Innovative Light Management Solutions

Commercial Buildings – Light Greener, Light Better®

LUTRON®

save energy with Lutron™ ®

Each year Lutron customers save over 9.2 billion kWh of electricity, which is equivalent to almost £1 billion, enough to light 4.5 million homes for a year and as much CO_2 as 2 million acres of trees absorb in one year. [1]

Compared to standard light switches, Lutron light management solutions save energy while creating inviting, comfortable, and productive spaces – making light greener and better.

Since 1961, Lutron has led the effort to create elegant lighting solutions that enhance the spaces where we work and live. From the beginning, we have dedicated ourselves to developing and supporting products that are renowned not just for their reliability and their innovative style and function, but also for their energy saving benefits.

[1] Massachusetts Institute of Technology, U.S. Department of Energy, and Lutron sales data.
[2,3,4,5,6,7] Please refer to Appendix on pages 22 and 23 for a list of references.

DIMMING: A BETTER WAY TO GET MORE WATTS

negawatt (n) – a saved watt[2]

We get more electricity in one of two ways: by generating new electricity or finding ways to use less of the electricity we already have. Generating new electricity – more watts – requires building more power-generating capacity. Building that capacity is expensive. Using less electricity – more negawatts – requires making smart investments in building technology to control and manage electricity use. And, it's much cheaper.

One of the best ways to generate more electricity – as more negawatts – is dimming, which reduces the power consumption of a lighting load.[3]

Power source	Estimated cost compared to dimming
Dimmer negawatts [3]	**–**
Coal [4]	4.0 times more costly
Wind [5]	4.2 times more costly
Nuclear [6]	8.6 times more costly
Solar [7]	22.0 times more costly

CONTENTS

LUTRON'S LIGHT CONTROL SOLUTIONS HAVE WORLD-WIDE BENEFITS

Lutron solutions do more than just control the light in a space. With the right design strategies, they can improve productivity, save substantial amounts of energy, and reduce operating costs.

IMPROVE THE TRIPLE BOTTOM LINE PEOPLE, PLANET, AND PROFITS.[1]

PEOPLE

Studies show that proper lighting is beneficial for employees working in an office space. The improved comfort and workplace satisfaction brought by daylighting, task-appropriate electric lighting, and individual lighting control can result in reduced absenteeism and increased productivity and workplace satisfaction.[2, 3, 4]

PLANET

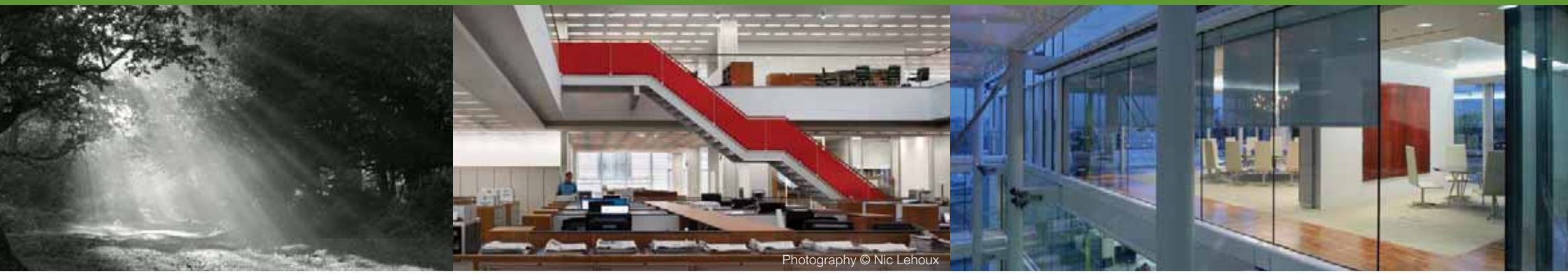
Lutron lighting control solutions can save significant amounts of energy when the appropriate strategies are applied. Corporations and universities using Lutron systems have reported reduced lighting energy usage of 60% or more.[5] These major reductions in energy use can shrink a building's carbon footprint, lower greenhouse gas emissions, and reduce nighttime light pollution.

PROFITS

Lutron light control solutions can improve the bottom line by increasing employee productivity, cutting lighting energy costs significantly, and reducing the labour, maintenance and operating costs associated with ongoing facility management activities, such as re-lamping.[6]

[1,2,3,4,5,6] Please refer to Appendix on pages 22 and 23 for a list of references.

HELP YOUR BOTTOM LINE AND THE PLANET



ANNUAL ELECTRICITY USE IN OFFICE BUILDINGS

In the UK, lighting accounts for more electricity usage in commercial buildings than any other connected system.[1] Effective lighting control is a critical component of an energy-saving lighting design because it can dramatically reduce lighting energy usage over baseline usage.

Combining strategies like dimming, switching, daylight sensing, daylighting, occupancy sensing, individual control, scheduling, and limiting maximum output can have a significant impact on the amount of electricity used by the lighting in a commercial building.

Lutron customers report reducing the amount of electricity used by the lights in their facilities by as much as 75%.[2]

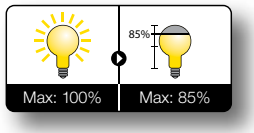
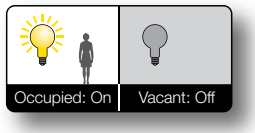
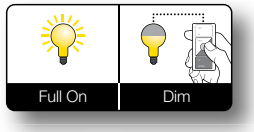
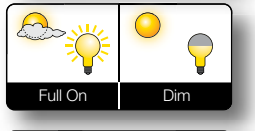
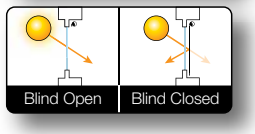
[1, 2] Please refer to Appendix on pages 22 and 23 for a list of references.

HOW DO LUTRON SOLUTIONS SAVE ENERGY?


The White House

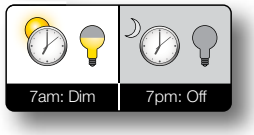

U.S Census Bureau, Public Information Office

Lutron offers a range of energy savings solutions. Our products and systems are easily installed in either new construction or existing buildings and expandable from a single room to an entire building or campus. These expandable solutions provide a range of energy saving strategies.

	Energy-savings strategy	Estimated energy savings
	**HIGH-END TRIM** Sets the maximum light level based on customer requirements in each space.	20% Lighting
	**OCCUPANCY/VACANCY SENSING** Turns lights on when occupants are in a space and off when people vacate the space[1].	15% Lighting
	**PERSONAL LIGHT CONTROL** Gives occupants the ability to set the light level.	15% Lighting
	**DAYLIGHT HARVESTING** Dims electric lights when daylight is available to light the space.	10% Lighting
	**CONTROLLABLE WINDOW BLINDS** Moves blinds to reduce glare and solar heat gain.	10% HVAC
	Typical energy savings	**60% Lighting, 10% HVAC**

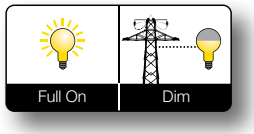
U.S Federal Reserve

Additional strategies used



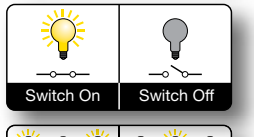
SCHEDULING

Provides scheduled changes in light levels based on time of day.[2].



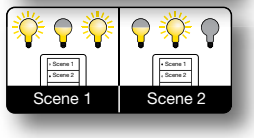
DEMAND RESPONSE

Automatically reduces lighting loads during peak electricity usage times.



SWITCHING

Automatically turns lights off during the day to conserve energy.

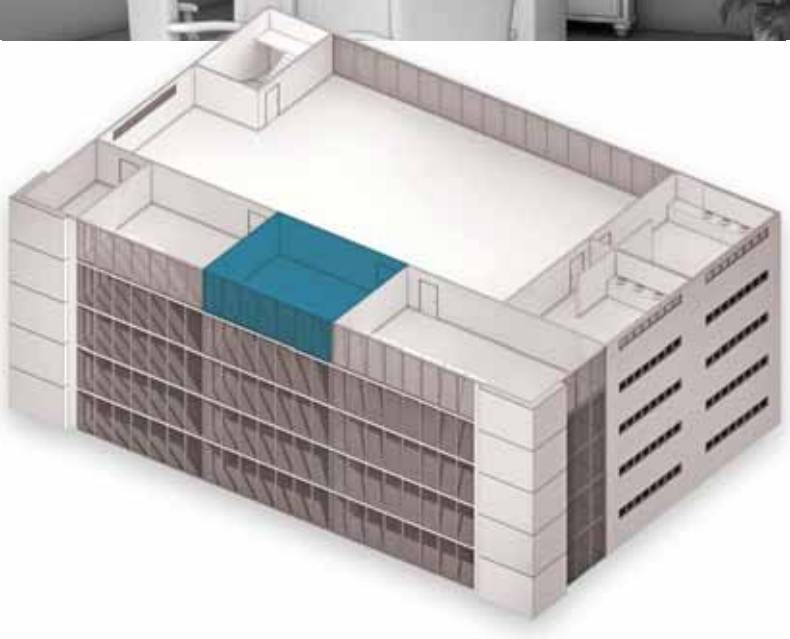


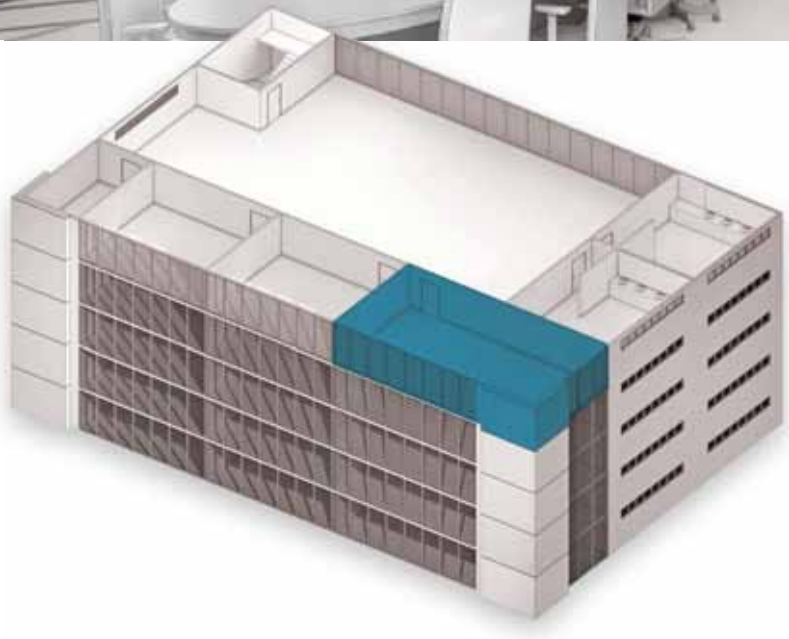
PRESET SCENES

Users can select pre-programmed light scenes at the touch of a button.

[1] Occupancy or vacancy sensing can save up to 60% energy depending on the application and use.
[2] When scheduling is used without occupancy or vacancy sensing a 15% energy savings can be expected.

EXPANDABLE LIGHT MANAGEMENT SOLUTIONS –





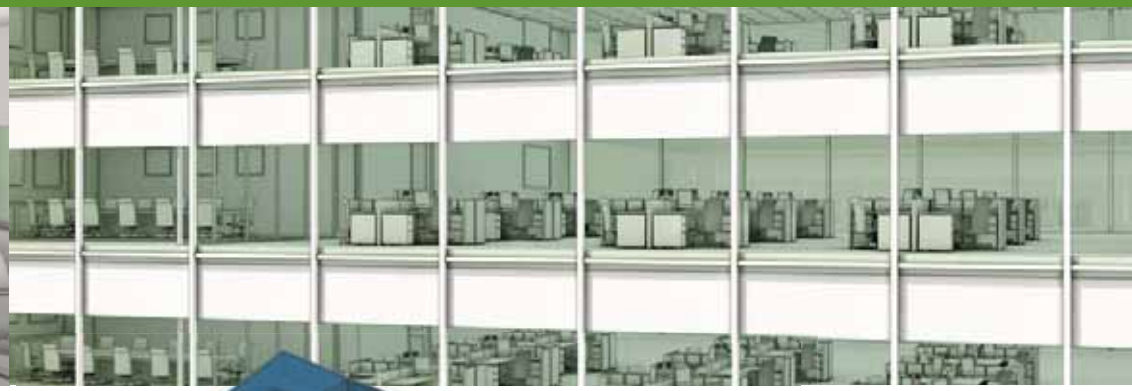
START WITH STANDALONE SOLUTIONS

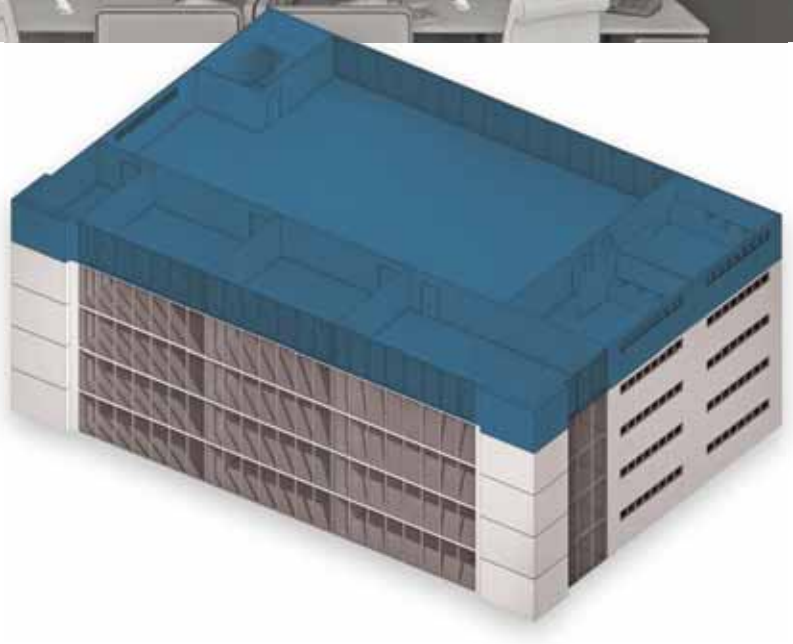
For single-room applications, Lutron offers simple retrofit lighting controls to improve employee comfort and productivity, while saving energy. Standalone means that these solutions operate independent of one another. Multiple rooms containing these controls cannot be tied together and operated as a single system. However, these solutions are the simplest way to start saving energy today.

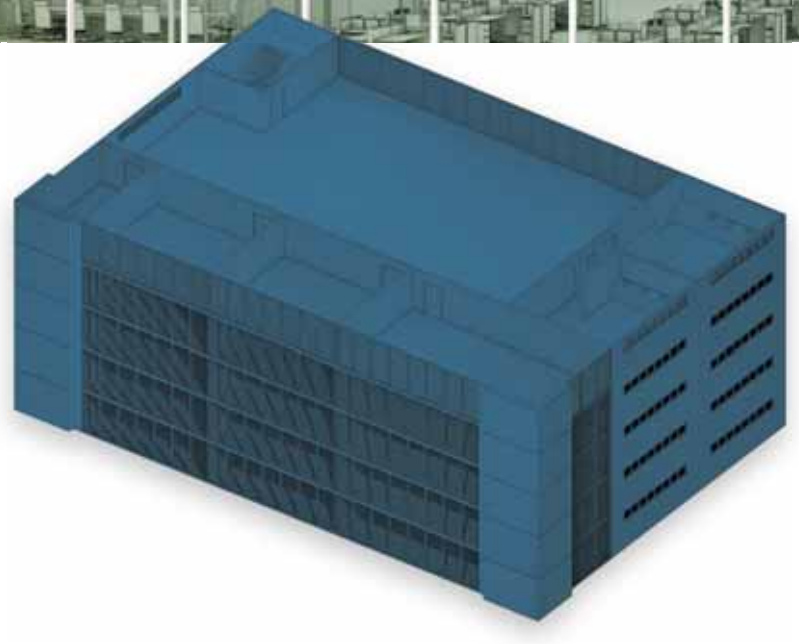
UPGRADE TO SINGLE-ROOM MINI-SYSTEMS

For more advanced and expandable light and blind control, use Lutron QS components to build wired or wireless mini-systems. These mini-systems can be easily expanded at any time to control multiple rooms or larger spaces and are suitable for both new construction and retrofit solutions.

FROM A SINGLE-ROOM TO AN ENTIRE BUILDING







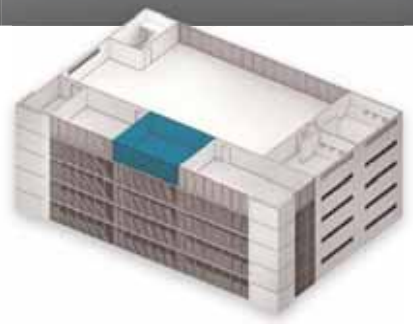
TIE MULTIPLE ROOMS TOGETHER

QS devices can easily be linked across multiple rooms to provide significant yearly savings from ongoing reduced energy costs, increased lamp life, and lower maintenance costs. Wired and wireless devices make installation easy, and this highly expandable solution can be easily reconfigured, with no need for rewiring.

ADD QUANTUM® TO CONTROL AN ENTIRE BUILDING OR CAMPUS

Quantum manages both daylight and electric light by integrating light and blind control devices. With Quantum, facility managers can maximise energy efficiency, comfort, and productivity, as well as configure, monitor, analyse, and report on the light in an entire building – all from a central location.

START WITH STANDALONE SOLUTIONS



The Radio Powr Savr™ wireless occupancy sensor and Rania® wireless RF switch combination offers a truly retrofit energy-saving solution that installs in minutes and is guaranteed to save you time and money. The Clear Connect™ RF Technology ensures reliable wireless communication. As an alternative, Lyneo® 0–10 V dims 0–10 V fluorescent zones, offering intuitive and precise dimming.

STANDALONE SOLUTION COMPONENTS

A **Radio Powr Savr™ occupancy/vacancy sensor**

easy-install RF occupancy sensor requires no wires and saves energy by automatically turning lights on and off based on space occupancy; features include a 10-year battery life, cutting edge XCT™ technology for small motion detection, and the ability to link up to 3 sensors for added coverage

B **Rania® wireless RF switch**

RF switch requires no neutral, making it ideal for retrofit applications; link up to 10 switches to the Radio Powr Savr sensors to control additional zones of light in a space

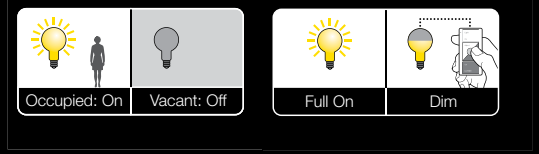
or

B **Lyneo® 0–10 V dimmer**

simple, sleek dimmer allows you to dim 0–10 V fluorescent lights to create the perfect visual environment and save energy

THESE SOLUTIONS CAN YIELD

Energy-saving strategy	Estimated energy savings
Occupancy/vacancy sensing or scheduling[2]	15% Lighting
Personal light control[3]	10% Lighting



BENEFITS

Radio Powr Savr with Rania wireless RF switch

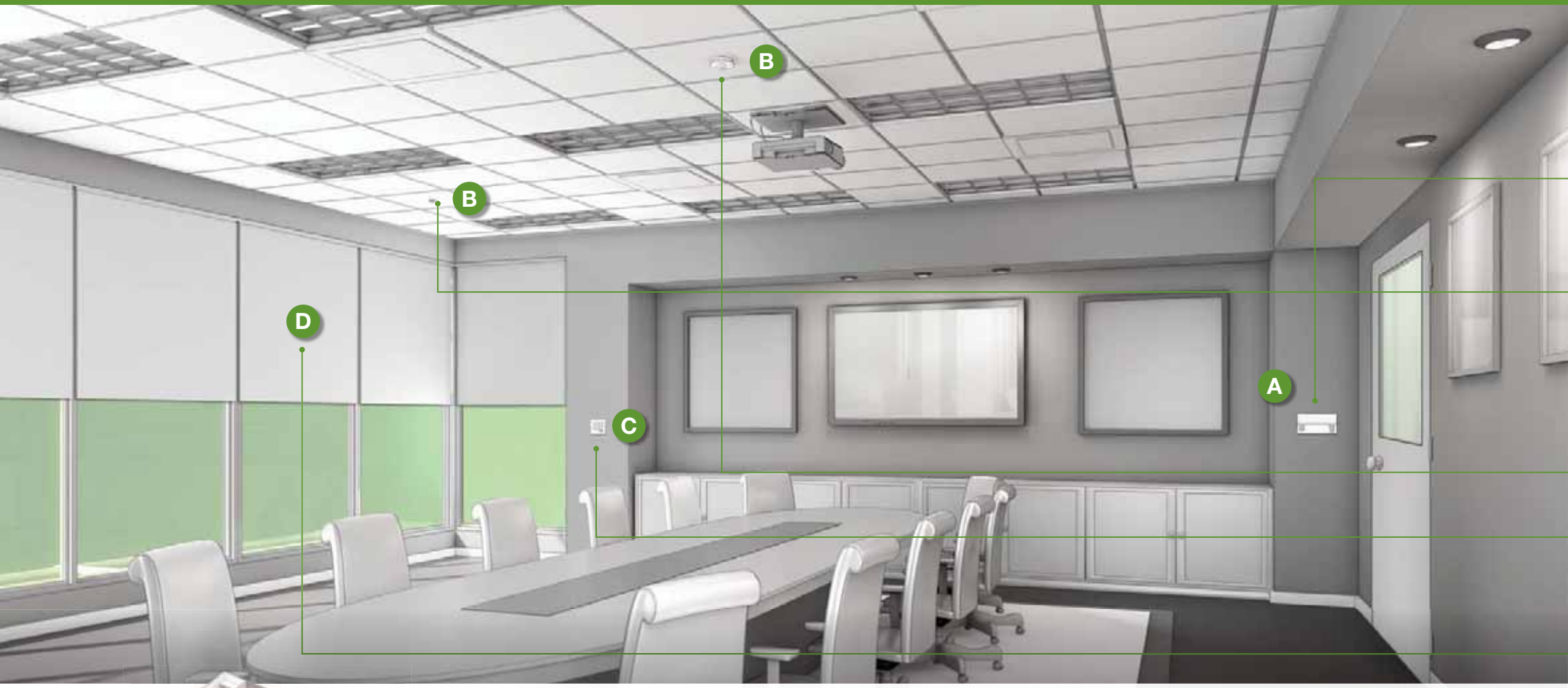
- Installs in minutes with no wires to pull
- Saves energy with occupancy or vacancy option
- Retrofit solution with no neutral required
- Innovative technology with fine motion detection

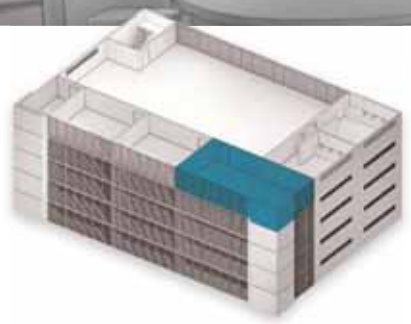
Lyneo 0-10V dimmer

- intuitive control of 0–10 V dimmable fluorescent ballasts
- enhanced aesthetics and ergonomics for user friendly personal light control
- dim for additional energy savings

[2, 3] Please refer to Appendix on pages 22 and 23 for a list of references.

UPGRADE TO SINGLE-ROOM MINI-SYSTEMS





For more advanced, expandable light and blind control solutions, use Lutron QS components to build your system. Start with the GRAFIK Eye® QS in an office or conference room and add sensors, blinds, and keypads to meet the aesthetic and functional needs of the space.

SINGLE-ROOM SOLUTION COMPONENTS

A **GRAFIK Eye® QS wireless**

customisable preset lighting control that allows you to adjust the lights and blinds for any task or activity, and save energy at the touch of a button; features include a built-in timeclock, direct wired or wireless connections to Lutron blinds, sensors, and keypads, and simple integration with 3rd party devices

B **Radio Powr Savr™ wireless sensors**

the Radio Powr Savr family of wireless occupancy/vacancy sensors and daylight sensors are an easy-to-install solution for saving energy. The sensors turn off or dim lights based on room occupancy or available daylight.

C **seeTouch® QS wallstations**

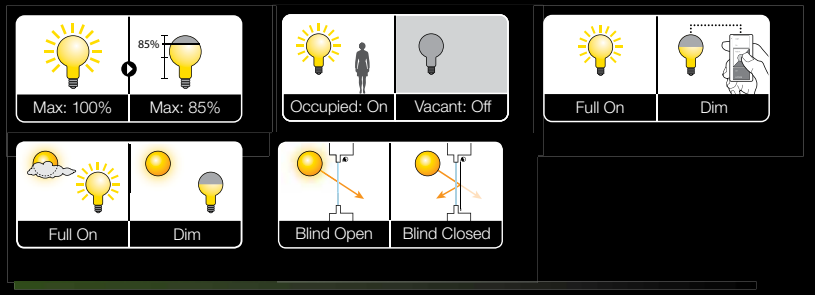
customisable wallstations allow you to adjust lights and blinds to achieve the optimal light level for any task at the touch of a button

D **Sivoia™ QS blinds**

ultra-quiet roller blinds, curtain tracks, and skylight blinds provide precise and elegant control of daylight to reduce sun glare and heat gain, increasing your comfort, productivity, and energy savings

THESE SOLUTIONS CAN YIELD

Energy-saving strategy	Estimated energy savings
High-end trim[1]	20% Lighting
Occupancy/vacancy sensing or scheduling[2]	15% Lighting
Personal light control[3]	10% Lighting
Daylight harvesting[4]	10% Lighting
Controllable window blinds[5]	10% HVAC

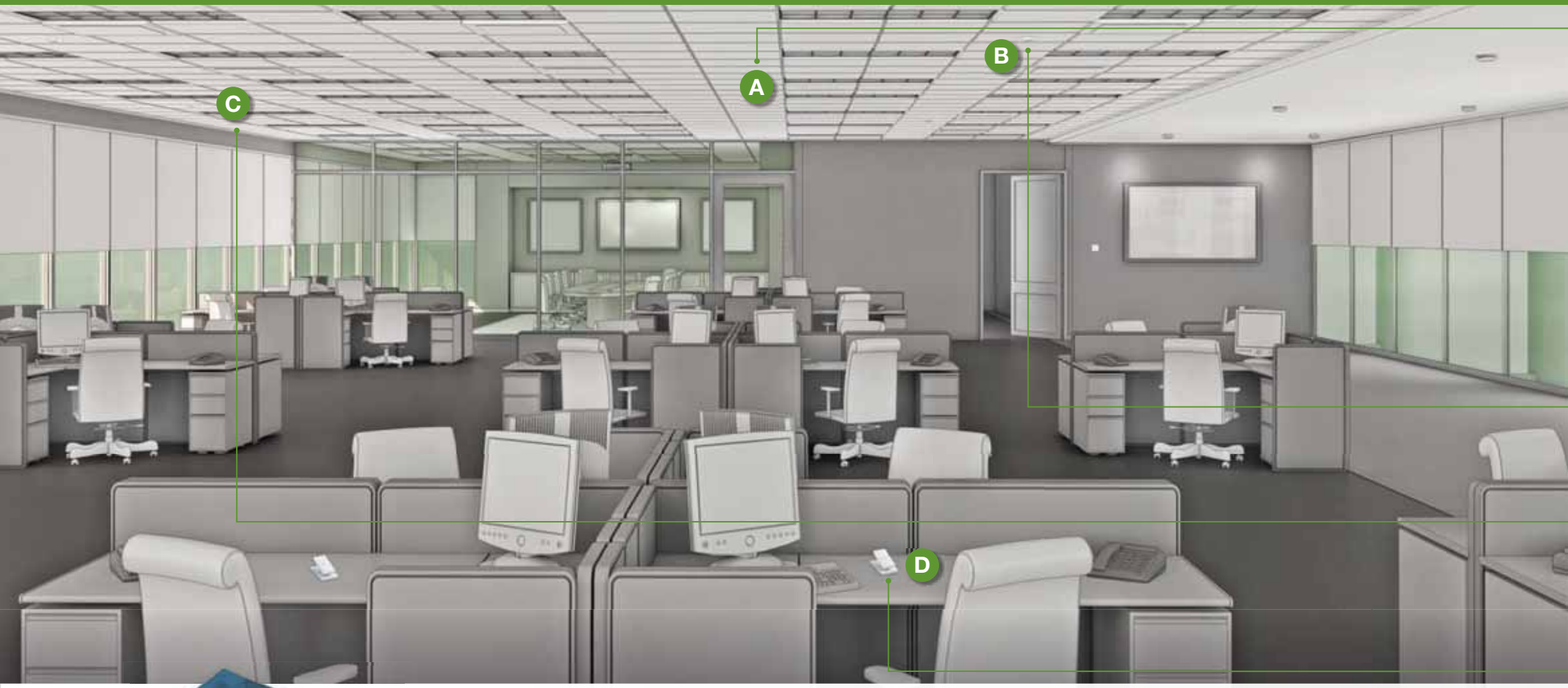


BENEFITS

- Easy to design and integrate
- Easy to reconfigure and program
- Energy saving with dimming and occupancy sensing
- Scheduling made easy with built-in time clock
- Wireless capability for scalability
- Ultra quiet blind control

[1, 2, 3, 4, 5] Please refer to Appendix on pages 22 and 23 for a list of references.

TIE MULTIPLE ROOMS TOGETHER



This highly expandable and flexible solution integrates daylight and occupancy sensors for significant energy savings and can be easily designed, installed, and reconfigured to meet the changing needs of any space.

MULTIPLE ROOM SOLUTION COMPONENTS

A **Energi Savr Node™**

a modular approach to light control systems that allows infinite flexibility for designing and reconfiguring any space; this simple, programmable solution connects DALI ballasts (by other manufacturers), 0-10 V ballasts, or switching fixtures to wired or wireless sensors and controls for energy management.

B **Radio Powr Savr™ wireless occupancy/vacancy sensors**

save energy and add convenience by automatically turning lights on and off based on space occupancy.

C **Radio Powr Savr™ wireless daylight sensors**

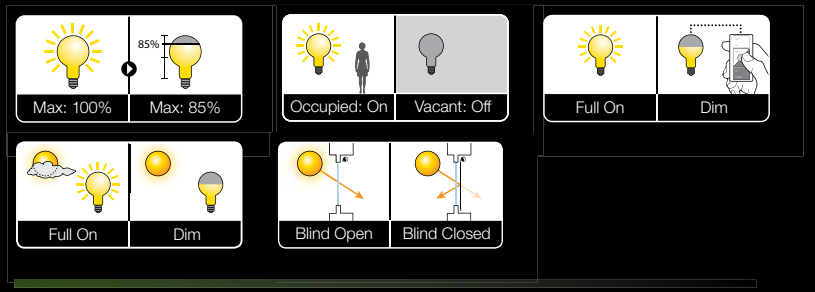
save energy by automatically adjusting light levels based on the amount of daylight entering a space.

D **Pico Wireless Controller**

adjust light level from anywhere in your space for enhanced productivity, comfort, and convenience. (Available as free standing, wall-mounted, car-visor clip, or on a table stand)

THESE SOLUTIONS CAN YIELD

Energy-saving strategy	Estimated energy savings
High-end trim[1]	20% Lighting
Occupancy/vacancy sensing or scheduling[2]	15% Lighting
Personal light control[3]	10% Lighting
Daylight harvesting[4]	10% Lighting
Controllable window blinds[5]	10% HVAC

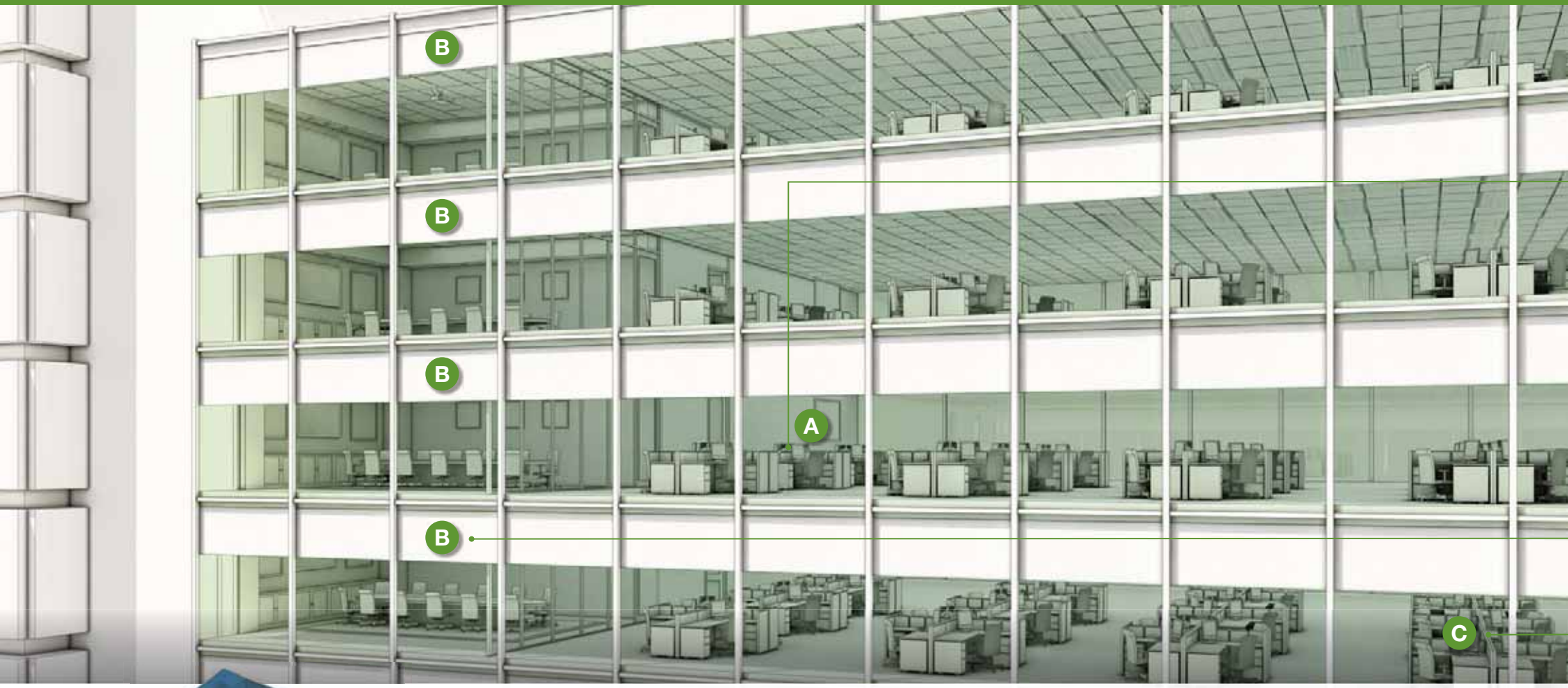


BENEFITS

- Easy to install with plug and play features
- Modern technology with simple portable software
- Expandable and versatile
- Automatic ballast replacement (DALI versions)
- Energy saving with dimming and sensing
- Integrated control of Sivoia QS Ultra quiet blinds

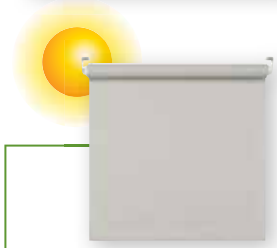
[1, 2, 3, 4, 5] Please refer to Appendix on pages 22 and 23 for a list of references.

ADD QUANTUM® TO CONTROL AN ENTIRE BUILDING OR CAMPUS



By adding Quantum®, QS systems can be easily scaled to control multiple floors, an entire building, or an entire campus. Facility managers can configure, control, manage, monitor, and report on all the lighting in a building from a central location. By maximising the use of daylight and minimising waste, Quantum allows you to save significant amounts of energy and protect the planet.

ENTIRE BUILDING SOLUTION COMPONENTS



A **Green Glance™**
demonstrate your company's commitment to energy efficiency with this energy-saving display software; exhibit a real-time snapshot and historic view of the energy savings delivered by Quantum® in terms of electricity saved, CO_2 not emitted, or tons of coal preserved

B **Hyperion solar-adaptive shading**
a key feature in Quantum that maps the movement of the sun relative to the building for every day of the year; Hyperion creates a blind adjustment schedule to effectively manage daylight entering each façade to prevent heat and glare from entering a workspace and maximise effective daylighting, comfort, and productivity

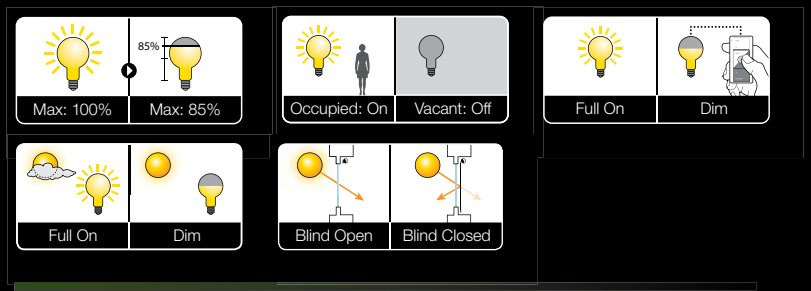
C **Q-Manager™ server**
dedicated computer that contains all the Quantum data and software to simplify centralised control, reporting, and trending

C **Q-Admin™ software**
powerful Quantum software that allows facility managers to control lights and blinds, set timeclocks, and configure, monitor, analyse, and report on the light in an entire building to maximise energy efficiency, occupant comfort, and productivity

C **IntelliDemand™**
a feature of the Q-Admin software that allows facility managers to easily adjust lighting usage throughout a building or a particular space by a specific percentage to meet the increasing demands for energy conservation

THESE SOLUTIONS CAN YIELD

Energy-saving strategy	Estimated energy savings
High-end trim[1]	30% Lighting
Occupancy/vacancy sensing or scheduling[2]	15% Lighting
Personal light control[3]	10% Lighting
Daylight harvesting[4]	10% Lighting
Controllable window blinds[5]	10% HVAC

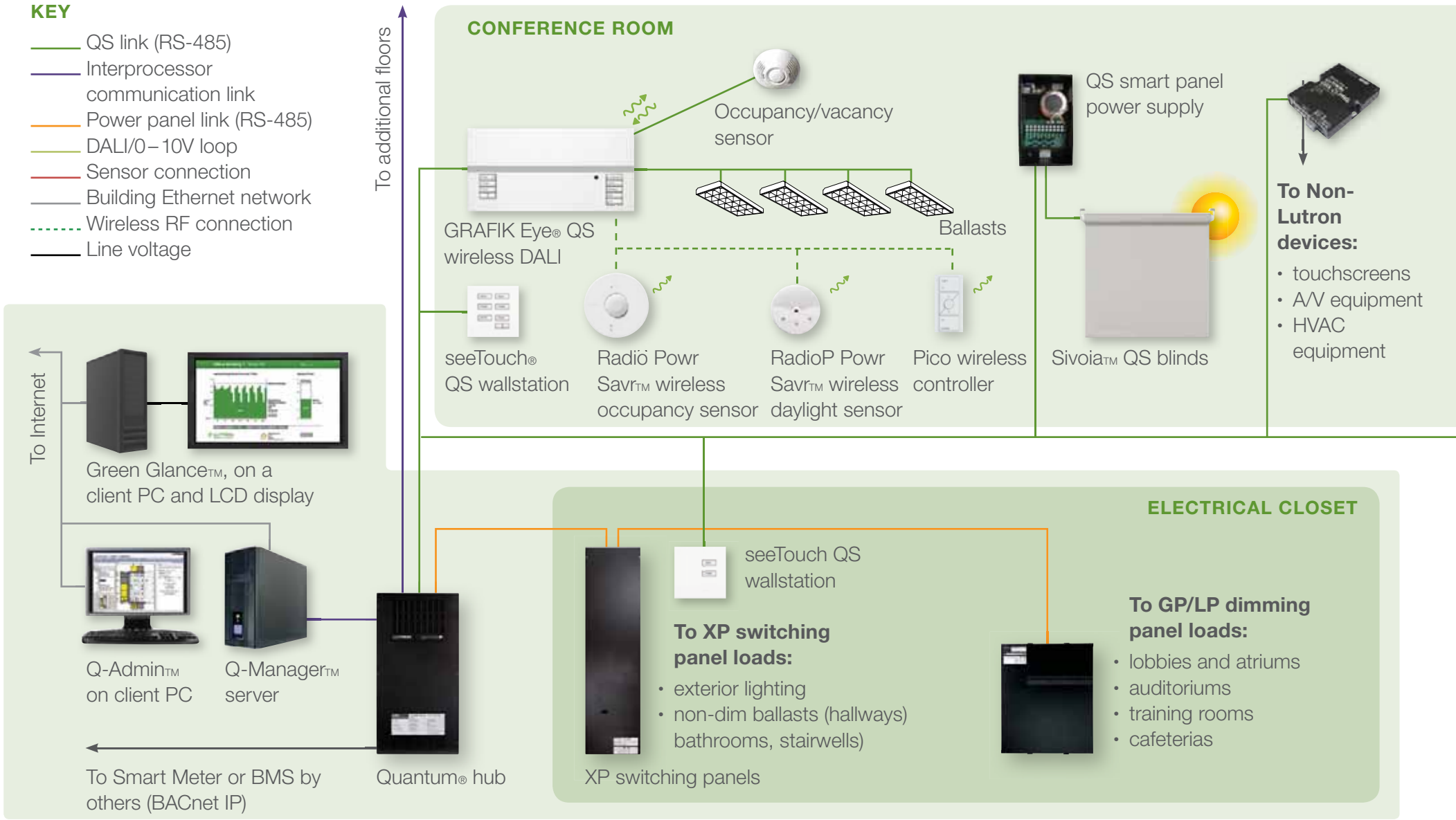


BENEFITS

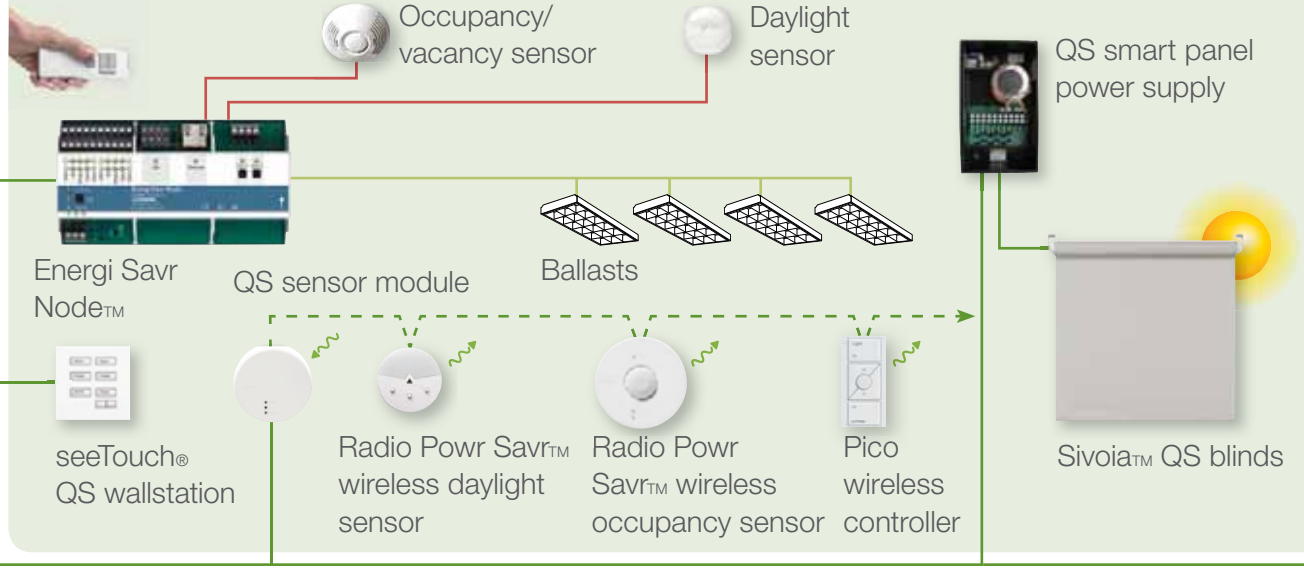
- Save Electricity and manage your environment
- Create a more flexible space
- Increase productivity and comfort
- State of the art blind control with Hyperion solar adaptive shading
- Preserve your bottom line with automatic real-time energy monitoring
- Enjoy advanced tuning for added energy saving benefits

[1, 2, 3, 4, 5] Please refer to Appendix on pages 22 and 23 for a list of references.

HOW THE COMPONENTS CONNECT TOGETHER: SAMPLE COMMERCIAL SPACE



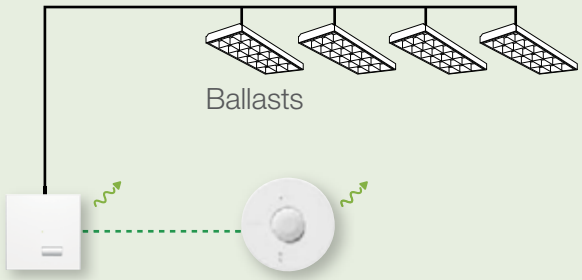
ENTIRE FLOOR (OPEN OFFICE SPACES)



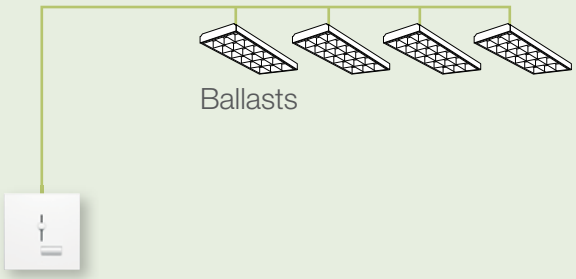
To Non-Lutron devices:

- touchscreens
- A/V equipment
- HVAC equipment

OFFICE A



OFFICE B





A HISTORY OF SUSTAINABILITY, INNOVATION, AND QUALITY

LEED

At Lutron, sustainability is not new to us. Since 1961, we have been designing industry-leading technology that saves energy and reduces greenhouse gas emissions, and we are a proud member of the U.S. Green Building Council, administrator of LEED.

Lutron is a company built on a belief in taking care of the people: customers, employees, and the community. We innovate in advance of market needs and continually improve our quality, our delivery, and our value.

Lutron has registered over 2,000 patents worldwide and manufactures more than 15,000 products. For over 45 years, we have met and exceeded the highest standards of quality and service. Every one of our products is quality-tested before it leaves the factory.

GLOBAL SERVICE AND SUPPORT

You can count on a level of support unequaled anywhere in the industry or anywhere in the world. Lutron provides technical phone support. Lutron Field Service, made up of a global network of customer-focused field service engineers, provides world-class services that begin before your building is commissioned and continue throughout the life of your building.

Prestigious projects (left to right):

Musikschule Grünwald, Munich
Le Meridien, Tokyo
Chelsea Harbour, London
Royal Mirage Arabian Court, Dubai
Bank of China, Beijing
The White House, Washington, DC

SAVE ENERGY ON YOUR NEXT PROJECT

Call Lutron today at +44 (0)20 7702 0657 and you will be connected to a Lutron representative who will be able to provide you with a plan of action for your application.

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LIGHT GREENER LIGHT BETTER
PAGE 2 & 3

[1] Massachusetts Institute of Technology, U. S. Department of Energy, and Lutron sales data.

[2] Lovins, Amory. “The Negawatt Revolution.” The Conference Board Magazine, Vol. XXVII, No. 9.

[3] Average dollars per watt saved using a dimmer in typical residential and commercial applications, arrived at using the following calculation:

$100 (average cost of a Lutron commercial dimmer) / 240W (average 20% savings on a typical 1200W load) = $0.42

$16 (average cost of a Lutron residential dimmer) / 60W (average 20% savings on a typical 300W load) = $0.27

$0.42 per watt + $0.27 per watt / 2 = $0.35 per watt, average

[4] Westar Vice President, coal fired power plant builder http://www.npr.org/templates/story/story.php?storyId=6881347

[5] US Department of Energy http://www.nrel.gov/docs/fy07osti/41435.pdf

[6] 21st century science and technology magazine http://www.21stcenturysciencetech.com/articles/spring01/nuclear_power.html

[7] San Jose Business Journal. http://sanjose.bizjournals.com/sanjose/stories/2009/02/09/daily59.html

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[1] Savitz, Andrew W. and Karl Weber. The Triple Bottom Line: How today’s best-run companies are achieving environmental, social and economic success – and how you can, too. Jossey-Bass, San Francisco. 2006

[2] Determinants of Lighting Quality II by Newsham, G. and Vetch, J., 1996.

[3] Light Right Consortium. Research Study on the Effects of Lighting on Office Workers. http://www.lightright.org/research/index.htm

[4] Heschong Mohone Group for the California Energy Commission. Windows and Offices: a study of Office Worker Performance and the Indoor Environment. October 2003.

[5] Glenn Hughes, director of construction for The New York Times Company building in New York City reports 75% lighting energy savings using Lutron systems. Jeff Choma, manager of mechanical and electrical systems at Georgian College in Ontario Canada reports 70% lighting energy savings using Lutron systems. Lighting energy savings exceeding 60% is frequently reported by customers using Lutron solutions as part of an overall energy-saving design programme.

[6] Incandescent bulbs last 20 times longer if dimmed by 50% (Refers to a 50% reduction in perceived light level). (Source: IESNA 9th Edition Lighting Handbook page 6-13 figure 6-19 and Lutron experiments). Longer bulb life means less re-lamping.

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[1] Source: Department for Business Enterprise & Regulatory Reform. Energy Consumption in the United Kingdom, 2008 Update. Pub URN 08/456

[2] Glenn Hughes, director of construction for The New York Times Company building in New York City reports 75% lighting energy savings using Lutron systems. Jeff Choma, manager of mechanical and electrical systems at Georgian College in Ontario Canada reports 70% lighting energy savings using Lutron systems. Lighting energy savings exceeding 60% is frequently reported by customers using Lutron solutions as part of an overall energy-saving design programme.

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[1] Source: California energy study http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF

[2] I ESNA 2000 Proceedings, Paper #43: An analysis of the energy and cost savings potential of occupancy sensors for commercial lighting systems. “Occupancy sensor savings range from 17% to 60% depending upon space type and time delay settings.” When scheduling is used without occupancy sensing or vacancy sensing, 15% energy savings can be expected.

[3] I ESNA 2000 Proceedings, Paper #34: Occupant Use of Manual Lighting Controls in Private Offices. “Giving the occupant manual switching and dimming provided a total of 15% added savings above the 43% achieved by motion sensors.”

[4] US Department of Energy. How to Select Lighting Controls for Offices and Public Buildings. Claim: 27% potential savings using daylight harvesting.

[5] Lutron-commissioned simulation by T.C. Chan Center for Building Simulation and Energy Studies, University of Pennsylvania, September 2008.

"We designed our building to use 13.8 Watts per square meter of lighting power... it's only using 3.6 — that's 75% less."

Glenn Hughes, Director of Construction for The New York Times Company during design, installation, and commissioning of The New York Times Building

This facility saves over £217,000 each year by managing light with Lutron solutions.

THE NEW YORK TIMES, NEW YORK, NEW YORK, USA

Green Facts

Buildings	1
Square Meters	over 55,470m^2
Lighting Fixtures	over 15,000
Lighting Energy Savings	75%
Annual CO_2 Reduction	1,250 metric tons

LUTRON®

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