

LIGHT'S LABOURS LOST – FACT SHEET

Lighting uses more power globally than is generated by all nuclear- or hydro-power plants, (greater than 2200 TWh/year), and is growing rapidly. Lighting accounts for ~17.5% of global electricity use with the largest share used in commercial and public buildings, followed by residential lighting, industrial sector lighting and outdoor/street lighting. This level of consumption could be substantially reduced for the same level of lighting service were less energy wastage occurring from the use of inefficient lighting technologies, a lack of adequate controls, a failure to make better use of natural daylight and wide variations in recommended lighting levels.

Among lamp technologies, low-efficiency incandescent lamps account for 79% of lamp sales (by volume) but provide just 8% of the total light-output. Fluorescent lamps and high intensity discharge lamps (HIDs) give out up to eight times as much light per unit power as incandescent lamps and last between 5 and 29 times as long. There is a strong variation in efficacy (light output per unit power input) among fluorescent and HID lamps too. For example, it is still common for street and road lighting to be provided by mercury vapour discharge lamps whose efficacy is between one-half and one-third of that of more efficient high-pressure sodium and metal-halide lamp alternatives. The ballasts used to start and regulate fluorescent and HID lamps also have a significant variation in efficiency.

Globally incandescent lamps account of about 31% of lighting electricity demand, as opposed to 44% for fluorescent lamps and 25% for HIDs. Simply using compact-fluorescent in place of incandescent lamps, deploying high- in place of low-efficiency ballasts and phasing-out mercury vapour HID lamps would reduce global lighting demand by up to 40%.

Yet the low efficiency of many current lamps is only part of the reason for light's labour's to be lost. A typical luminaire (the fixture in which the lamp is housed) absorbs more than 50% of the light emitted by the light-source while the most efficient absorb less than 10%.

Installed illumination levels in OECD countries commonly exceed recommended values and there is a wide variation in nationally recommended lighting levels for identical spaces. Optimisation of lighting levels and the distribution of light (to use more task lighting and low ambient light levels in place of generic floodlighting) will save yet more energy. The use of automatic controls, which turn lights off when no one is present and dim artificial light in response to rising daylight levels, will typically save between 20 and 40% of total lighting energy use and can be highly cost effective. More effective zoning of manual controls can also make a large difference in many buildings.

Lastly, there is a great opportunity to save energy for artificial lighting by designing new buildings or retrofitting existing buildings to make better use of natural daylight. Buildings designed to optimize daylight can receive up to 70% of their annual illumination needs from daylight and while a typical building will only get 20 to 25%.

Deployment of the efficient lighting technologies and practices mentioned above is generally highly cost-effective and offers short-term paybacks on investments. Yet it doesn't happen as a matter of course due to the existence of a number of important market barriers and imperfections. In recent years governments have been increasingly deploying a range of policy measures to help overcome these obstacles. These measures include addressing the lighting system as a whole (*i.e.* building codes that limit the maximum power demand of the lighting circuit per unit area and mandating the use of controls and zoning in new build and retrofits) and measures aimed at specific lighting components (*i.e.* minimum energy efficiency requirements for lamps and ballasts). There has also been extensive experience with: market transformation programmes such as the Green Lights programmes in the USA, Europe, China and Australia; utility programmes and incentives schemes. Although much still remains to be done, many of these policy measures have been very effective within their terms of reference.