

## Energy efficiency and luminous efficacy of LEDification

Energy efficiency and luminous efficacy have the highest impact on increasing environmental friendliness of lighting systems.

### Energy Efficiency

The goal to reduce the amount of energy required to provide products and services.

### Efficacy

The amount of visible light emitted for a given amount of power used.

### Payback time of LEDification

Varies from less than a year (for direct retrofit of a light source) to 2-3 years for a complete lighting system.

### Efficacy levels and lifetime of typical streetlighting lamps<sup>1</sup>

LAMP TYPE	EFFICACY lm/W	LIFE TIME hours
Mercury vapour	13-48	12-24 K
Metal halide	60-100	10-15 K
High pressure sodium	45-130	12-24 K
LED	70-150	25-60 K

COMPARED TO MOST OTHER TECHNOLOGIES, LEDs REACH VERY HIGH-ENERGY EFFICIENCY LEVELS (lumen per watt of power)

## Annual global electricity savings for lighting will reach 640 TWh in 2030



**saving \$360 billion**  
in avoided investment  
in 290 large coal-fired  
power plants



CO<sub>2</sub> emissions  
savings are  
**390 megatonnes  
annually**

Provide new grid  
connections to over  
**300 million  
households**



**\$50 billion  
savings**  
in consumer savings  
on their electricity bills



LEDs reduce energy consumption for street lighting up to 60% compared to conventional lamps. Dimmed LED lighting can reduce energy consumption up to 85% compared to conventional solutions.<sup>2</sup>

See next page for more information ➤

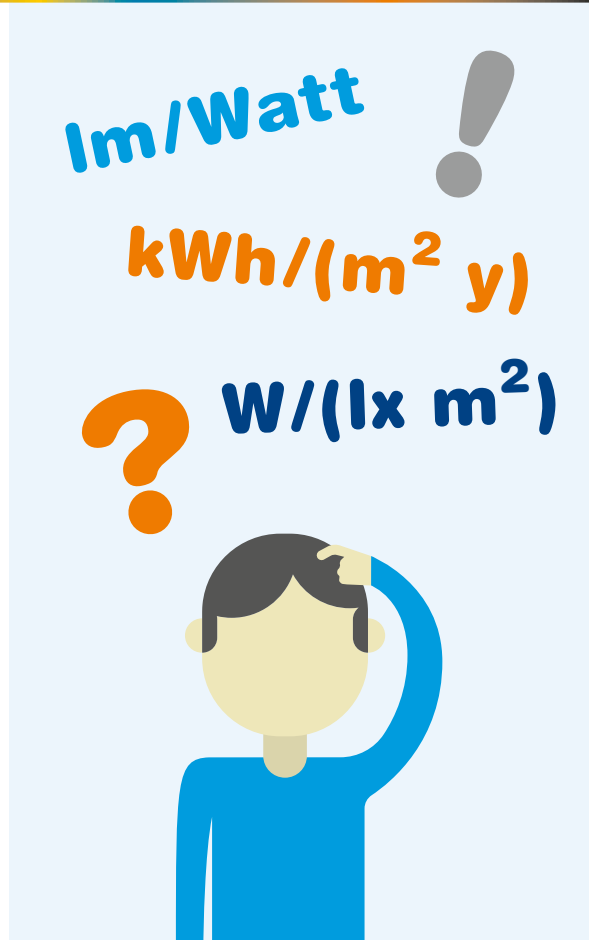
## Measuring energy efficiency

Overview of key terms for measuring energy efficiency according to EN13201-5

- ▶ **Luminous efficacy**, (lm/W).
- ▶ **Power density indicator (PDI)**, W/(lx m<sup>2</sup>).
- ▶ **Annual energy consumption indicator (AECI)**, kWh/(m<sup>2</sup> y).
- ▶ **Operational profile**, hours the lighting installation is switched on for each day and at what percentage of full power it will operate at for each hour.
- ▶ **Road profile**.

### Lowest luminaire efficacy of prospective lighting systems<sup>3</sup>

YEAR OF TENDERING	EFFICACY, lm/W
2018–2019	130
2020–2021	147
2022–2023	165



## Main requirements for tenderer<sup>3</sup>

- ▶ Standard photometric file that is compatible with common light planning software and that contains technical specifications on the light output and energy consumption of the luminaire, measured by using reliable, accurate, reproducible and state-of-the-art measurement methods relevant to international standards.
- ▶ Provide a clear calculation, where the values for the luminaire efficacy, maintenance factor and utilisation factor of their proposed design are visible. The calculation results must include the measurement grid and calculated illuminance/luminance values.
- ▶ Provision the technical specifications of the metering and measurement system and provide clear instructions for O&M of system. A calibration certificate compliant with Measuring Instruments Directive 2004/22/EC shall be provided for each control zone.



**See also:**

1 <https://doi.org/10.1016/j.crhy.2017.10.013> and <https://doi.org/10.3390/su10113925> 3 [https://ec.europa.eu/environment/gpp/eu\\_gpp\\_criteria\\_en.htm](https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm)  
 2 <https://doi.org/10.3390/su10113925> and <http://www.premiumlightpro.eu/>