Lighting Control Best Practice Guide for Office Buildings

With nearly 20 years of experience developing and producing lighting controls, The Watt Stopper has helped thousands of organizations implement energy saving lighting control systems. For each facility, there is an optimal lighting control solution, one that meets the owner's, facility manager's, and occupants' needs, and which can be most effectively operated and maintained.

Toward achieving this goal, The Watt Stopper offers comprehensive lighting control products encompassing several product lines: occupancy sensors, lighting control panels, daylighting controls, HID controls, and products to promote integrated control among multiple building systems. With these product resources and unsurpassed technical expertise, The Watt Stopper helps ensure that the right combination of products are used to satisfy the control needs of today's offices and their occupants.

This Best Practice publication focuses on design, specification, and installation guidance for lighting controls in commercial office buildings. It features applications that illustrate the best control practices for a variety of spaces. Each best practice considers the space use characteristics, occupant needs, lighting operation costs, energy savings and compliance with the requirements of ASHRAE 90.1-2001 and 1999. With this resource, lighting control design professionals will save time and effort spent on projects.

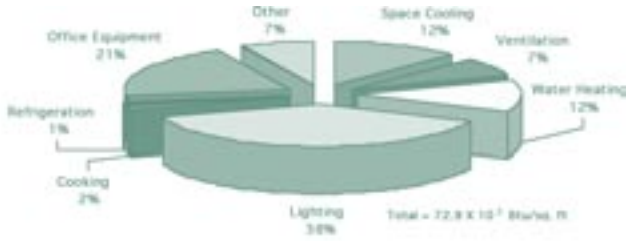
Each Best Practice includes:

- Description of application
- List of control needs
- Product solution
- Design considerations
- A lighting plan sketch
- Installation notes
- Wiring and installation diagrams
- Equipment schedule

the Watt Stopper®

Value of Lighting Control for Office Buildings

Energy codes and Green Building design trends share one common goal – saving energy. Lighting usage in today's office buildings accounts for approximately 38% of total energy use. As of 1999 there were 738,000 office buildings in the United States using approximately 18.7 kWh/ft^2 of electricity. This equates to spending approximately \$1.30/ft^2 on electricity, and \$0.50/ft^2 on lighting energy use.



Lighting controls can reduce energy costs significantly. One research project estimated the expected energy cost savings from the use of occupancy sensors in private offices, conference rooms, and restrooms to be approximately 26%, 27%, and 40%, respectively*. These savings are realized simply by turning lighting off when the rooms are unoccupied and lighting is not needed. In addition, daylighting controls can further reduce lighting energy use by switching or dimming electric lighting when sufficient daylight is present.

Office Building Space Usage

Space usage in an office building varies depending on the space type, occupant patterns, and type of work being done. Private offices, conference rooms, and restrooms are generally better suited for occupancy based control because of the unpredictable and varied occupancy of these spaces. Other areas, such as open offices and hallways, where schedules are more predictable, may be better suited for time based control.

Space ownership plays an equally important role in the design and selection of lighting controls. In areas where ownership is strongest, manual override controls might be desirable. Common areas, where no single occupant or group of occupants has ownership, may benefit more with automated control.

* IES paper JIES Summer 2001 "The Effects of Changing Occupancy Sensor Time-out Setting on Energy Savings, Lamp Cycling and Maintenance Costs", Maniccia, et. al.

Influential Factors for Lighting Control

Energy Code Requirements

The U.S. Department of Energy has ruled that every state must adopt an energy standard at least as stringent as ASHRAE 90.1-1999 by July 15, 2004. A major component of this standard requires automatic lighting shut off control for buildings greater than 5000 square feet. This means that occupancy sensing, time scheduling or signalling from building automation systems must be used to automatically turn lights off. In addition are requirements for controlling individual spaces, location of space controls and control of exterior lighting. A brief overview of the ASHRAE lighting control requirements is provided on pages 56-57 of this guide.

Green Building Design

The U.S. Green Buildings Council's LEED program encourages architects to use a holistic building design approach. This includes optimizing daylight penetration and views to the exterior and designing well-integrated systems that maximize energy savings. In a Green Building design, lighting control is important for three primary reasons. First, they enable compliance with ASHRAE 90.1-1999, which is a LEED prerequisite. Second, LEED encourages daylighting design, thereby allowing energy savings by dimming or turning off electric lights when they're not needed. Third, electrical energy usage can be further reduced by integrating the operation of lighting and mechanical systems.

Safety and Security

Providing lighting when and where needed is a key factor of safety and security. Proper design and use of lighting controls is an integral part of addressing these concerns. Location and accessibility to manual controls, adequate night lighting, timely exterior lighting control, reliable system operation as well as other lighting control elements, all play a part in ensuring safety and security in commercial office buildings.

Energy Efficiency

With rising energy costs, making commercial office facilities operate as efficiently as possible is of increasing importance. Good lighting control design not only reduces costs, but also supports our responsibility toward preserving non-renewable resources that are used to create energy.