

# DRAFT PROPOSAL FOR A NEW IEA IMPLEMENTING AGREEMENT ON EFFICIENT ELECTRICAL END-USE EQUIPMENT

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## **Introduction**

This proposal has been drafted by Peter Cunz, Chairman of the IEA End-Use Working Party, together with IEA Secretariat staff from the Energy Technology and Long-Term offices. It follows a preliminary concept paper provided for information to the CERT in October 2006.

The purpose of this document is to inform and stimulate support from Member and non-Member Countries and potential Sponsor organisations for a new Implementing Agreement (IA) for energy efficient electrical end-use equipment and appliances (not including vehicles).

This paper describes some aims and initial tasks of the proposed IA. However it should be recognised that these may be revised later according to the preferred scope and emphasis of those organisations actually participating. We therefore encourage any organisation which considers that it may become a Contracting Party to provide comments at an early stage. Details on how to respond to this proposal is provided at the end of this document.

A first definition workshop will be held on 9 March 2007 in Paris to clarify the principle aims and tasks of the IA.

Further details on the procedure for establishing an Implementing Agreement are available from the following website: <http://www.iea.org/Textbase/techno/index.asp>

## **Background**

An increasing number of international research studies confirm that energy efficiency presents the largest and one of the lowest-cost options for reducing carbon dioxide (CO<sub>2</sub>) emissions. Energy efficiency can also play a major role towards increasing energy security. The IEA's *World Energy Outlook's Alternative Policy Scenario* identifies energy efficiency as contributing 80% of avoided CO<sub>2</sub> emissions globally. Similar conclusions are drawn in *Energy Technology Perspectives 2006*, which identifies energy efficiency gains as '*the first priority for a more sustainable energy future; a message which is echoed in the Stern Review: 'The Economics of Climate Change'*<sup>1</sup>.

IEA sector-specific studies such as *Cool Appliances: Policy Strategies for Energy Efficient Homes* and more recently *Light's Labour's Lost: Policies for Energy-Efficient Lighting* show that significant reductions can be made in the short-term through the wide-scale adoption of commercially available end-use technologies. Further savings can be realised by improvements to existing technologies, as discussed in *Energy Technology Perspectives 2006*. Optimising the use of appliances provides additional opportunities.

Although the uptake of end-use efficient technologies is currently hampered by the presence of multiple barriers, several countries have implemented policies which have been highly effective in raising the market share of the most efficient equipment and appliances. These experiences (in some cases spanning up to 15 years) include combinations of mandatory and voluntary programs, and demonstrate effective policy responses which could be used in more countries and for a wider range of technologies. Better understanding how these policies have worked and the issues surrounding implementation is essential for the development of a more wide-scale policy response.

Currently, end-use Implementing Agreements largely examine new technologies, with emphasis on the efficiency of those technologies. But none of the Implementing Agreements focus on appliances and equipment, despite the fact that household appliances contribute 30% of all electricity consumed in OECD countries and produce 21% of all energy-related CO<sub>2</sub> emissions. By 2020 it is estimated that appliance electricity consumption will have grown by 25% compared to current levels (OECD/IEA, 2003).

Many appliances are traded internationally, which provides consumers access to the best goods while providing manufacturers access to a wider market. Unfortunately, regional and/or national differences

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<sup>1</sup> [http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/sternreview\\_index.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm)

in the performance standards of products hinder free trade and increase costs to consumers. As a result, most policy makers agree that international harmonisation will be necessary to continue the growth of new markets for efficient products. The alignment of standards internationally will also help to address concerns that, as the market share of efficient products increase in some countries, less efficient products may be 'dumped' in countries without strong policies.

The recent increase in IEA member country enquiries of the IEA Secretariat on end-use energy efficiency suggests that there is substantial demand for further work in this area. The demand for improved energy efficiency has resulted in increasing international dialogue – through the IEA, the G8, the APP6 initiative and the CSD Marrakech accord. These groups have the potential to encourage the adoption of far reaching energy efficiency policies amongst participating countries on a wide range of technologies and applications. While this high-level policy direction is vitally important, ultimately the abilities of countries to develop effective national responses rely upon the regular sharing of information relating to a range of technical as well as policy issues.

Therefore a forum is needed which supports national policies for energy efficient appliance and equipment. In this regard, monitoring and sharing information on trends in performance, and establishing benchmarks for "good" products, are important activities which can best be done collectively by a group of countries. In addition, a forum is needed where experts and policy-makers can examine the fine detail of standards in order to see how harmonisation can occur and discuss the potential to co-ordinate energy efficiency policy responses<sup>2</sup>.

This proposal to establish a new Implementing Agreement aims to fill the gap in international co-ordinated work on efficient end-use appliances by providing a forum for countries to share expertise, develop their understanding of the technologies and issues involved. Several initial tasks and technology areas have been identified as important, however these are by no means exhaustive and it is envisaged that further tasks and technologies will be added.

## **Aims**

The aims of this proposed Implementing Agreement are to:

- Improve co-operation between participating Governments and Sponsor organisations in activities to promote the deployment of efficient electrical end-use energy efficient technologies (excluding vehicles);
- Facilitate on-going international dialogue and public awareness of end-use electrical efficiency (excluding vehicles); and
- Undertake research and investigative activities, and to provide such information as deemed necessary to enhance the deployment of efficient electrical end-use energy efficient technologies (excluding vehicles).

It is an important feature of this proposal that the Implementing Agreement cannot impose requirements on participating countries, but can provide a forum where country responses and activities can be co-ordinated voluntarily. The extent to which individual countries wish to participate in such co-ordinated actions will remain the sole responsibility of each country.

## **Scope**

The new Implementing Agreement will focus on end-use appliances and equipment which consume electricity, excluding motor vehicles. The proposed scope of activities will include tasks related to technology, policies and user behaviour of appliances.

Activities will include research (including the compilation of existing research) and dissemination of information relating to:

- Best practice in the energy performance of end-use electrical appliances and equipment;
- International comparisons of energy performance of electrical end-use appliances and equipment;
- Harmonization of technical standards and standards for performance measurement and evaluation;

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<sup>2</sup> Albeit that final decisions must remain the province of national governments and similar authorities.

- Existing and innovative policies to accelerate deployment of technologies and their impacts;
- Usage patterns of technologies by consumers in different countries;
- Effects of consumer behaviour on energy consumption; and
- Mechanisms to encourage behavioural change by consumers which lead to reductions in energy consumption.

### **Proposed Annexes**

The scope of annexes of existing Implementing Agreements varies. However, in general, annexes are sub-tasks to the Implementing Agreement that provide interested participants the opportunity to focus on particular aspects of the overall subject, such as end-use sectors, technologies or other relevant areas of interest.

For this proposed Implementing Agreement, it may ultimately be feasible to have an Annex for all major end-use sectors; however it is proposed that the initial focus should be on sectors where there is the most immediate demand and opportunity for international co-ordination. Based on the recent work of the IEA Secretariat, such topics could include lighting and electric motors.

There are some important areas of work which span all potential end-uses. Examples of cross-cutting activities include standby power, research relating to usage patterns and user behaviour, and technology benchmarking.

At this stage it is proposed that the initial list of annexes include both specific end-use sectors and cross-cutting activities.

Though the final list of Annexes will be decided by the signatories to the Agreement, annexes already suggested by those IEA countries who have expressed interest in participating include:

- Standby Power (see attached proposal).
- Lighting (see attached proposal).
- Benchmarking (see attached proposal).

In addition, based on priorities of the Energy Efficiency Working Party (EEWP) and on information received by the IEA Secretariat, further initial annexes could include:

- Electric Motors: harmonization of standards and promotion of high efficient motors in appliances.
- End-use profiling: co-ordination of data collection of user behaviour with respect to specified technologies, particularly usage patterns. This is needed to assess the energy consumption of different technologies, and to identify common duty cycles for energy performance algorithm calculations.

### **Funding**

The funding of an IA can be either “cost shared” with a fixed fee for each Member, or “task shared” with voluntary contributions from each Member, or a combination of both approaches. The funding approach and the budget for the IA will be decided upon by participants.

Task-sharing works well when there are a number of different concepts that are being investigated by different participants in parallel, while cost-sharing is more appropriate for funding a single joint activity or experiment.

Some participants use common funds to cover the costs of a central administration, leaving the project costs to be task shared.

When deciding upon funding mechanisms for this IA, participants may wish to consider a structure that encourages participation by developing countries. For example, financial contributions could be scaled according to national GDP, consumption/GDP CO<sub>2</sub> emissions or similar.

## **Participation**

Implementing Agreements are open to participation by all countries or their representatives. In addition, sponsors from energy technology companies may participate, provided there is no conflict of interest.

In view of the importance of co-ordinating activities, participation by organisations representing a number of governments should be encouraged, such as the European Union, the Asia-Pacific Economic Cooperation, and the Asia Pacific Partnership.

To assist with co-ordinating information and activities in developing countries the involvement of organisations such as the United Nations Development Program, the United Nations Environment Program, the Global Energy Facility, and the World Bank should be sought.

## **Responding to this Proposal**

To respond to this proposal, interested parties are encouraged to:

- Provide written or verbal comments;

*and/or*

- Indicate a wish to participate in the workshop on 9th March 2007, in Paris. Further details will be provided nearer the event.

### **In both cases, please contact:**

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## **PROPOSED ANNEX: STANDBY POWER**

Over recent years, the issue of Standby Power has gained a high profile in some countries, however implementation of policy measures cover a minority of products which contribute to standby consumption. The majority of policies are voluntary, although Government procurement and mandatory measures are increasing. Implementation amongst developing countries is scarce, even though standby power represents a rapidly growing area of energy demand.

This Annex of the IA will assist governments to implement measures to reduce standby power consumption by sharing information on successful approaches and disseminate information on technological progress. The IA could also publish international comparisons based on measurement data from around the world, provide guidance on national studies and define terminology.

National standby power programs have tended to identify the products with a standby power mode and individually target policies towards those which consume the most energy. However, there now more than 40 products identified with a standby power component and as this number increases, dealing with each product separately is becoming less cost effective. In addition, for some products the traditional boundaries between devices has become blurred, and it is growing more difficult to define products individually.

The solution is to apply a uniform standby power requirement to all products (such as the 1-Watt target) – the so-called “horizontal approach”. This ensures that all devices are included by default, unless specifically excluded. This provides certainty for manufacturers and therefore enables the market for technical solutions to transform faster and at the lowest cost. Administratively, it is easier to define the exceptions to this requirement, than to attempt to specify all the products which are included.

It is proposed that two groups of products will be excluded from the horizontal standard:

- Products already regulated by an efficiency standard, whose test procedure captures standby power use;
- Products with special features that make it “difficult” to immediately achieve the horizontal threshold.

By excluding those products already covered by a standby power regulation avoids possible conflicts with other national efficiency standards.

The second exclusion applies to products where there are technical or economic barriers to complying with the threshold (e.g. 1-Watt). Certain medical products might qualify for this exclusion, where high-voltage and low current must be delivered. There may also be low-voltage, high-current applications needing exclusion. No products should be permanently excluded; instead, a postponement would be granted, with an interim level set in the meantime.

It is envisaged that the IA will create a list of recommended exceptions, which will be publicly available for reference by all national programs wishing to implement horizontal standby measures. This internationally coordinated list of exceptions will be agreed by participants in this Annex, who will consider applications for exemption status from manufacturers of internationally traded products. This framework will therefore enhance opportunities for harmonisation while also reducing the burden on national administrators and manufacturers of establishing requirements for individual countries.

### **Tasks**

The main tasks of this Annex include:

- To establish internationally harmonised operating rules for the horizontal approach for Standby Power;
- To share information on standby power policies amongst participating countries;
- To provide guidance on the measurement of standby power and terminology, and share collected data;
- To share information on low-standby power technologies.

## PROPOSED ANNEX: LIGHTING

The 2006 IEA publication, *Light's Labour's Lost: Policies for Energy-Efficient Lighting* identified that lighting accounts for 19% of global electricity consumption, more than is provided by hydro or nuclear power, and gives rise to 1 900 Mt of CO<sub>2</sub> emissions (70% of those from light duty vehicles). The analysis further demonstrated that at least 40% of this energy use could be saved cost-effectively through the systematic adoption of higher efficiency solutions in all the main end-use sectors: non-residential indoor lighting, residential indoor lighting and outdoor lighting. Moreover, significant amounts of energy could be saved in vehicle lighting and via programmes aimed at substituting off-grid fuel-based lighting with higher efficiency alternatives in developing countries. The IEA has already supported research on integrating daylight into buildings under the auspices of Tasks 31 and 21 in the Implementing Agreement for a Programme to Develop and Test Solar Heating and Cooling Systems (SHC IA) and the Implementing Agreement for a Programme of Research and Development on Energy Conservation in Buildings and Community Systems (ECBCS IA) and is currently conducting research into energy efficient lighting technologies in ECBCS IA Annex 45; however, there is a strong need to conduct cooperative activities to assist governments with the development of energy efficient lighting policy measures. To this end, it is proposed to develop a new lighting annex within this implementing agreement to assist policy-makers in designing comprehensive lighting energy efficiency policy portfolios to address all important energy savings opportunities.

### Tasks

The main tasks of this Annex could include:

- Implementation of cooperative actions that assist in raising the energy efficiency of residential lighting. For example, cooperative measures concerning quality and efficacy requirements for Compact Fluorescent Lamps (CFL) and other potential substitutes for standard incandescent lighting such as solid-state lighting and infra-red halogen lamps; cooperative measures aimed at improving the efficiency of residential luminaires; actions to determine and improve consumer acceptance of higher efficiency lighting solutions; sharing information on residential lighting energy efficiency policies including minimum efficiency standards and labelling, lighting requirements in building codes and certification, market transformation programmes, public awareness and fiscal/financial incentives
- Implementation of cooperative actions that assist in raising the energy efficiency of non-residential indoor lighting. These could include cooperative measures concerning: quality, efficacy and other energy performance requirements for linear fluorescent lamps, ballasts and luminaires; other non-residential indoor lighting technologies (e.g. high-intensity discharge lamps, CFL, halogen lighting and solid-state lighting); accelerating the deployment of effective energy-saving lighting controls; best practice in recommended indoor lighting levels; promoting the effective use of daylight; encouraging best practice in switching arrangements and user control; encouraging best practice in lighting design; the potential of advanced metering and real-time performance benchmarking; sharing information on non-residential indoor lighting policies including minimum efficiency standards and labelling, lighting requirements in building codes and certification, market transformation programmes, awareness and fiscal/financial incentives
- Implementation of cooperative actions that assist in raising the energy efficiency of outdoor lighting, e.g. addressing technologies, policies & programmatic efforts such as: high efficiency technologies for street and roadway lamps, luminaires, ballasts and controls; best practice in outdoor lighting energy efficiency policies (outdoor lighting levels and light pollution, product efficiency requirements, labelling, outdoor lighting ordinances, market transformation efforts, financing etc.)
- Implementation of cooperative actions that assist in raising the energy efficiency of vehicle lighting e.g. addressing technologies, policies & programmatic efforts such as: best practice in specifications for daytime lighting requirements (daytime running lights), interactions with vehicle lighting safety measures to encourage the use of high efficiency lighting technologies (e.g. solid state lighting, xenon headlamps etc.)
- Implementation of cooperative actions that assist in raising the energy efficiency of off-grid lighting in developing countries e.g. addressing technologies, policies & programmatic efforts
- Sharing information on lighting energy efficiency policies and best practice amongst participating countries and on energy efficient lighting technologies.

## **PROPOSED ANNEX: BENCHMARK RESEARCH**

The aim of this Annex is to examine the energy performance of products in the marketplace, including the average and most efficient products, and to identify the scope for future improvement. This is important in order to:

- Assist policy-makers establish appropriate thresholds for mandatory or voluntary programs;
- Provide international benchmarks which can be used by manufacturers and suppliers with to compare current product performances, and as design targets for future products;
- Track progress in improving the energy efficiency of appliances and equipment over time;
- Compare product performance in different markets, particularly for internationally traded goods. This can be useful, for example in order to check whether poorly performing products are being 'dumped' in some markets.
- Increasing competition between manufacturers, distributors, retailers and service companies;
- Encouraging industry groups to maintain high code of conducts;
- Advancing testing procedures;
- Encouraging international harmonization initiatives.

Sources of this information can include the results of national studies, performance data collected during product registration for national programs, international databases or offered by industry. For this reason, industry involvement would greatly enhance the abilities of this annex. In some cases, where test methodologies vary, it may be possible to adjust data to account for differences in test procedures or conditions.

If necessary, and provided that participants agree, the Annex could decide to undertake specific product performance testing programs.

It is envisaged that this Annex would contain a strong communication component, with a mission to publicise its findings to stakeholders,

It should be noted that the Group for Energy Efficient Appliances (GEEA) currently publishes criteria for "good" products in Europe on an annual basis (see [www.efficient-appliances.org/](http://www.efficient-appliances.org/)). GEEA have indicated that they would like to see this activity taken over by this IA.

### **Tasks**

The main task of this Annex includes the assembly and presentation of benchmarking studies comprising the following information:

- The average and best available energy performance within researched products and markets;
- Changes in the energy performance of products over time;
- Comparison of relative energy performance in different markets;
- Potential future performance levels for specified products.

The selection of products to study should be made based on the following criteria:

- Sufficient share (now or in the near future) of electricity consumption;
- Large potential of energy efficiency (wide spread between best/worst available products);
- No detailed market and benchmark data available in this product category;
- Potential candidate for policy measures;
- New advanced technology available.

The following mass products could be candidates for study:

- Lighting with point source (light-emitting diodes, or LED);
- Lighting and fixture with linear source (T5 lamps, sensors and electronic ballast);

- Pumps, fans and compressors (premium motors and integrated electronic adjustable speed drives);
- Large TV displays;
- Room air conditioners.
- Laundry dryer (heat pump);

Examples of recent international benchmarking studies:

- Paul Ryan: *Benchmarking of Electric Motor Efficiency Levels in Four Asian Countries*, April 2005.
- Peter DuPont: *Benchmarking of Air Conditioner Efficiency Levels in Five Asian Countries*. *Danish Energy Management*, June 2004 (AGO).
- APEC: *A survey of Efficiency Levels Specified for Three-Phase Cage Induction Motors*, January 2003.
- Energy Efficient Strategies: *Greening White Goods, A Report into the Energy Efficiency Trends of Major Household Appliances in Australia from 1993 – 2005*. Final Report prepared for National Appliance and Equipment Energy Efficiency Committee. June 2006.