evaluated the most effective routes to implement customer DSM and other customer/utility services using wideband communication infrastructures. Through their investigation of wideband communication media, Task experts have been able to help utilities and potential DSM and Value Added Service providers assess the pros and cons of investing in and developing wideband communication systems.

Rapid development in the installation of wideband (>144k bits/sec) communication systems is taking place within telephone companies and organizations generally outside utilities. These systems are being developed to accommodate Internet access and competitive telephone and cable television services. Much of the wideband communication infrastructure already installed for residential customers is one-way communication and used for cable television services. However, due to customers' increased demand for telephone services these systems are being enhanced to two-way communication. In addition, a significant number of new two-way wideband systems are being installed for residential customers in many countries.

Due to changes in the communication systems, utilities and Value Added Service providers are being faced with the decision of whether to: 1) invest in narrowband channels as a means to implement utility Value Added Services in the short-term, or 2) invest in wideband infrastructure thereby expanding their business and their capacity to provide additional services in the long run. One alternative to investing in wideband infrastructure immediately is to wait until other organizations have installed the communication infrastructure and then piggyback onto it, if the economics are right. The problem this option poses is that the utility may have customers who could benefit immediately from the expanded services provided by wideband channels.

To investigate these types of issues, Task experts studied the costs and benefits between narrowband and wideband communication systems, and quantified the technical and financial benefits of both communication media as it applied to specific customer/utility functions. Task participants also determined the impact of different migration strategies on communication system design and hardware, and the benefits of installing narrowband with migration to wideband as opposed to installing wideband at the outset.

Highlights of the Task work on wideband communication systems include:

- A technical evaluation of customer wideband media equipment (satellite, cable and terrestrial Set Top Boxes and modems) was conducted to determine the potential for interfacing this equipment to customer/utility service technologies and communications gateways. This wideband equipment proved to be compatible with the Task's proposed flexible customer gateway specification. This flexible gateway is structured so that different protocols and communication media can be used while retaining a common core structure. If this gateway design were to be used then common products could be manufactured, installed cost effectively and adapted to meet the changing needs of customers and service providers.

- A financial evaluation was completed to estimate the costs for wideband network operators to provide different services. In this evaluation, Task experts agreed upon a set of services and then quantified the capital and annual costs of providing these services using several narrowband and wideband media external to the home. The evaluation was carried out by projecting market penetrations of different services to a customer population and attributing the costs of the service provisions using different media and customer gateways.

Based on the results from these two evaluations, Task participants have developed strategies for transitioning from installed narrowband media to wideband media. They also have completed an assessment on whether narrowband media should be installed by customer/utility service providers or whether the service providers should wait until a residential customer, wideband infrastructure becomes available. Taking into account all the different scenarios, the experts have concluded that a standard interface to a narrowband customer gateway installation should be available in all wideband customer Set Top boxes and modems.

Building upon the results of this subtask and others, Task II experts will continue their work on communication technologies for DSM. And over the next year, experts will focus on the design and prototype implementation of a flexible customer DSM gateway.

For more information on this new work contact the Task II Operating Agent, Richard Formby, EA Technology Limited, United Kingdom, fax: +44 151 347 2500, e-mail: jrf@eatl.co.uk. (See IEA DSM web site for address.)

IEA DSM Hi-Motors Competition

Two motors from ABB Motors were awarded the IEA DSM *Award of Excellence* after meeting the demanding requirements set out in the DSM Hi-Motors competition. The goal of this competition was to develop an electric motor that cut losses by 25-50% compared to an average motor. After designing a motor to meet the efficiency specifications of 90.4% for a 5.5kW motor and 95.8% for a 75kW motor, the competitors' motors were tested at Lappeenranta University of Technology in Finland. The winning ABB motors exceeded these stringent requirements--the smaller motor reached an efficiency of 90.5% and the larger motor, 96%.

Considering that motors are responsible for about 65% of industrial energy consumption, there is a vast potential for savings. Motors are used in all sectors and in a wide range of applications, namely for fans, compressors, pumps, machine tools, air conditioning equipment, elevators, home appliances and office equipment. It is because of their extensive use that they are a prime candidate for increased energy savings. For example, ABB Motors' award-winning motor design could save thousands of dollars in lower maintenance and energy costs, as well as help reduce CO_2 emissions and other substances into the environment.

Maintenance Improvements

The lifetime of a super-efficient motor and its parts is longer because more energy is being converted into useful work instead of lost as heat. As a result of this decrease in the heat generated by the motor, parts such as the motor winding insulation, the bearings and the bearing grease last longer. For example, in the small ABB motor the lifetime of the winding insulation is four times longer, and in the larger ABB motor it is eight times longer compared to standard motors.

ABB Motors being awarded the IEA *Award of Excellence* by Hans Jørgen Koch, IEA Director for Energy Efficiency and Technology (left) and Heikki Härkönen from Motiva, organiser of the event. Receiving the award on behalf of ABB is Erik Sundin, Jouni Ikäheimo and Sven Sjöberg.

Armitage Communications

Energy Savings

Improvements in the efficiency of a motor can significantly lower energy costs. For example, a 1.6% efficiency increase means that a 75kW motor uses 1.3kW less energy. Savings like these can add up to thousands of dollars in reduced energy costs over the life of the product when you take into consideration the extended running hours and long service life that many motors have. Examples of the new ABB motors indicate a pay-back period of 1-3 years.

Environmental Benefits

A more efficient motor requires less power to run and therefore reduces CO_2 and other emissions into the atmosphere. For instance, a 11kW motor with 91.1% efficiency can reduce the environmental impact by as much as 21% over its life cycle, compared to a motor with 89% efficiency, because of its lower energy consumption (assumes that both motors operate 8,000 hours per year for 15 years on an average

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DSM Technology Procurement Competitions

Efficient Motors

- ABB Motors was awarded the IEA DSM *Award of Excellence* in February 1999 for two super-efficient electric motors.

Dryer Promotion Competition

- AEG of Germany won IEA DSM *Award of Excellence* and received the first EU Energy Class A Label for its energy efficient tumble dryer. This dryer is being marketed in Germany, the Netherlands and Sweden. There also are plans to market the dryer in other European countries.

Efficient Copiers

- Procurement competition is now running.
- Target goals are energy savings and reduced environmental pollution.
- Requirements include cost, quality, reliability and technical features, such as duplexing, smart controls and network compatibility.
- Tenders will be accepted every six months until September 2000.

LED Traffic Lights

- Specifications for design and performance are being prepared.

Efficient Drop-in Replacement for Incandescent Lamps

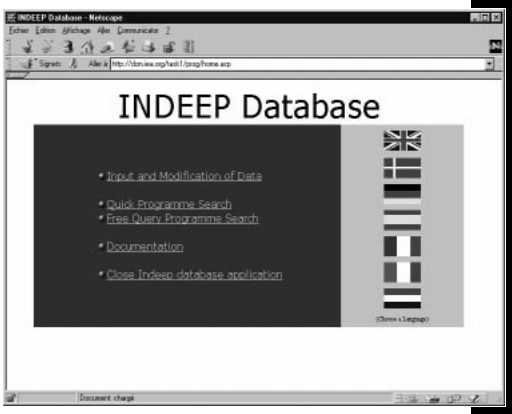
- The Future Bulb competition closed in February 1999 with no winning entries.
- Despite interested buyers in four European countries, only one submission was received which did not meet all the technical requirements and had a high market price.
- The competition did help to further develop compact fluorescent lamp (CFL) technology thus reducing the gap between CFLs and incandescent lamps as well as tackle some of the technical shortcomings identified in this project.

INDEEP Database Available on the Internet

The database developed in Task I, *International Database on Demand-side Management Technologies and Programmes*, will soon be available on the IEA DSM web site. This international database of energy efficiency provides information on the DSM programmes of electric and gas utilities as well as those carried out by others, such as government agencies and energy service companies. The database consists of programme descriptions, summary data on programme costs, participation rates, energy and demand savings, market delivery designs, evaluation methodologies, and practical information, such as programme contacts. And, periodically, summaries of lessons learned for a particular type of programme will be posted, for example, lighting programmes in commercial buildings or appliance rebate programmes for energy efficient refrigerators.

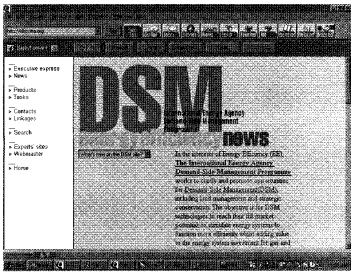
In January 1999, Task experts finalised the first phase of testing, and by the summer of this year, the database should be available to users in the countries participating in the Task -- Denmark, Sweden, Spain and the Netherlands. At this time, it is not clear whether the software will be available only in English or seven other languages as well.

Early in 1999 the "input section" of the INDEEP software will be available to everyone. A link will be created from the IEA DSM web site (http://dsm.iea.org) to the restricted INDEEP site. Anyone wishing to input information on a programme can do so by either downloading the four-page paper form, or entering the information on-site. To encourage individuals and organisations to contribute information to the INDEEP database, a bonus will be given for each programme



entered which can then be used to obtain free copies of INDEEP analysis reports, detailed programme information or one-page summaries. For organisations in Denmark, Sweden, Spain and the Netherlands these products are available free of charge from the INDEEP country experts, as these countries are participating in the Task.

Further information can be obtained from the IEA DSM web site or the "Progress Report INDEEP 1996-1997." This report is available free of charge from the Task I Operating Agent, Harry Vreuls, Novem, The Netherlands, fax: +31 46 452860, e-mail: h.vreuls@novem.nl (See the IEA DSM web site for address.)



http://dsm.iea.org

Visit the IEA DSM web site for more information on Programme activities, publications and contact names.

Task III *from page 3*

European mix of electricity). This type of motor is therefore a better environmental choice, even when you factor in the additional copper and iron needed to manufacture it.

Energy efficiency motors still hold a small share of the market despite their many benefits—lower operating costs which can offset the higher purchase price in the first year, longer motor life expectancy, lower noise and higher loading capacity. However, with the ABB motor now being marketed on a large scale this should help to increase industry's use of high efficiency motors and consumers' desire to purchase products which use these types of motors.

Efficient industrial motors are one of several products selected for a cooperative procurement activity by the experts of Task III, *Cooperative Procurement of Innovative Technologies for Demand-side Management*. For a complete list of the products currently being considered in this Task see the sidebar on page 3.

For more information contact the Task III Operating Agent, Hans Westling of Promandat AB, Sweden, fax: +46 8 660 54 82, e-mail: hans.westling@promandat.se. (See the IEA DSM web site for address.)

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