

The Leaking Electricity Initiative: an International Action to Reduce Standby Power Waste of Electrical Equipment

Abstract

This challenging IEA initiative aims to stimulate the energy efficiency effort in IEA Member countries. Significant energy can be saved on a large scale by reducing the electricity currently being wasted by electrical appliances in the OFF mode or standby mode. Preliminary assessment shows that up to 1% of CO₂ emissions can be avoided if this problem is dealt with using cost-effective measures.

1. Background: A Significant Waste of Electrical Energy

In homes and offices, electrical equipment consumes some electricity when placed on standby mode or even when switched off. The waste of energy comes primarily from inefficient standby features and excessive power consumption by the transformer when it has no load¹. For example, a telephone charger left plugged in the wall will draw electricity even when the equipment is fully charged and is not in use. Such electricity waste is described as "leaking electricity". It is an unnecessary consumption of electricity both in terms of power demand and energy consumed.

Each Watt consumed by an appliance in standby mode totals 8.76 kWh per annum, and costs one US dollar (one Euro) on average throughout IEA countries.

The typical loss per appliance is relatively low, 1-30 W (see Annex 1). However, when all the electronic appliances in homes and offices in one country are aggregated, it represents a significant fraction of total electricity use. In a typical Japanese or Danish home, standby losses correspond to 10% of total residential electrical consumption, while in the United States, standby losses account for about 5% (or about 100 Watt per home). Estimates of standby losses in the European Union lie between 5 to 10% of total residential electrical consumption.

In Germany, the average standby consumption in the residential sector is estimated to be 45 W per household. Combined with the losses incurred in the commercial sector, the standby consumption of equipment is more than 20 TWh a year (4% of national consumption). This gives rise to 14 million tons of carbon dioxide emissions, i.e. 1.6% of Germany's total. So, the waste of electricity caused by standby losses and its associated CO₂ emissions is significant and merits attention.

Equipment responsible for standby power waste is present in all sectors: households, services and industry. However, in the household and the commercial sectors, equipment is more generic and, consequently, easier to target.

2. Technical solutions exist to improve the energy efficiency of the standby power mode

¹**No load** refers to the power drawn by the power supply/transformer even though the product is not connected to it.

Technical solutions exist to reduce standby consumption by up to 90%. Increasingly, electronic appliances are being fitted with a new generation of power transformers that use only 100 milliWatts in standby mode compared to the 1-5 Watt consumed by traditional models. They are also more energy-efficient than traditional power transformers under normal operating mode offering 70-75% efficiency compared to 40-45%. Some of these new-generation power transformers are also cheaper than the models they replace. They are more compact and weigh less than a quarter of the traditional ones.

Another solution is the "smart" electronic switch that cuts power when there is no load and restores it instantly when necessary. Some companies have developed ways to retrofit these switches on fax machines, monitors, televisions, photocopiers, etc.

Most technical solutions are cost-effective, even given the current price of electricity. Retrofitting solutions will generally be less cost-effective than solutions incorporated in the design of the product.

3. A favourable context for co-ordinated international action

At a time when governments are trying to find ways to reduce their CO₂ emissions in a cost-effective way, eliminating unnecessary electricity losses from standby consumption is an interesting option. Moreover, the proliferation of new electronic equipment will continue to accelerate, and standby power waste will constitute an even greater share of electricity use. The electricity savings and the related CO₂ emissions at the national level could be significant, but individual costs are large compared to the potential saving of individual devices. Electronic devices are marketed internationally and it would be difficult and costly for a government to make the necessary effort to limit standby power waste domestically. These arguments call for a concerted effort among countries in order to develop worldwide energy efficient solutions that would be applied domestically.

Several policy instruments can be used to tackle this problem: from labelling to minimum standards, from voluntary schemes to regulation. Domestic circumstances will greatly influence the instruments countries select.

A co-ordinated international initiative could help transform the entire electronics market through an open and stimulating effort which encourages manufacturers of final products and components to use low-loss components and designs.

International collaboration improves the cost-effectiveness of such actions by:

- X reducing the number of disparate regulations and commitments according to which manufacturers design and test their products;
- X increasing the economies of scale of manufacturing advanced standby service technologies;
- X minimising distortions to industrial competitiveness and trade, and
- X reducing the costs of developing, operating and evaluating government programmes.

4. Building the programme from existing initiatives

In Germany, Switzerland, Denmark and the Netherlands, some local electric utilities conduct information and motivation campaigns to raise consumers' awareness and encourage the purchase of equipment with reduced standby consumption.

In Switzerland, the Federal Government has negotiated maximum levels of standby consumption with manufacturers and importers of electrical appliances. A strict calendar is observed and target values are revised downwards at regular intervals. In May 1998, the European Commission and manufacturers of televisions and video recorders signed a voluntary agreement to limit standby consumption to an average 6 W after January 2000. Current discussions cover a new agreement for audio equipment and for integrated receiver decoders.

A consortium of state energy agencies in seven European countries is collaborating through the Group for Efficient Appliances (GEA) to promote energy efficient televisions, VCRs and personal computers.

In Japan, some major electronics manufacturers have set voluntary targets for reducing the standby power consumption of TV sets, video and audio equipment to less than one Watt, spurring industry-wide competition to develop energy-efficient electronics.

In the United States, maximum standby consumption for televisions and VCR has been set by the joint US DOE/EPA Energy Star programme. Other electronic equipment is under consideration.

5. An IEA-led effort to stimulate a worldwide transformation of the electronics market

The IEA organised a first workshop on January 1999 to discuss the issue of standby power waste and encourage a direct dialogue between governments and industry. The workshop explored the benefits of international collaboration to encourage domestic efforts. The workshop was perceived as useful, timely and relevant. It highlighted the barriers to a co-ordinated energy efficiency action plan:

- lack of common definition and terminology;
- uncertainties on the magnitude of the electricity waste and the related CO₂ emissions;
- need for more analysis of the most relevant policy instruments to promote energy efficiency.

The IEA is currently managing three working groups to address these issues. The IEA is also preparing a second international workshop in January 2000 and stresses the need to maintain an open dialogue amongst all parties, especially with equipment manufacturers.

The objectives of the IEA in 2000 are:

- to work towards an international agreement between IEA Member countries and the industry;
- to encourage the deployment of the most useful measures in Member countries.

ANNEX 1

The Leaking Electricity Initiative: International Actions to Reduce Standby Power Waste of Electrical Equipment

A list of appliances is shown below along with the typical average standby power demand that they characterise:

Equipment	Off or Standby Power
TV set	0.1 to 13 W
VCR	5 to 19 W
Compact audio	0 to 18 W
Cable box	8 to 14 W
Clock radio	1 to 3 W
Microwave oven	2 to 6 W
Battery charger	2 to 4 W
Answering machine	2 to 4 W
Fax machine	5 to 30 W
Cordless phone	2 to 5 W
Cellular phone	2 to 7 W
Satellite earth stations	14 to 2 0 to 4 W
Personal computer	
Stereo system	0 to 18 W
Hi-fi amplifier	0 to 12 W
Cassette recorder	0 to 8 W
CD player	0 to 6 W
Audio portable	0 to 5 W
Coffee machine	0 to 4 W
Electric cooker	0 to 15 W
Doorbell transformer	1 to 2 W
Motion detector	1 to 5 W
Clothes washer	0 to 5 W
Plug-in power supply	1 to 3 W

Source:

1. Meier A., Huber W. AResults from the Investigations on leaking electricity in the USA≡, Lawrence Berkeley National Laboratory, April 1998.
2. Sidler O. AAn end-use measuring campaign in the domestic sector in France≡, SAVE report 4.1031/93.58. June 1997.
3. Rath U., Mordziol C. AKlimaschutz durch Minderung von Leerlaufverlusten bei Elektrogeräten≡ Text 45-97 ISSN 0722-186X. Umweltbundesamt.