

What to consider in designing a lighting control system

Different control types and strategies must be considered case by case to ensure energy and cost saving of the street lighting systems.

Based on the type of control system, there are three types of lighting control systems:¹

- ▶ **Autonomous control (calendar)** – The luminaires are pre-programmed with fixed periods for operation. This is by far the simplest and cheapest solution.
- ▶ **Centralised control** – a central system sends the control signal to all luminaires within a group. The information flow is in one direction only. While the central node can determine the status of the groups of lamps, it does not receive information about their individual status or any other local conditions.
- ▶ **Dynamic control** – enables a greater extent of control. Lamps can be controlled in groups or on an individual basis. The central control server can collect information on their status depending on the options installed.



Advantages of investing in a lighting control system

- ▶ Increase energy savings.
- ▶ Increase operational savings and better customer satisfaction.
- ▶ Achieve additional smart city applications.

ACTIVE CONTROL allows for significant energy savings, but it must be weighed against added complexity and cost.

DYNAMIC CONTROL is up to 34% more efficient than calendar control.

See next page for more information ▶

Street lighting control strategies²

- ▶ **Astronomical timer** – using precise information about sunrise and sunset times for any given geographical position. Doesn't consider weather conditions.
- ▶ **Daylight harvesting** – using photo sensors to detect the ambient light and adjust the artificial lighting if the ambient light levels fall or increase beyond certain threshold values. Doesn't consider traffic.
- ▶ **Traffic detection** – using motion sensors to make lighting dynamic and responsive to human presence, e.g. traffic may be consistently low, especially late at night.
- ▶ **Dimming** – depending on traffic, weather, and ambient lighting conditions it may not be necessary to operate lamps at full power throughout the night. By combining proper astronomical timers, daylight harvesting, and traffic detection schemes with dimming, huge energy savings can be attained. In some projects, up to 85–90% savings were achieved.



Benefits of Dimming³

- ▶ **Less electricity consumption** (easy to reduce electricity costs by 25–60%, reduced environmental impacts associated with electricity production).
- ▶ **Less light pollution** (less sky glow, less glare, less intrusive light, less effect on nocturnal species).
- ▶ **Lower risk of overheating** (and thus premature failure) – LED lifetime may be extended even beyond normal manufacturer claims.
- ▶ **Increased security.**

Consumption of LED solutions compared to high pressure sodium (HPS) lamps⁴

TYPE OF LIGHTING SETUP	ENERGY CONSUMPTION COMPARED
HPS – before retrofit	100%
LED – after lamp changing	59%
LED – dimmed with luminous flux tuning	50%
LED – dimmed with dynamic control	36%

See also:

1 LED Street Lighting Procurement & Design Guidelines, Ref. Ares (2017) 5874064 - 30/11/2017

2 <http://www.premiumlightpro.eu/> and <https://www.tvilight.com/>

3 https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

4 <https://doi.org/10.3390/su10113925>