15 ways to make energy efficient lighting easy

When considering energy efficiency and lighting it is important that it is not considered in isolation. A lighting installation has a basic requirement to provide a sufficient amount of light to allow a task to be performed efficiently and safely. Requirements for this are given in standards such as EN 12464 (Lighting of workplaces), EN 13201 (road lighting), EN 1838 (emergency lighting), etc. In addition, as well as providing good task illumination the lighting installation should provide light of a good enough quality to provide a pleasant and fulfilling environment for the occupants of a space. The ideal is to provide these two aspects in as energy efficient way as possible.

Energy efficiency is a complex set of interactions and relationships linked to technology, physical environment, social behaviour and work requirements. However we can consider energy efficiency may generally be split into four main areas:

Technology

Lamp efficacy
How efficiently a lamp converts electricity into light (lm/W)

Ballast classification
Controls the electricity supply to the lamp (Energy Efficiency Index EEI)

Luminaire distribution
Light is controlled and emitted from a luminaire using optics which bend and shape the light to the correct location

System efficacy
The combination of optical and thermal control within the luminaire (luminaire lm/W)

Control

Presence/Absence
Presence: Lights automatically turn on and off with movement.
Absence: Lights automatically turn off and have to be manually switched on.

Daylight
Artificial lightingresponds to the natural light conditions

Constant illuminance
A function designed to produce correct lighting levels for the duration of the maintenance period

Task/Scene setting
Allows the user to set scenes and adapt the lighting to different tasks

Timed off
Automatic cut-off can be installed to turn all lights off during unoccupied hours

Application

Task lighting
Lighting the task areas with the correct amount of light

Zoning of lighting
Lighting is zoned according to occupancy patterns or window location

Maintenance schedule
Maintenance must be performed in response to product age, performance and environment

Waste light
Any light which does not hit the intended target is waste light

Environment

Reflectance
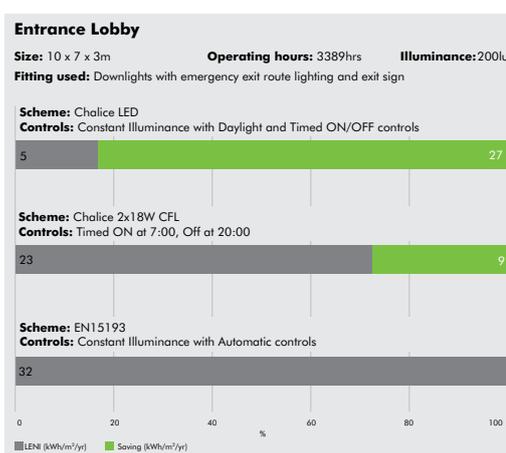Light is reflected from the surface within the space

Visible smart metering
Results of actions can be quickly seen as increased or decreased energy use

Energy Efficiency Graphs

LENI is the Lighting Energy Numeric Indicator, calculated according to EN15193. It is the total annual lighting energy in kWh/m² year, accounting for the energy required when the lighting is in use and active and the savings that may achieved through the use of lighting controls. It also takes into account the energy required by the controls when the lighting is inactive (the standby load) and the energy required to keep emergency lighting operational (battery charging load)

EN15193 provides a table of benchmark LENI values for a variety of applications and in the following pages graphs are shown comparing possible real solutions with these benchmark figures.

The example on the right gives a detailed explanation of the information that may be found on the graphs displayed throughout this book.

Entrance Lobby

Size: 10 x 7 x 3m   **Operating hours:** 3389hrs   **Illuminance:** 200lux
Fitting used: Downlights with emergency exit route lighting and exit sign

Scheme: Chalice LED
Controls: Constant Illuminance with Daylight and Timed ON/OFF controls

| 5 | 27 |

Scheme: Chalice 2x18W CFL
Controls: Timed ON at 7:00, Off at 20:00

| 23 | 9 |

Scheme: EN15193
Controls: Constant Illuminance with Automatic controls

| 32 |

0   20   40   60   80   100
%

LENI (kWh/m²/yr)   Saving (kWh/m²/yr)

Typical installation details

Saving over the EN15193 scheme using the best through life cost scheme with LED technology and the most appropriate controls for the application

Saving over EN15193 scheme using the lowest capital cost installation with minimal controls (a typical base level scheme)

Base scheme is always according to EN15193 Class 1 (lowest energy requirement) in the most appropriate application and with appropriate controls