



Lighting Controls Best Practices for Open Office

Acuity Brands has been helping to design open office environments and other spaces for many years, and we want to share our best practices that we learned over time. Building owners and tenants need to have a captivating space that is designed with the tasks and comfort of the occupants in mind, while offering maximum flexibility for the inevitable change in tenants or space reconfiguration.

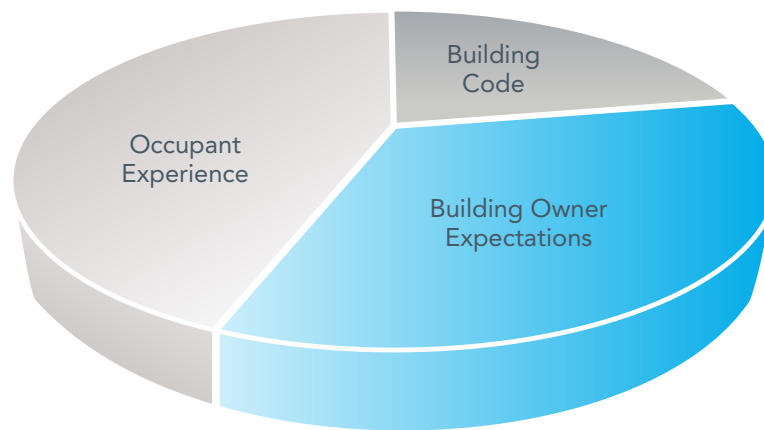
The considerations below illustrate the requirements of an open office and touch on some more subtle nuances that may be overlooked, if not part of a standard checklist for a quality project.

Common Code Requirements

In most building energy code requirements, the following lighting control strategies are needed to aid in achieving compliance for an open office. It is preferable to have a lighting controls solution that has all the capabilities listed below:

- Manual control, including dimming
- Auto-off by occupancy or Time Clock
- Photocell control where natural light is present
- Zoning of large open office spaces (when required by code)
- Receptacle control (when required by code)

Open Office



What are the Key Code Requirements?

Most spaces will require occupancy sensing and spaces with windows may require daylight control. With larger areas, the ability to zone may be required, including provisions for dimming lights in neighboring zones when unoccupied, while keeping occupied zones at proper levels. Augmenting natural light with artificial is important to provide adequate light levels for task-oriented work. Naturally, customers will utilize manual controls to reduce light levels, but low-end trimming can limit the reduction to 50%.

Building Owner and Occupant Expectations

A building owner expects a return on investment over time through efficiency and productive employees. Employees are productive in a space where they are comfortable, so it is important to balance customization with proper light levels to ensure proper light levels are established.

Often, there is a tradeoff between what code requires and what the building owner and occupant want. There is a way to meet the needs of both. However, it requires driving value into the space so that an occupant feels appreciated. Lighting controls offers the ability to personalize the open office space to the needs of different work groups through the use of zoning that can be done through a mobile app or software. By adding value to their space, you increase their feeling of self-worth, which results in more productive employees.

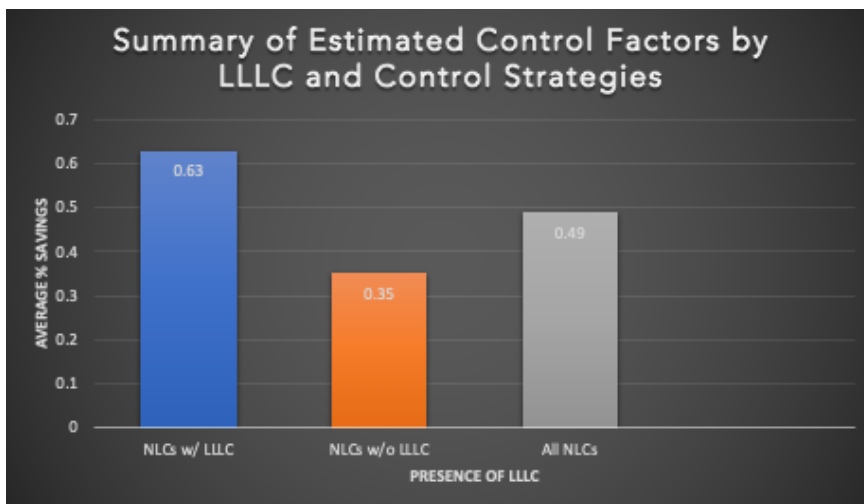
According to a recent DesignLights Consortium® (DLC) report¹, the average energy savings from all networked lighting control systems is 49%. The DLC report states that an open office has an average savings of 50%, which is on par with the office building type average savings.



Customization – Through the use of zoning, different customization can be applied to a variety of areas or departments that appeal to those in the space. Modern control systems can utilize software solutions to zone and re-zone spaces easily, while making adjustments to trim settings, allowing the users of the space to have simple switch controls for adjusting to their needs.

Confidence – At its core, the occupant would like the lights to turn on at a comfortable and consistent level; this will avoid complaints and maintenance calls. They want to control the space to maximize their comfort, have conveniently located wall switches, and have control devices and sensors that respond reliably to manual and automatic commands. Also, occupants want to navigate corridors with sufficient lighting that provides clear and safe-feeling wayfinding. Occupant confidence translates to less waste and more productivity.

Return on Investment – A space still needs to operate in a way to maximize savings, which is accomplished by common, intelligent controls. Light fixtures with embedded controls (Luminaire Level Lighting Controls, LLLC) are a great way to see a return on investment more quickly. According to a 2020 report by the Design Lights Consortium, lighting control systems with LLLC achieve 14%-28% higher savings than non-LLLC systems. And by combining both sensor and output control capability – a common feature of LLLC systems – they are often less expensive initially than systems without, due to reduced installation cost while simplifying design practices with the elimination of discrete sensors.



63% average savings with LLLC, 35% average savings without.

Budget – “Savings over time” is a phrase that commonly characterizes lighting controls; however, by creating an atmosphere that is welcoming to employees, a business realizes an immediate return on its investment in indirect ways. And one would think that a “welcoming” space would be expensive to create, but advancements in lighting control technology have substantially reduced total system costs. A great way to save on the budget is to consider wireless lighting controls. Wireless technology has rapidly improved with range and ease of use, and they are easier to install. Systems are also more scalable, so a system can be installed as a stand-alone implementation while still delivering core necessities to improving employees’ productivity. And it can be affordably upgraded to a networked solution, often with little extra hardware and faster ROI potential.

Design Guidance

When designing considerations should be given to the following items:

- Size of the office space
- Type of office (cubicle or open plan)
- Number of workspaces in the office space

At a minimum, your open office design should include:

- Occupancy sensors
- Photocells (if windows are present)
- A relay to control the fixture (unless using luminaire-level lighting controls)
- A relay to control receptacles (where or when applicable)



Additional Considerations:

- **Fixture** – embedded controls – clean aesthetics, reliable, less devices to install. Embedded sensors avoid ceiling clutter.
- **Digital communication** – controls that utilize digital communication have several advantages over traditional, analog controls. They offer more granularity in lighting output levels and provide bi-directional communication with drivers, exposing driver data for analytics and deeper integration possibilities.

Specification Guidance

These are specification items that enhance an open office, adding to what code requires without going over the budget.

Requirement	Reason	Example Language
Instantaneous response	Slow communication between devices can cause distractions and impact occupant productivity.	Lighting control commands via switch, occupancy, and photocell broadcasts shall result in instantaneous, zone-wide, uniform responses.
Low-profile or embedded controls	Enhances the space aesthetics by limiting visual ceiling clutter, reduces initial installation cost.	Ceiling sensors shall support recessed installation or inclusion on luminaires in the space. Where luminaire inclusion is not available, the exposed profile of all ceiling sensors shall not extend further than 1" or 25mm below the ceiling.
Software supporting remote or mobile app configuration of the space	Easier adjustment of settings by the occupant.	Remote programming of devices via personal computer or mobile application shall be supported.
Custom labeling of wall switch buttons	Offers personalized control for the occupant or building owner to make controls easy to identify.	Devices with mechanical push-buttons shall be made available with custom button labeling. Graphic wall switches shall support labeling of digital sliders and scene buttons.
Dual technology occupancy sensors	Avoids mistaken lights-off situations.	Occupancy sensors installed in all private offices and personal spaces shall support an additional, "dual" sensing technology to reduce erroneous offs.
Digital communication	Allows for data to be exchanged between devices, which increases customization and allows for future upgradeability.	Lighting controls shall support two-way, digital communication. Lighting controls that utilize analog communication shall not be accepted.

Other Specification Considerations

To accelerate ROI, specify networked solution capabilities like the below.

Requirement	Reason	Example Language
Energy analysis software	To visualize and understand the reasons behind energy savings and to prove savings for energy initiatives.	Software shall include intuitive graphical screens in order to facilitate simple viewing of system energy performance.
Building automation integration	Lighting and HVAC are a significant portion of a building's energy spend and are the biggest sources of comfort complaints. Building automation integration offers many benefits, such as improved occupant comfort, energy efficiency gains, maintenance and serviceability, improved data on the usage of the building, and improved building value.	System shall interface with third party building management systems (BMS) to support two-way communication using industry standard BACnet/IP protocol, BACnet MS/TP protocol, or RESTful API.
Spatial analytics	Building owners can see how the building is being used and makes changes needed, investing in frequently used spaces and renovating or repurposing unused spaces.	Software shall allow for representation of all occupied and unoccupied spaces via transparent zones placed on a two-dimensional, graphic floorplan. System shall support trending of occupancy information, exportable through a CSV file.



Conclusion

For an open office, a natural balance needs to be set between the occupant's comfort and their tasks, while providing flexibility for inevitable reconfigurations. Driving value through focusing on the occupant and their experience, adhering to the building owner's asks for the building, and referencing code as a tertiary item on your checklist will create a recipe for success in your open office projects.

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References

¹ Wen, Y., Frey, M., Luntz, B., Springfield, A., Kisch, T., & Kehmeier, E. (2020, September 24). Energy Savings from Networked Lighting Control (NLC) Systems with and without LLLC. Retrieved November 16, 2020, from <https://www.designlights.org/lighting-controls/reports-tools-resources/>