



Reduce lighting energy
costs with controls

 **LCA** LIGHTING
CONTROLS
ASSOCIATION

**Reduce energy costs.
Support sustainability**

**Get control
of your lighting.**

Upgrading lighting systems to next-generation lighting technologies can deliver energy and maintenance cost savings of up to 50+% while maintaining or improving lighting quality. By incorporating advanced lighting controls into your lighting upgrade, you can accelerate cost savings, maximize the value of the upgrade investment in labor, and convert lighting from an ongoing expense into a managed building asset.

Lighting controls are devices and systems that introduce operational flexibility into lighting to support visual needs and energy management. Automatic controls save energy by reducing or turning OFF lighting when it is not needed. Implemented as a standalone project or as part of a lighting upgrade, they can generate energy savings of 24-38+%.

This guide, produced by the Lighting Controls Association, introduces lighting control strategies and common equipment types suitable for both new and existing buildings of almost any type.

To learn more, talk to your building professional or manufacturers' representatives, or visit

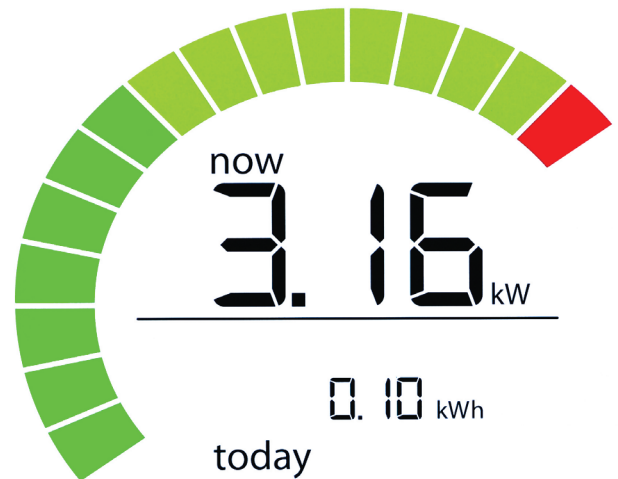
LightingControlsAssociation.org



Lighting Control Strategies

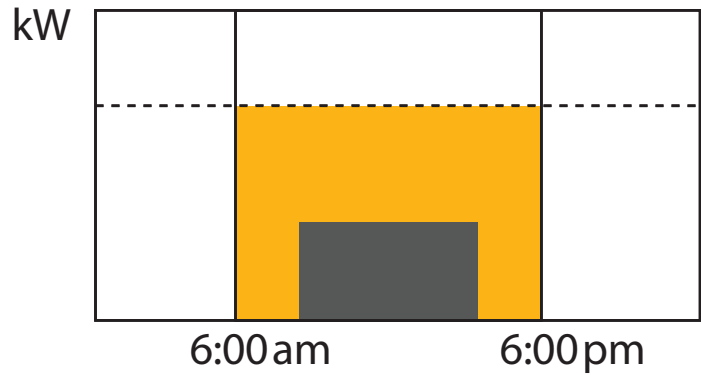
Lighting controls are devices and systems that accept an input, make a decision about whether to reduce the lighting and by how much, and control the load as an output. The inputs may be manual (based on human initiative) or automatic (based on time, occupancy, ambient light level or instructions from a building management system).

The outputs are switching, dimming or control data. The unique combinations of inputs and outputs gives us a variety of strategies that, when properly matched to the application, can deliver satisfying average lighting energy cost savings up to 38+%.



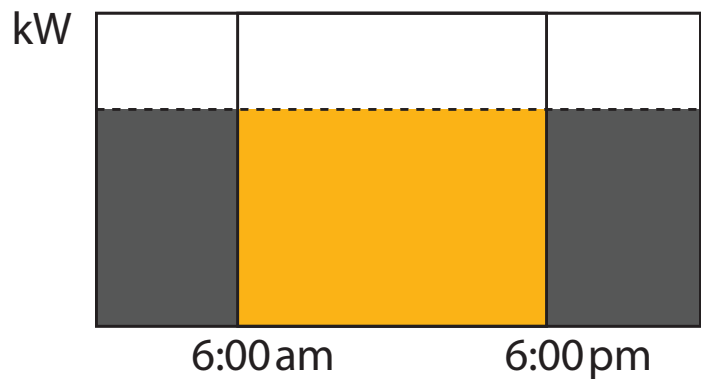
Manual control

Manual controls enable users to turn ON/OFF or reduce their lighting in response to visual needs. Incorporating flexibility provides a selection of light levels and can increase satisfaction while producing energy cost savings. The Lawrence Berkeley National Laboratory (LBNL) estimates average lighting energy savings of 31-36%. Manual control is ideally suited for personal workspaces such as private offices.



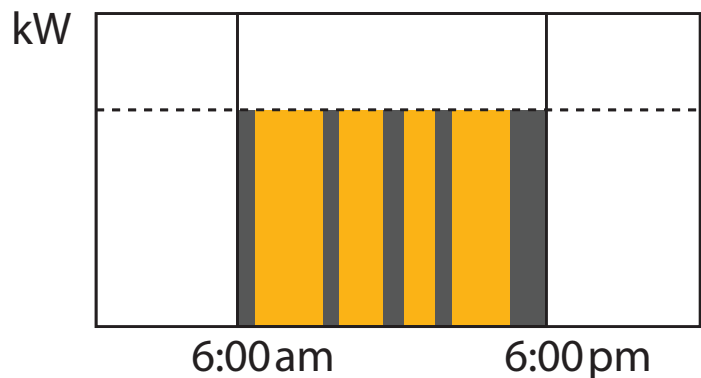
Time-based control

Time-based controls turn lighting ON/OFF or reduce it based on a time event, saving energy and maintenance costs by reducing lighting when it is not needed. This type of control is ideally suited to spaces that are consistently occupied on a predictable schedule or for site lighting applications. LBNL estimates average lighting energy savings of 24% using this strategy.



Occupancy sensing

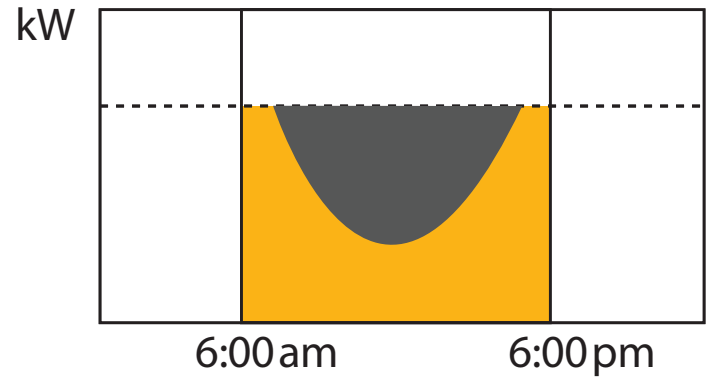
Occupancy sensing controls turn lighting OFF or reduce it in response to whether the space is occupied. LBNL estimates average lighting energy savings of 24%. The sensor may automatically turn the lights ON to full output or a reduced light level, and/or require manual-ON operation (vacancy sensing). This type of control is ideally suited to spaces that are intermittently occupied, such as private offices and classrooms.



Daylight harvesting

Daylight harvesting controls turn lighting OFF or reduce it based on the contribution of daylight to task lighting needs. LBNL estimates average lighting energy savings of 28%.

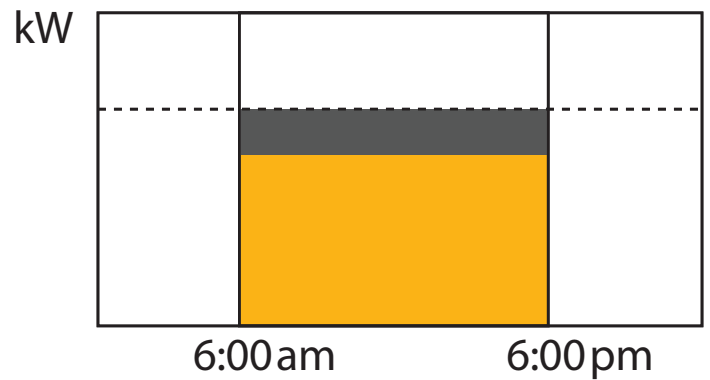
This type of control is ideally suited to spaces receiving consistent, ample daylight.



Task tuning

Task tuning control involves analyzing the local lighting needs in each space and dimming various areas based on need.

This type of strategy is well suited to older buildings designed to obsolete light level recommendations. LBNL estimates average lighting energy savings of 36%.



Combining strategies

These and other lighting control strategies such as demand response can be economically combined and layered within the same space; LBNL estimates average lighting energy savings of 38%.



Control Equipment

A variety of equipment and options is available to enact a single or combination of lighting control strategies.

Manual controls

Manual controls allow local adjustment of light levels. These include switches, wallbox dimmers, programmable integrated dimmers and wall stations interacting with a remote dimming panel.

Panel-based lighting controls

Panel-based lighting control systems feature a logic controller and power output device(s) to switch and /or dim lighting loads. The logic controller can switch or dim loads in response to schedules and devices such as wall stations, occupancy sensors and photosensors.

Panel-based systems may include contactors, controllable circuit breakers or relays housed within a metal enclosure. For dimming, various dimmers may be installed. These systems are commonly networked together to provide remote programming, monitoring and override control. Some offer onboard metering capability.

Occupancy-based controls

Occupancy sensors save energy by automatically reducing lighting when a space becomes unoccupied. The sensor may be manual-ON (vacancy sensor), auto-ON-to-50%, or auto-to-full-ON. It may switch or dim the load as an output.

The sensor may use passive-infrared (PIR) sensing technology, which detects the movement of heat; ultrasonic, which detects changes in reflected sound waves; acoustic, which detects sounds indicative of human occupancy; or a combination of these. The sensor may be mounted on the wall, ceiling or within a light fixture or workstation.

Another occupancy-based option is a simple timer switch, well suited to small spaces that are used briefly and intermittently, such as utility closets.

Photocontrols

Photocontrol systems are based on a light sensor that generates a control signal indicating the lights should be reduced to save energy in response to available daylight. The control system may be open-loop, which responds only to daylight, or closed-loop, which responds

to both electric and daylight to maintain a target light level. The sensor may be mounted on the wall, ceiling or within a light fixture or control device. Some occupancy-based controls offer a daylight hold-back feature, which prevents the lights from turning ON automatically when sufficient light levels are already present.

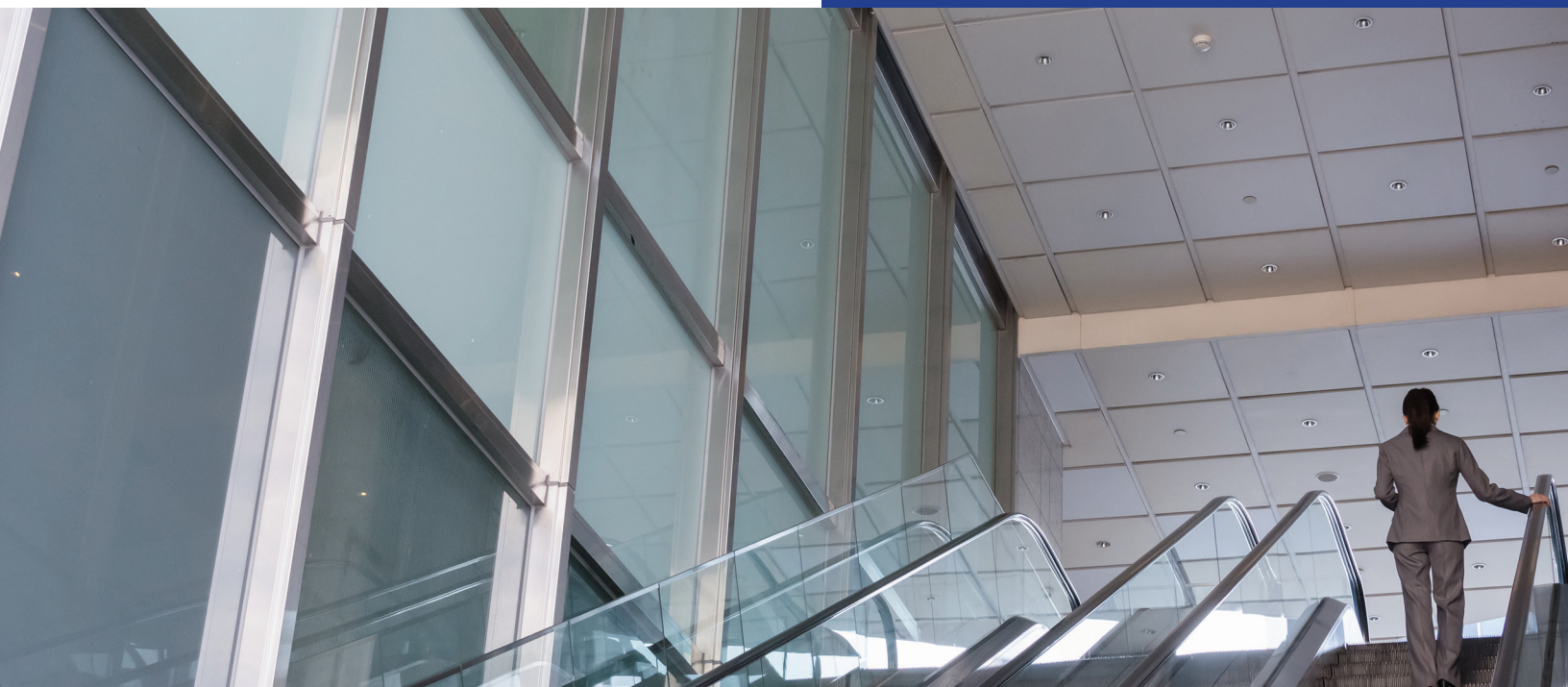
Dimmable ballasts and drivers

All lighting systems aside from incandescent lamps require a dimmable ballast or driver. This device may be designed to communicate with control devices using low- or line-voltage wiring. It may offer continuous dimming (smooth transitions between output levels expressed in imperceptible increments across a range) or step dimming (abrupt or smooth fade transitions between one or more output levels between OFF and full ON).

Putting it together

Lighting controls may be installed as standalone devices or systems used to control lighting single interior and exterior lighting loads, rooms or whole buildings or even campuses. Devices may be communicate via low- or line-voltage wiring to interact as systems.

Tying the system to a single control point (e.g., a PC loaded with graphical software) enables centralized commands and scheduling as well as the potential for generating information that can be used for measurement, verification and analysis.



Get control of your lighting.

A wide range of advanced lighting control options is available to optimize the performance and energy efficiency of both new and existing building lighting systems. These options can generate up to 38% energy savings while turning your lighting into a managed building asset either as a standalone system or as part of an integrated building management system. Whether upgrading to next-generation fluorescent and HID or LED, advanced lighting controls are an ideal part of the solution to high energy costs.

Learn more.

The Lighting Controls Association, administered by the National Electrical Manufacturers Association, provides public education about lighting control technology and application. Visit us online to access hundreds of articles, whitepapers and education courses providing detailed information.

www.LightingControlsAssociation.org



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