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How enlightened is Europe?

Lighting is an important energy user but, as Paul Littlefair of the UK's Building Research Establishment explains, few European countries have building energy regulations that encourage the installation of efficient lighting.

The EU ENPER project, coordinated by the Belgian Building Research Institute and funded by the EU's SAVE initiative and by national organisations including the UK Office of the Deputy Prime Minister, aims to review and develop energy performance calculations in European building energy regulations.

Lighting accounts for 10% of EU electricity consumption, and in some buildings can be the biggest single energy user. A survey of 18 nations was carried out as part of the ENPER project to find out what provision, if any, is made for lighting in their building energy regulations.

Eight countries (Austria, Denmark, Germany, Italy, Spain, Sweden, Switzerland and Yugoslavia) made no specific provision for lighting in their building energy regulations, although most have separate standards on lighting provision.

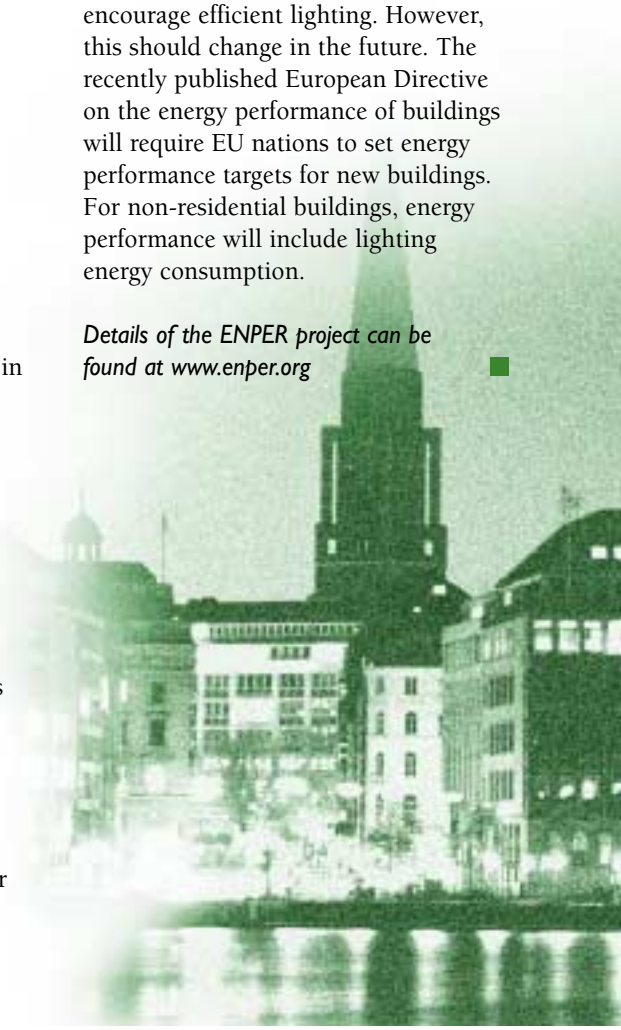
Five other countries (Finland, Ireland, Lithuania, Norway and Portugal) had default values for lighting in their building energy calculation procedures. However, it was not possible to offset more efficient lighting against higher energy consumption elsewhere in a building, so there is no incentive to install energy efficient lighting.

Four countries (France, Belgium, the Netherlands and Greece) had, or were planning, a detailed calculation procedure for lighting as part of their building energy requirement. In each case the energy consumed by lighting in a building can be estimated and then included in the predicted overall building energy consumption. Installing more efficient lighting will make it easier to achieve the overall building target.

Of all the countries surveyed, the UK is unique in having a specific requirement for efficient lighting in its building energy regulations. Revised Building Regulations dealing with the conservation of fuel and power came into force in England and Wales in April 2002. For the first time, requirements have been introduced for new dwellings, covering both external and internal lighting. Furthermore, the existing requirements for lighting in buildings other than dwellings have been extended to cover display lighting and luminaire efficiency in offices and in industrial and storage buildings.

The information available clearly showed that most of the countries surveyed did not have measures in their building energy regulations designed to encourage efficient lighting. However, this should change in the future. The recently published European Directive on the energy performance of buildings will require EU nations to set energy performance targets for new buildings. For non-residential buildings, energy performance will include lighting energy consumption.

Details of the ENPER project can be found at www.enper.org



Contents

Highlighting the need for greater lighting efficiency

A recent global lighting survey commissioned by the IEA Secretariat provided some interesting statistics for the fifth Right Light Conference, held in Nice, France, in May 2002:

- Global electricity production for lighting totalled 21,103 PJ in 1997.
- Half of the world's 1000 large electric power plants in 1997 were in IEA member countries.
- The two billion people that lack direct access to electric lighting consume 3600 PJ of energy in fuel-based lamps that give a relatively poor light.

The savings potential for lighting energy is estimated at 30-50%. One quarter of this potential is associated with fuel-based lamps: a kerosene lamp, for example, is about 1200 times less energy efficient than a compact fluorescent lamp. Energy saving solutions discussed included more efficient lamps and lighting systems, better lighting design and greater use of daylight.

Today's energy efficient lighting is the product of a long history of gradual improvement. Various oil 'crises' stimulated the national promotion of new technologies, while recent years have seen the introduction of international market transformation schemes such as the Greenlight initiatives in the USA, the EU and China, and the World Bank-UNDP IFC/GEF Efficient Lighting Initiative (ELI).

The EU Greenlight programme introduces the concept of energy efficient lighting to non-domestic customers through manufacturers, building owners, energy agencies and energy service companies (ESCOs). The ELI multi-country pilot programme reinforces existing national lighting programmes and introduces energy efficient lighting to new markets in Argentina, the Czech Republic, Hungary, Latvia, Peru, the Philippines and South Africa. ELI works with the lighting industry to remove barriers to the adoption of more energy efficient and environmentally beneficial lighting products.

The Conference's overview of experiments in Nepal using light-emitting diode (LED) technology showed that the technology can be a healthier and more energy efficient alternative to fuel-based lamps.

More information on the Conference can be found at: www.iaeel.org

Abstracts of papers are available on the European Council for an Energy-Efficient Economy Web site at www.eceee.org (see the library and links pages).

The potential for cost savings at a Jordanian hospital

The connected lighting load at the Arab Centre for Heart and Special Surgery (ACHSS) is around 240 kW. The lighting system consists mainly of fluorescent tubes, halogen lamps, high-pressure sodium lamps and a few incandescent lamps. There is no separate transformer dedicated to lighting, and the hospital does not make the fullest possible use of natural daylighting.

Fluorescent tubes provide most of the lighting throughout the hospital and its offices. There are 3327 36-watt tubes and 4303 18-watt tubes. Each tube has a conventional magnetic ballast which consumes around 15 watts of electricity.

Replacing each conventional ballast with an electronic ballast would have two benefits:

- an electronic ballast consumes only about 3 watts;
- a fluorescent tube used with an electronic ballast consumes less energy.

The energy savings that the hospital would achieve by using electronic ballasts are estimated to be about 20 watts for every 36-watt tube and 15 watts for every 18-watt tube. Assuming a 50% utilisation factor and operation for 16 hours/day, this gives a total saving of around 383,520 kWh/year, worth around USD 32,357/year (where USD is the US dollar).

Lighting around the perimeter and entrances to the building is provided by 139 70-watt halogen lamps, giving a load of 9.73 kW. Replacing these halogen lamps with 25-watt compact fluorescent lights would reduce the lighting load by an estimated 6.255 kW. The associated annual savings would be 22,830 kWh (assuming operation for 10 hours/day), giving cost savings of USD 1932/year.

Lighting up Africa efficiently

The lighting component of electricity bills in Africa can vary widely with the size and nature of the facility. Small tourist lodges have a higher lighting component (40-60% of the electricity bill) than larger facilities with more energy-intensive equipment (5-15%). Industrial lighting energy consumption is limited, while in the health and education sectors, the lighting component falls as establishment size increases.

During the past three years, Energy Alternatives Africa Ltd, a joint venture with ESD UK, has targeted hotel, health and educational facilities in Eastern and Southern Africa. Detailed assessments of site energy use identify the opportunities for energy cost savings and enhanced productivity.

Using compact fluorescent lamps (CFLs) instead of incandescent or baton-type fluorescent lamps has reduced lighting energy use by up to 60%. CFLs also reduce the noise and flicker associated with older fluorescent lighting, and improve the colour. LED lighting will be used more in future as prices fall, particularly for off-grid locations and facilities that require ergonomic lighting designs.

Energy Alternatives Africa projects have demonstrated that the greatest energy saving opportunities occur in lighting for paths, public areas, and in feature and bedroom lighting, particularly when coupled with timers and motion and daylight sensors. Other opportunities include the use of LED clusters for night lighting and efficient fluorescents for common areas, particularly in hospitals.

The projects also show that the adoption of efficient lighting technologies is slow, with the hotel sector making the greatest progress because of the associated financial gains. Elsewhere, adoption is limited by lack of financial incentive, high cost relative to income, and informational and logistical barriers.

If the huge energy saving opportunities that exist in the commercial, public and domestic sectors are to be realised, it will be necessary to educate end users, highlight the opportunities and provide guidance during implementation.

Drought accelerates energy efficiency

On 1 March 2002, the Brazilian Government ended nine months of electricity rationing.

The electricity shortfall during 2001 and early 2002 was the result of inadequate rainfall (90% of Brazil's electricity comes from hydroelectric plant), an annual growth in demand of nearly 4%, and inadequate investment in generation and transmission facilities.

As the problems became clear, the reaction of both Government and public was rapid. Government imposed a 20% cut in electricity on households and commerce, and a quota equivalent to 80% of past use on industry. The public, motivated by the government appeal and by the scare of having no electricity in the future, saved more than 20% in some months.

Some of the most effective action was seen in the lighting sector. The Government removed all taxes from compact fluorescent lamps (CFLs), reducing the price by 60% and considerably enhancing their popularity. An awareness programme, highlighting the advantages of CFLs over incandescent lamps, complemented this change. CFL sales soared from 20 million/year before the electricity shortage to 55 million during 2001.

Assuming that each CFL consumes about 15 W and replaces a 60 W incandescent bulb, the potential reduction in generating capacity is 1600 GW. However, not all CFLs are in use simultaneously, so the real reduction is nearer 950 GW.

Assuming four hours of use for the average CFL, energy savings totalled 1.4 TWh/year. Savings to individual householders were significant, and the measures postponed a substantial investment in new electricity supply.

When rationing was suspended, electricity consumption did not return to the level previously expected for 2001. The same proved true in 2002. The market had truly been transformed.

GREENTIE is an intergovernmental information centre on greenhouse gas mitigating technologies. It was established in 1993 by the International Energy Agency (IEA) and the Organisation for Economic Co-operation and Development (OECD), in response to Agenda 21 and the UN Framework Convention on Climate Change (FCCC). GREENTIE operates a worldwide technology database, the Directory, containing approximately 7,700 suppliers, R&D centres, consultants, information centres and other experts whose products and services help to reduce greenhouse gas emissions. The Directory is available online through GREENTIE's Web site. Participating countries include Argentina, Australia, Brazil, Bulgaria, Cameroon, China, Colombia, Denmark, Eritrea, France, Germany, Hungary, India, Indonesia, Italy, Japan, Kuwait, Mexico, Nepal, the Netherlands, Norway, Pakistan, Philippines, Poland, Republic of Korea, Russian Federation, Seychelles, Singapore, Slovak Republic, Sweden, Tanzania, Thailand, Tunisia, Uganda, Ukraine, United Kingdom, United States of America, and Zambia.

A landmark model transaction for the ESCO sector

The Development Bank of the Philippines (DBP), the Philippine Department of Energy (DOE), and the IFC/GEF Efficient Lighting Initiative (ELI) are uniting to improve energy efficiency (EE) project financing in the Philippines by developing a landmark model transaction for the growing energy service company (ESCO) sector.

ESCOs in the Philippines are expected to absorb the capital risk of EE projects through performance contracts and technical expertise. The ELI hopes to establish ESCOs as catalysts for efficient lighting retrofits and other commercial/industrial sector EE improvements, but ESCOs often fail to obtain credit because local banks lack confidence in the concepts of EE and performance contracting.

To provide an industry benchmark, the DOE will carry out an energy audit of DBP's 34-year-old building in Makati City. DBP, as the end-user of ESCO services, will design its own EE credit facility, while the ELI will provide technical assistance in the development of an energy service performance contracting business plan that will provide a basis for future ESCO transactions in the Philippines.

"We believe that our collaborative efforts in this model transaction will allow us to tap the banking, finance and ESCO sectors as pro-active agents of sustainable market transformation towards energy efficiency", explains Alexander Ablaza, Country Director ELI-Philippines.

For more information about ELI-Philippines contact the Country Director (aablaza@ph.soluziona.com).

ELI is a three-year, USD15 million programme (where USD is the US dollar) to accelerate the adoption of energy efficient lighting technologies in Argentina, the Czech Republic, Hungary, Latvia, Peru, the Philippines and South Africa. It aims to reduce market barriers to efficient lighting using multi-country initiatives, local and global partnerships, and country-specific interventions. ELI is implemented globally by the International Finance Corporation (IFC) and funded by the Global Environment Facility (GEF).

For more information, contact ELI's Global Director (rsturm@ifc.org).

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