

## Quantum® Total Light Management

Improves comfort and productivity while saving energy



Photography © Nic Lehoux



Photography © Nic Lehoux



## THE CHALLENGE:

**OPTIMISE ELECTRIC LIGHT AND DAYLIGHT TO SAVE ENERGY AND CREATE A PRODUCTIVE, COMFORTABLE, VISUAL ENVIRONMENT.**

Most buildings today are over-lighted because there is enough daylight in the space; or lights are set to a higher level than appropriate for the people inside; or spaces are lighted even though they are unoccupied. This wastes energy, creates discomfort, and reduces productivity.

## THE SOLUTION:

**MANAGE LIGHT WITH QUANTUM®.**

Quantum manages both electric light and daylight, to not only save energy and simplify operations but also improve the comfort and productivity of the people in your building.

## THE COST OF WAITING:

**A TYPICAL 4,600 M<sup>2</sup> COMMERCIAL BUILDING SPENDS ABOUT £29,000 EACH YEAR ON LIGHTING ENERGY.<sup>1</sup>**

Much of that money is wasted due to ineffective light control. Through optimising electric light and daylight, Quantum can cut those costs by 60% or more while greatly improving the visual environment.

<sup>1</sup> Source: The New Thinking About Lighting, Building Operating Management, August 2008.



## WHAT IS QUANTUM?

Quantum is a whole-building or whole-campus lighting control system that centralizes control of all electric lighting and shades. Quantum software gives users the ability to control, monitor, manage, and report on lighting energy usage from single fixtures to entire facilities.

## WHAT ARE THE BENEFITS?

### **Save electricity and protect the environment**

Reduces greenhouse gases by eliminating unnecessary energy use

### **Save money**

Lowers operating costs and peak demand charges

### **Create a more flexible space**

Lighting and shading zones can be re-configured without rewiring

### **Increase productivity and comfort**

Makes occupants more productive and comfortable with preferred light levels and automated shade control

## WHERE IS QUANTUM USED?

- office, education, healthcare, hospitality and other buildings
- for new construction or renovations

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# BENEFITS OF QUANTUM® TOTAL LIGHT MANAGEMENT



## SAVE ELECTRICITY AND PROTECT THE ENVIRONMENT

### **MORE ELECTRICITY IS USED FOR LIGHTING THAN ANY OTHER BUILDING SYSTEM.**

Controlling your lighting is usually the easiest and most visible way to manage your energy costs while enhancing your space.

Light control strategies such as tuning, dimming, occupancy sensing, daylight harvesting, scheduling, and automatic shading reduce energy consumption which conserves natural resources and lowers the amount of CO<sub>2</sub> released into the air.

## SAVE MONEY

### **LOWER OPERATING AND MAINTENANCE COSTS.**

- automatically turn off lights in vacant spaces
- use only the amount of electric light needed
- minimise electricity demand charges by lowering light levels during peak periods
- reduce lighting and HVAC loads by dimming lights and automatically controlling shades
- report lamp failures for optimal group re-lamping

Lighting is responsible for 39%<sup>1</sup> of the annual electricity costs in a typical commercial building — more than any other building system.

<sup>1</sup> According to the Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, released September 2008..





## CREATE A MORE FLEXIBLE SPACE

### **EASILY CONTROL AND RE-CONFIGURE LIGHT SOURCES.<sup>2</sup>**

Lighting and shading zones can be re-configured without rewiring, making reconfiguration of office space simple. As the needs of a space change, wireless wall controls, hand held controls, occupancy sensors, and daylight sensors can be reassigned to different fixtures or groups of fixtures. Furthermore, the Quantum® system is expandable from small, stand-alone spaces, to whole floors, to the whole building or campus.

## INCREASE PRODUCTIVITY AND COMFORT

### **MAKE YOUR TENANTS OR EMPLOYEES MORE PRODUCTIVE WITH SELECTABLE PREFERRED LIGHT LEVELS FOR SPECIFIC TASKS.**

Since 90% of information is received visually, having the right light for the job is crucial. Research indicates that people are more productive working in their preferred light level.<sup>3</sup> Furthermore, Quantum® shade control eliminates harsh sun glare and heat making employees more productive and comfortable. And increasing comfort and productivity improves employee recruitment and retention.

Sources:

<sup>2</sup> Incandescent, fluorescent, LED, CFL, halogen, and neon/cold cathode.

<sup>3</sup> Determinants of Lighting Quality II by Newsham, G. and Veitch, J., 1996.

# KEY COMPONENTS OF QUANTUM® TOTAL LIGHT MANAGEMENT

## ENERGI SAVR NODE™ ELECTRIC LIGHTING CONTROLS



### ENERGI SAVR NODE

- controls light fixtures (by others) and provides direct connection to occupancy and daylight sensors



## SIVOIA® QS DAYLIGHT CONTROLS



### SHADES

- reduce sun glare and solar heat gain for increased productivity, comfort, and energy savings while preserving views
- quietly controls shades with ultra-precise alignment



## GRAFIK EYE® QS SCENE AND ZONE CONTROLS



### GRAFIK EYE QS

- controls multiple shade and light zones; creates light scenes at the touch of a button



### SEETOUCH QS KEYPAD WALLSTATIONS

- select a preferred light level for every task, and adjust shades quietly at the touch of a button



### PICO WIRELESS CONTROLLER

- controls your lights from anywhere in your space for comfort and convenience – available as free standing, wall-mounted, car-visor clip or on a table stand





## RADIO POWR SAVR™ SENSORS



### OCCUPANCY SENSOR

- saves energy and increases convenience by automatically turning lights off when space is vacant, and on when space is occupied



### DAYLIGHT SENSOR

- saves energy by reducing electric lighting usage based on amount of daylight



## QUANTUM® HUB AND POWER PANELS



### QUANTUM HUB

- connects all Quantum system components



### QS SMART PANEL POWER SUPPLY

- provides low voltage power to Sivoia® QS shades and accessories



### POWER PANELS (GP, XP, LP)

- remote dimming and switching capability for all common light sources, including incandescent, fluorescent, LED, CFL, halogen, and neon/cold cathode



## QUANTUM® SOFTWARE



### GREEN GLANCE™ SOFTWARE

- shows building occupants the environmental and energy savings that result from Quantum

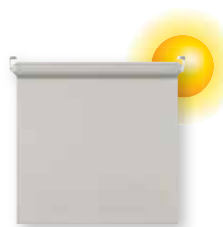


### Q-ADMIN™ SOFTWARE

- centrally operates, configures, monitors, sets timeclocks, and creates reports for lighting in an entire building

### Q-MANAGER™ SERVER

- computer that stores all relevant data for reporting and trending (light levels, sensor status, power consumption, and more)



### 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

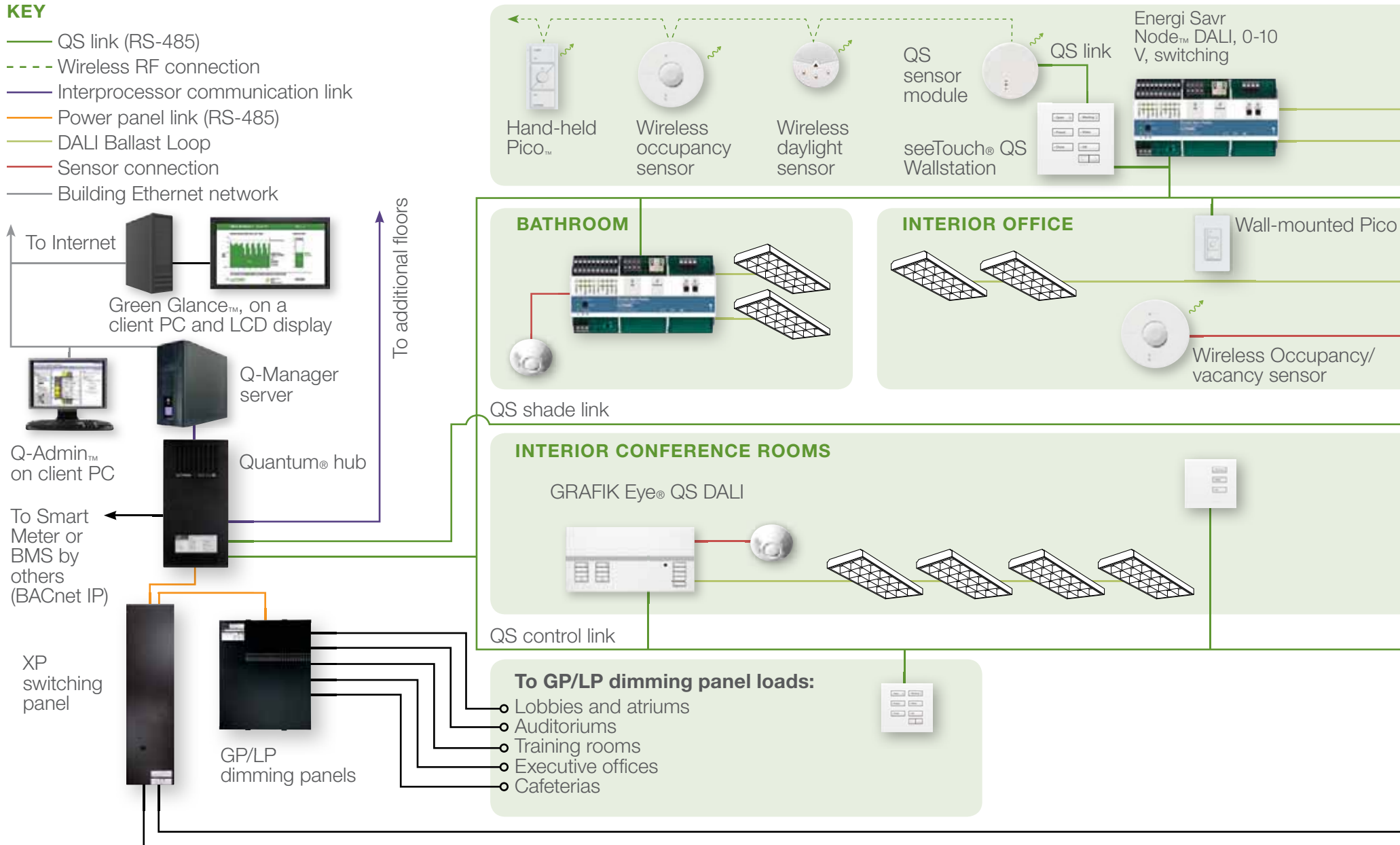


## QUANTUM® TOTAL LIGHT MANAGEMENT

# HOW THE COMPONENTS CONNECT TOGETHER

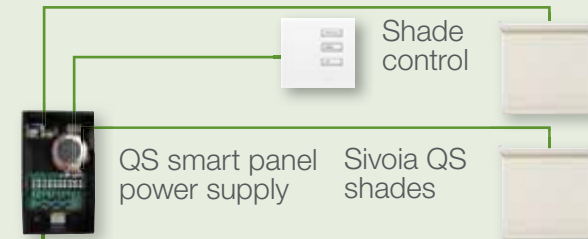
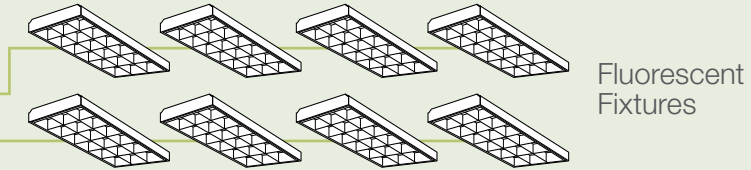
## KEY

- QS link (RS-485)
- - - Wireless RF connection
- Interprocessor communication link
- Power panel link (RS-485)
- DALI Ballast Loop
- Sensor connection
- Building Ethernet network

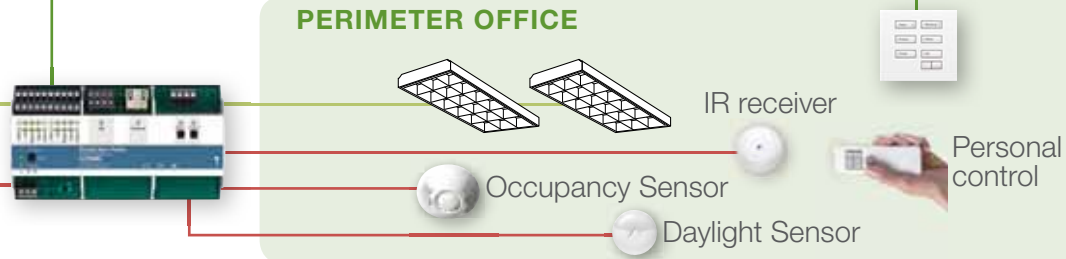




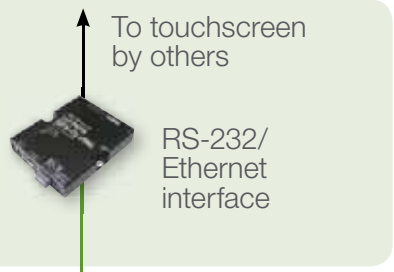
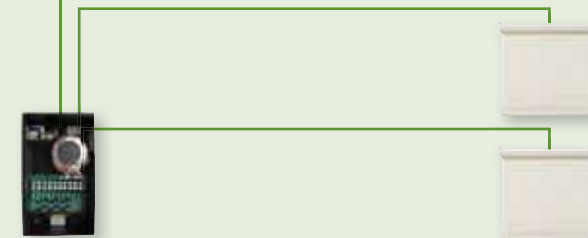
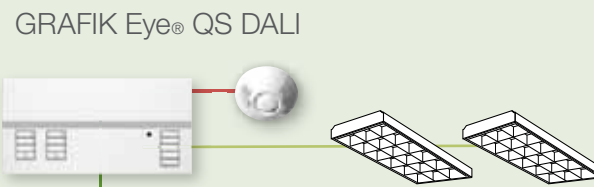
### OPEN OFFICE AREAS



### PERIMETER OFFICE



### EXTERIOR CONFERENCE ROOMS



to other QS devices

# QUANTUM® ENERGY SAVINGS AND LIGHT CONTROL STRATEGIES



## ARCHITECTURAL LOAD DIMMING

Allows the users to dim traditional light sources such as incandescent, halogen, low voltage, and LED.

## FLUORESCENT DIMMING

Highly efficient dimming that allows the users to dim fluorescent lights.

## CONTROLLABLE WINDOW SHADES

Allows quiet control of daylight for improved comfort and productivity using Sivoia® QS shades.

## SWITCHING

Allows the user to switch on or off all non-dimmed light sources using 1 million cycle relays.

## HIGH-END TRIM

High-end trim sets the maximum light level for each space, providing guaranteed energy savings.

## LIGHT LEVEL TUNING

Sets the target light level based on customer requirements in each space. This level is lower than the high-end trim light level.

## SCENE AND ZONE CONTROL

Users can select pre-programmed light scenes or raise and lower individual light zones.

## SCENE CONTROL

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

## PERSONAL LIGHT CONTROL

Allows users in the space to select the correct light level for the desired task. Often that is much less light than full-on.

## OCCUPANCY OR VACANCY SENSING

Automatically turn off lights when people vacate the space.



### **DAYLIGHT HARVESTING**

Automatically adjusts the electric lighting levels based on the amount of daylight in the space.

### **SCHEDULING**

Lights turn off or are dimmed and shades are adjusted automatically at certain times of the day or in relation to sunrise and sunset.

### **HYPERION™ SOLAR-ADAPTIVE SHADING**

Automatically adjusts Lutron Sivoia® QS window shades based on the angle of the sun to maximise the effective use of daylight.

### **PARTITIONING**

Automatically adapts the lighting controls to changes in room configurations.

### **BACNET INTEGRATION**

Allows simple integration with the building management system.

### **REMOTE MONITORING AND CONTROL**

Allows management of your building's light from anywhere in the world.

### **INTELLIDEMAND™ LOAD SHED (DEMAND RESPONSE)**

Allows the facility manager to reduce lighting load at times of peak electricity pricing.

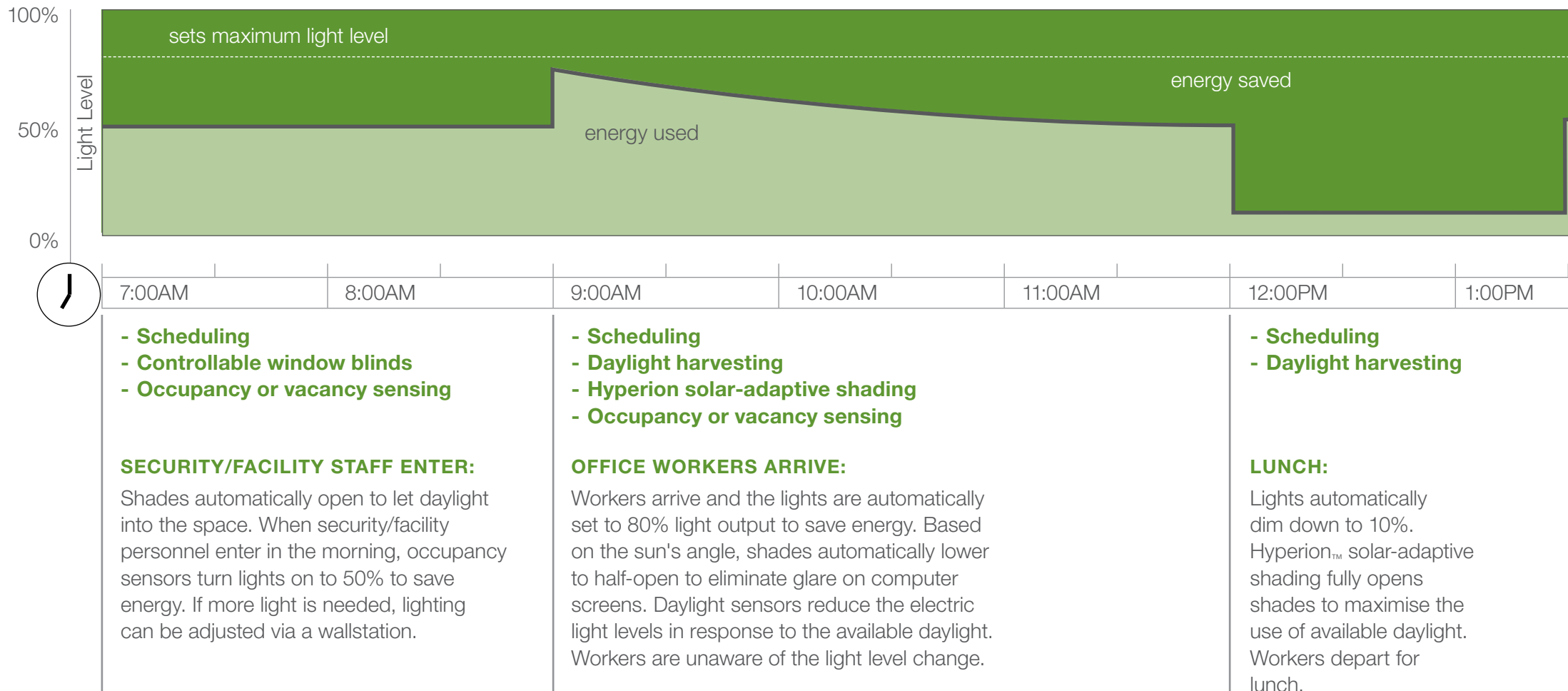
### **REPORTING AND TRENDING**

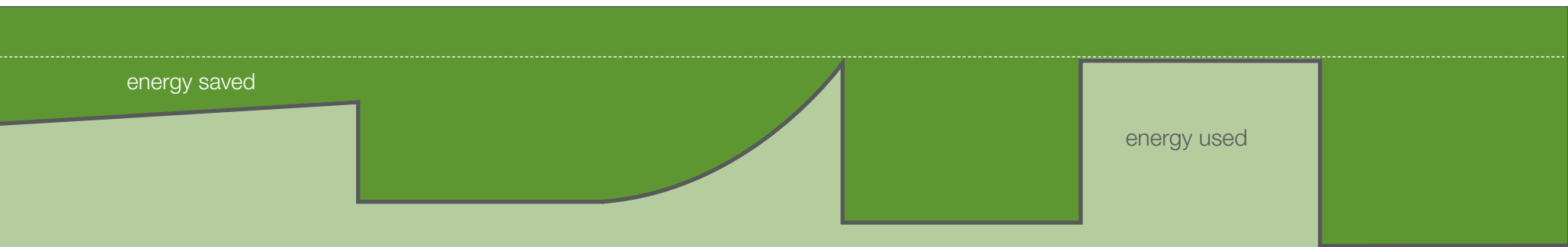
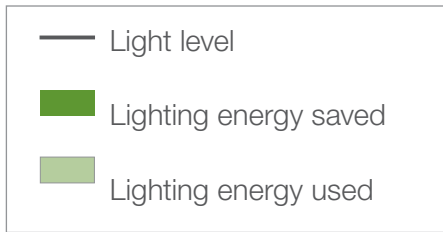
Allows the system operator to intelligently manage and monitor the lighting in their building.

# A DAY IN THE LIFE OF AN OFFICE

Using occupancy sensors, daylight sensors, controllable shades, timeclocks, and/or manual controls, Quantum® reduces lighting energy usage typically by up to 60%.

## ENERGY USE IN AN OPEN OFFICE AREA WITH QUANTUM® TOTAL LIGHT MANAGEMENT





	2:00PM	3:00PM	4:00PM	5:00PM	6:00PM	7:00PM
	<ul style="list-style-type: none"> <li>- Scheduling</li> <li>- Hyperion solar-adaptive shading</li> </ul> <p><b>WORKERS RETURN:</b> As daylight decreases due to changing weather conditions, lights automatically rise to higher levels. Workers are unaware of the light level change.</p>	<ul style="list-style-type: none"> <li>- Personal light control</li> <li>- Controllable window blinds</li> <li>- Hyperion solar-adaptive shading</li> </ul> <p><b>WEBINAR:</b> Workers dim their lights and adjust shades with hand-held remotes to clearly view the computer screen and have enough light to take notes.</p>		<ul style="list-style-type: none"> <li>- Scheduling</li> </ul> <p><b>WORKERS LEAVE:</b> Lights automatically dim down to 10%. Control devices can override if light is still needed.</p>	<ul style="list-style-type: none"> <li>- Scheduling</li> </ul> <p><b>CLEANING:</b> Lights automatically turn on to 80% level for the cleaning staff.</p>	<ul style="list-style-type: none"> <li>- Scheduling</li> <li>- Controllable window blinds</li> </ul> <p><b>AFTER HOURS:</b> Timeclock automatically turns lights off and lowers shades to save energy, minimise light pollution, and create a clean aligned facade.</p>



## WHAT IS HYPERION?

Hyperion is an available feature for Quantum® that adjusts Sivoia QS shades throughout the day based on the sun's position. This provides effective daylighting while reducing solar heat and glare to maximize the comfort and productivity of building occupants.

Precise shade adjustment schedules are developed by combining information gathered about the building with user-specified limits on sunlight penetration and amount of time between shade movements.

To accommodate for variations in weather conditions, Hyperion can also be programmed to transition into a cloudy day mode.

## WHY DO WE NEED HYPERION?

### **Seasonal solar variation:**

The angle and intensity of available daylight changes throughout the year. Hyperion manages these variations by incrementally altering the shade adjustment schedule of each facade on a daily basis.

### **Comfort and productivity:**

Hyperion controls incoming daylight to reduce glare and heat gain – removing these physical discomforts has been shown to positively impact productivity.<sup>1</sup>

### **Preserve external views:**

Shades remain partially open whenever possible and sheer fabrics maintain views even when the shades are closed.

### **Maximize effective daylighting:**

Hyperion daylight management works with the Quantum daylight harvesting system to significantly lower electric light usage.

### **Cloudy-day override:**

To accommodate for variations in weather conditions, Hyperion can also be programmed to transition into a cloudy day mode.

### **Lower HVAC costs:**

In addition to enhancing the performance of daylight harvesting lighting systems, Hyperion can also provide energy savings of its own.

- **Summer:** Shades reduce the need for air conditioning by blocking and reflecting solar heat, resulting in a 10-30% reduction in heat gain.<sup>2</sup>
- **Winter:** Shades can be programmed to close at night, adding insulation and reducing heating costs, resulting in a 3-29% reduction in heat loss.<sup>2</sup>

**For more information, refer to the Hyperion brochure (P/N 367-1626) or visit [www.lutron.com/shadingsolutions](http://www.lutron.com/shadingsolutions).**

Source:

1 Boyce et al. The Benefits of Daylight Through Windows. <http://www.lrc.rpi.edu/programs/daylighting/pdf/DaylightBenefits.pdf>

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

## HOW IT WORKS

Hyperion™ adjusts shades to accommodate for the position of the sun in the sky throughout the day and throughout the year.

June 21st | 11:00 a.m.

Hyperion automatically positions shades to let useful daylight into the space. Lights near windows dim to save energy.



December 21st | 11:00 a.m.

Shades remain partially closed to block harsh low-angled winter sun. Lights near windows remain bright to maintain preferred light levels.

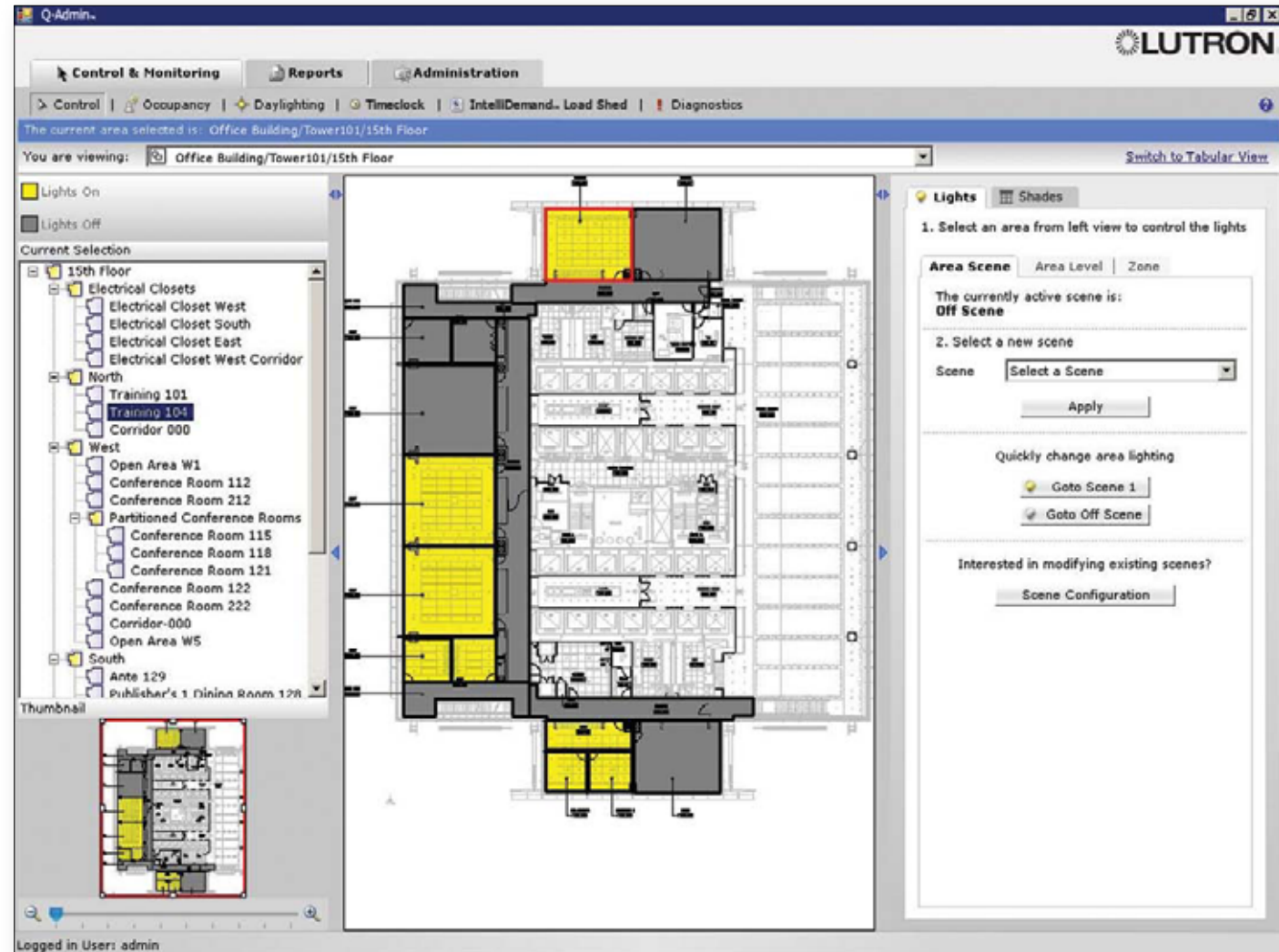


## BEYOND LIGHT CONTROL TO LIGHT MANAGEMENT

The heart of the Quantum® solution is Q-Admin—Quantum's powerful software that allows facility managers to manage their electric light and daylight for maximum energy efficiency, comfort, and productivity. From a central location, a facility manager can not only control electric lights and shades but also configure, monitor, analyse, and report on the light in an entire building.

### CONTROL AND MONITOR

Allows you to control and monitor any space in your building by area scene, area level, or individual zone.



## TIMECLOCKS

Q-Admin™ software includes two types of timeclocks, a time-of-day clock (e.g. 8pm weeknights) and an astronomic clock (e.g. dawn or dusk), which control the lights and shades on the Quantum® network. Lights can automatically be set to a preset level or turn on or off in certain spaces based on the time of day; and shades can automatically raise or lower in certain spaces at specific times.

The screenshot displays the Q-Admin software interface for configuring a timeclock. The main window shows the configuration for 'Building Sweep to OFF Timeclock' on Tuesday, August 26, 2008. The interface is divided into several sections:

- Navigation:** Control & Monitoring, Reports, Administration.
- Control:** Control, Occupancy, Daylighting, Timeclock, IntelliDemand, Load Shed, Diagnostics.
- Timeclock Settings:** You are viewing: Building Sweep to OFF Timeclock.
- Event Schedule:** A table showing the timeclock event at 10:30 PM, labeled 'Turn Lights OFF'. The event applies to various rooms, each with a corresponding 'Off Scene' setting.
- Room List:**

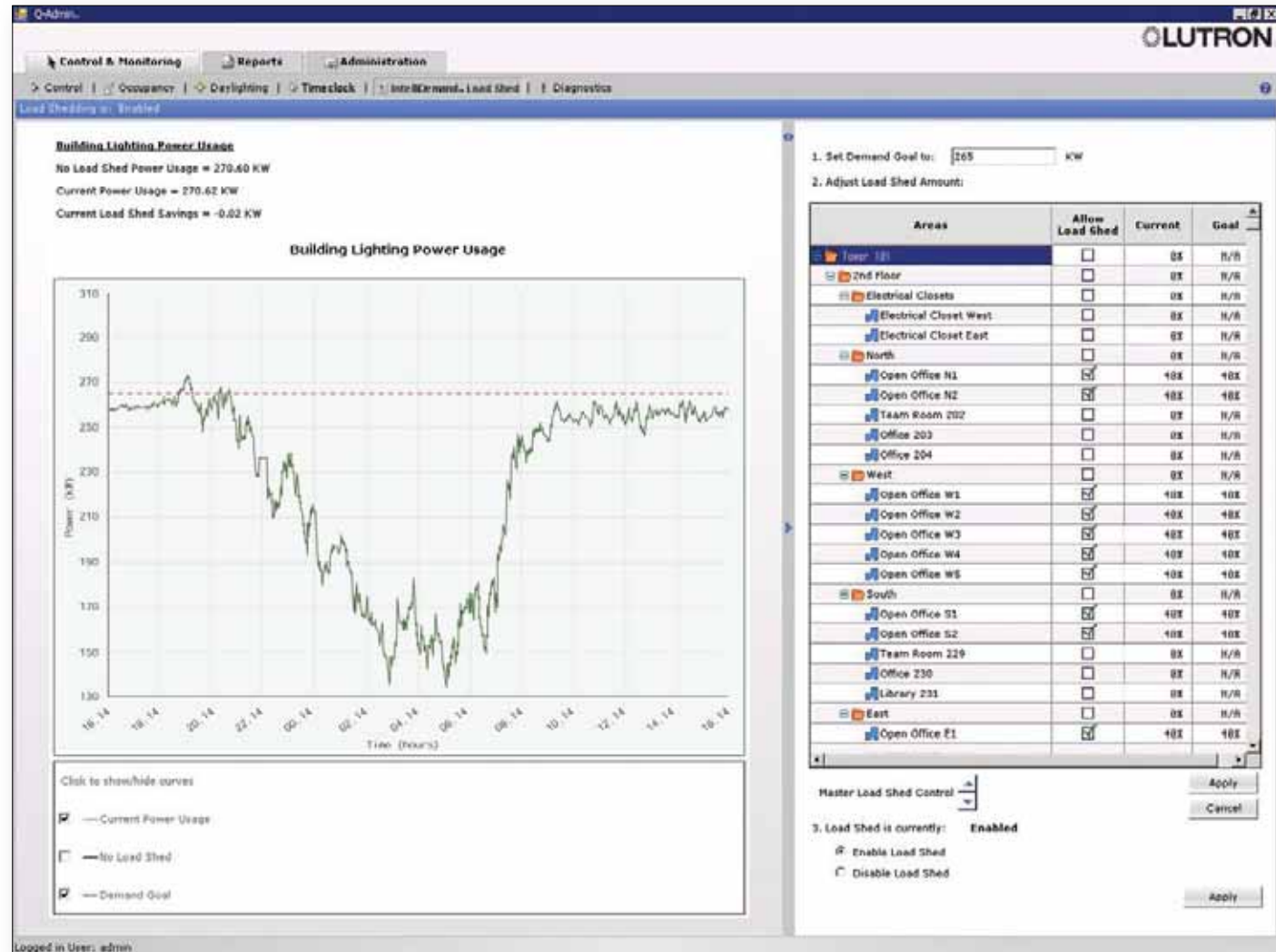
Room Name	Off Scene
Lutron/CB52nd Floor/Blue Quad/Office B201	Off Scene
Lutron/CB52nd Floor/Blue Quad/Office B202	Off Scene
Lutron/CB52nd Floor/Blue Quad/Office B203	Off Scene
Lutron/CB52nd Floor/Blue Quad/Open Office	Off Scene
Lutron/CB52nd Floor/Blue Quad/Restrooms	Off Scene
Lutron/CB52nd Floor/Purple Quad/Office P201	Off Scene
Lutron/CB52nd Floor/Purple Quad/Office P202	Off Scene
Lutron/CB52nd Floor/Purple Quad/Office P203	Off Scene
Lutron/CB52nd Floor/Purple Quad/Open Office	Off Scene
Lutron/CB52nd Floor/Purple Quad/Printer Room	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Copy Room	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Kitchen	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Office S201	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Office S202	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Office S203	Off Scene
Lutron/CB52nd Floor/Salmon Quad/Open Office	Off Scene
Lutron/CB52nd Floor/Yellow Quad/Passway	Off Scene
Lutron/CB52nd Floor/Yellow Quad/Office Y201	Off Scene
Lutron/CB52nd Floor/Yellow Quad/Office Y202	Off Scene
Lutron/CB52nd Floor/Yellow Quad/Office Y203	Off Scene
Lutron/CB52nd Floor/Yellow Quad/Office Y204	Off Scene
- Left Sidebar:** Includes options for Weekly, Holiday, Summer Hours, and Special. It also shows 'Day Begins at: 12:00 AM', 'Sunrise: 6:24 AM', and 'Sunset: 7:43 PM'. A calendar for August 2008 is visible, with the 26th highlighted.
- Right Sidebar:** 'I want to:' section with options: View Events (checked), Set Up Recurring Events Define the Outputs a Timeclock Controls, Test Events, Enable/Disable Selected Timeclock, and Review Location Settings.

# Q-ADMIN™ SOFTWARE HIGHLIGHTS

## INTELLIDEMAND™ LOAD SHED

Allows facility managers to shed a percentage of the system's lighting output to reduce energy costs for their facility. This can result in lower electricity rates or rebates from utility companies, who often request reductions in electricity levels when peak load conditions threaten to cause a blackout. With Q-Admin™ software, simply set the percentage reduction in light level and instantly load shed your entire facility or particular space from its current power level.

Load shedding is a critical part of participating in the Smart Grid. By receiving signals from a utility company or energy aggregator, Quantum can automatically respond by lowering light levels unobtrusively throughout the facility.





## REPORTS

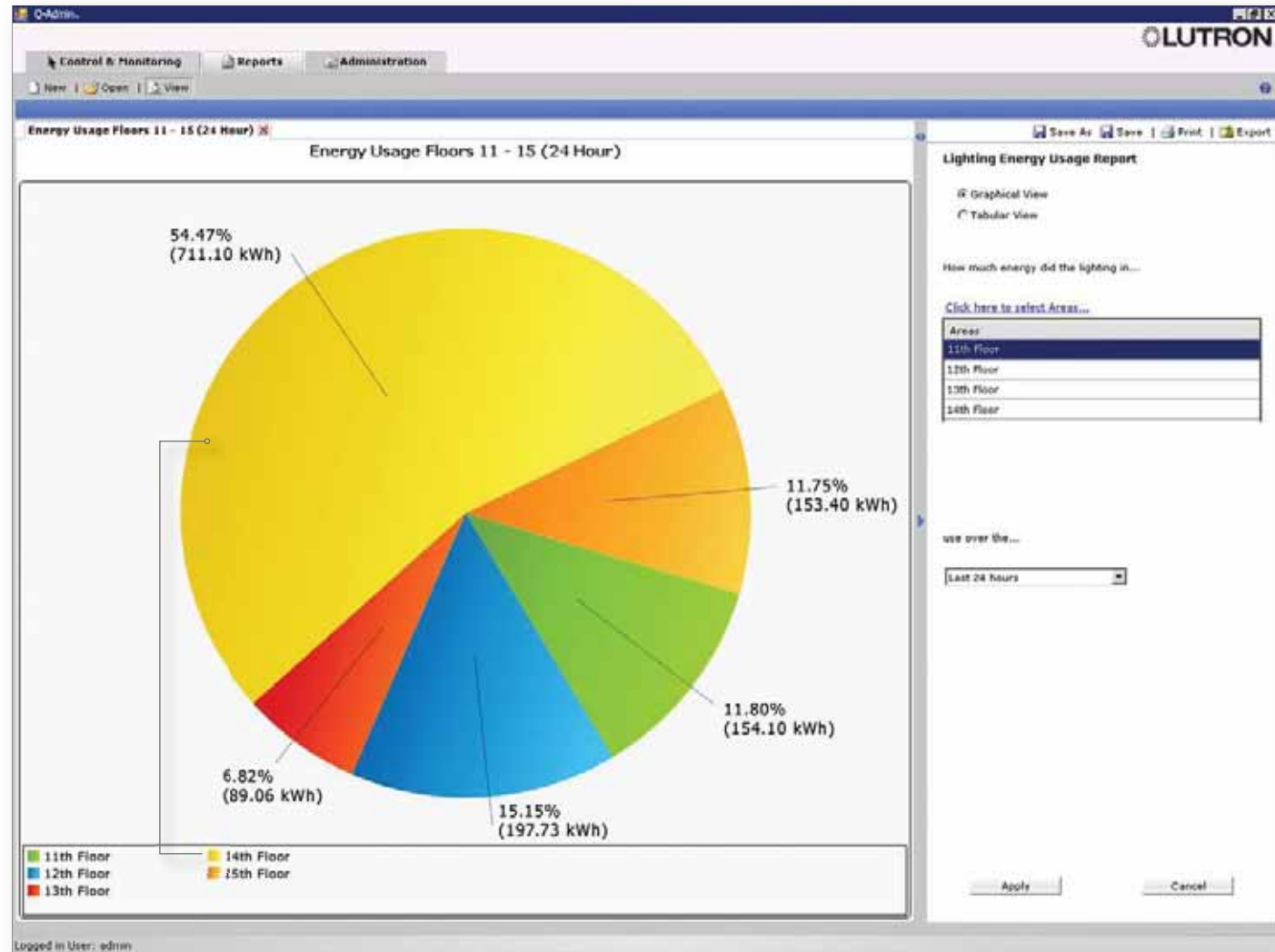
Allows facility managers to improve maintenance and operations, identify issues before they become problems, and monitor the lighting energy consumption in the whole building or any part of the building.

### REPORTS INCLUDE:

- lighting power or energy usage
- system activity
- fluorescent lamp failures

### CALCULATING VS. MEASURING ENERGY USAGE

The Lutron Quantum solution generates highly accurate energy savings calculations based on system settings, an approach to energy monitoring that represents significant cost savings over the installation of billable-grade energy monitoring equipment.





## HOW GREEN IS YOUR BUILDING?

**DEMONSTRATE YOUR COMPANY'S COMMITMENT TO ENERGY EFFICIENCY WITH GREEN GLANCE ENERGY-SAVING DISPLAY SOFTWARE.**

Green Glance software provides a quick snapshot of your building's energy savings from using the Quantum® total light management system.

Building owners and facility managers can use Green Glance to motivate employees to save energy, or to support their organisation's reputation for being green and socially responsible. They can also use Green Glance as an educational tool to display their facilities' economic and environmental benefits from using Quantum, such as money saved, CO<sub>2</sub> not emitted, or tons of coal preserved. Furthermore, they can use Green Glance software to display any other green facts about their building such as details on waste reduction programs or water efficiency systems.

# GREEN GLANCE™ DISPLAYED ON A USER-SUPPLIED LCD SCREEN



Average lighting energy saved over user-selected period.

Maximum potential savings

User can select pre-defined spaces

User-selectable time periods for lighting energy displays

Displays local conditions (requires internet access)

Displays lighting energy and environmental savings

Displays project details and lighting energy calculation information

Real-time lighting power saved by using Quantum®

Building local time and date

Compares lighting energy savings of different time periods

# OUR COMPANY



## A HISTORY OF SUSTAINABILITY, INNOVATION, AND QUALITY



LEED

At Lutron, sustainability is not new to us. Lutron is a company built on a belief in taking care of people: customers, employees, and the community. We are a proud member of the U.S. Green Building Council, administrator of LEED. And since 1961, we have been designing industry-leading technology that saves energy and reduces green house gas emissions.

We innovate in advance of emerging 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 unequalled 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

[www.lutron.com/asia](http://www.lutron.com/asia)

## SAVE ENERGY ON YOUR NEXT PROJECT

**Call Lutron today at +91 124 471 1900** (New Delhi),  
**+91 22 4070 0867** (Mumbai) or **+91 80 4030 0485**  
(Bangalore) to obtain a plan of action for your application.

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“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 Quantum®.

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

#### Green Facts

Buildings	1
Square Meters	over 55,470m <sup>2</sup>
Lighting Fixtures	over 15,000
Lighting Energy Savings	75%
Annual CO <sub>2</sub> Reduction	1,250 metric tons



Photography © Nic Lehoux