



APPLICATION PROFILE

Occupancy Sensor Control in Commercial Office Space



**QDC Property
Management,
Inc.**

Six commercial office buildings
Washington, DC

Energy Manager:

Paul Gray

Contractors: Commercial
Lighting of Virginia, Fostech
Corp.

Utility: PEPCO

PROJECT RESULTS

Energy Savings	40%
Installed Cost	\$ 193,750
Rebate	\$ 97,500
IRR	51%
Simple Payback	1.9 years
Annual kWh Savings	562,000 kWh
Pollution Prevented	
CO ₂	618,000 lbs/yr
SO ₂	4,960 lbs/yr
NO _x	1,735 lbs/yr

TYPICAL APPLICATIONS

- Private Offices
- Open Offices
- Conference Rooms
- Restrooms
- Copy Rooms
- Galleys
- Mechanical-Electrical Rooms
- Storage Areas



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OCCUPANCY SENSOR CONTROL IN OFFICES

For help in starting an occupancy sensor control program, contact a Green Lights Lighting Management Company Ally. For a list of these companies, call the Green Lights Hotline at 1-888-STAR-YES.

Automatic lighting controls are an essential component of an aggressive and profitable energy management program in commercial offices. Occupancy sensors minimize the unnecessary lighting of vacant spaces to save energy both during and after normal business hours. Occupancy sensors not only eliminate wasted lighting in infrequently or unpredictably occupied spaces during the day, but also prevent runaway lighting operation at night by eliminating reliance on occupants, cleaning or security crews to manually turn the lights off.

Occupancy sensors are suitable for a wide range of lighting applications. Sensors are most commonly mounted in switch locations, combinations of wall/corner surfaces, or ceiling mounted above the center of a space. Two motion-sensing strategies are prominent; passive-infrared and ultrasonic technologies. Infrared sensors detect body heat and require a direct "line-of-sight" to occupant motion. Ultrasonic sensors emit and receive ultra high-frequency sound waves well above the range of human hearing. They are better at recognizing motion hidden from the sensor's direct view. Some occupancy sensors are also equipped with an integral photocell to combine daylighting control with occupancy control.

The specification, placement and installation of occupancy sensors should be done by experienced, knowledgeable personnel. For a successful application, proper calibration is a must. Most sensors have adjustments for sensitivity to ensure that occupant motion is detected while filtering out extraneous signals, and for time delay to minimize excessive on/off cycling. Sensors equipped with photocells also have a light level setpoint adjustment to turn lights off in a room when adequate daylight is available. Trial installations are an excellent way to address many of these issues.

Benefits

- **Complimentary Technology:** Occupancy sensors make an excellent compliment to many lighting technologies, offer additional HVAC savings and security advantages, and are often the most cost-effective component of a lighting upgrade.
- **Peak Demand Period Opportunities:** Occupancy sensors are the only effective control strategy for reducing lighting run-time during business hours. Demand charges often account for 20-50% of an energy bill.
- **Immediate and Flexible Savings:** A properly commissioned occupancy sensor can immediately adapt to many workplace variables while remaining a low-maintenance component of lighting systems.

Issues

- **False Switching:** Occupant anxieties related to false switching can be addressed through careful specification of detection strategy, installation position, and post-installation commissioning.
- **Lamp Life:** Although fluorescent lamp life is reduced by frequent switching, the overall reduction in operating hours can extend the calendar life for lamps.
- **Energy, Demand, and \$ Savings:** Demand and energy rate structures must be considered to ensure that anticipated energy savings yield cost savings.
- **Occupant Education:** An occupant notification and education program is an essential component to foster user acceptance and ensure lasting savings.

CASE STUDY



QDC Property Management, Inc.

Paul Gray gets excited when he describes what occupancy sensors have done for the thousands of Class A offices he manages in Washington, D.C. "We do night inspections," he says. "One night recently, I drove by a couple of our buildings where we had installed sensors, and they were completely dark!" Paul continues, "people always leave their offices intending to return in just a minute." The truth is, we often get sidetracked and leave for a much longer time—with the lights burning the entire time. Occupancy sensors allow us to take advantage of these instances."

Paul included sensors in the scope of work when QDC upgraded over a million square feet of commercial office space to T-8 lamps and electronic ballasts. "We knew that more energy could be saved by combining occupancy sensors with the lighting

retrofit," he says. Despite a demanding group of occupants in leased space, Paul has seen the need for almost no sensor adjustments after the initial installation and commissioning. The occupants are happy with these automatic controls.

Facility Information

750,000 square feet

Approximately 3,000 private offices, along with other areas

6,250 2-lamp fixtures

1 wall-mount, PIR occupancy sensor per private office with 2 fixtures

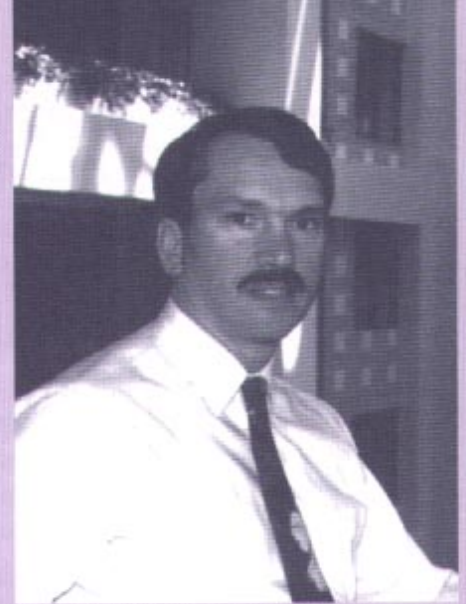
3,625 hours per year (base case)

2,175 hours per year (upgrade)

Equipment Information

Watt Stopper PIR wall-mounted sensors

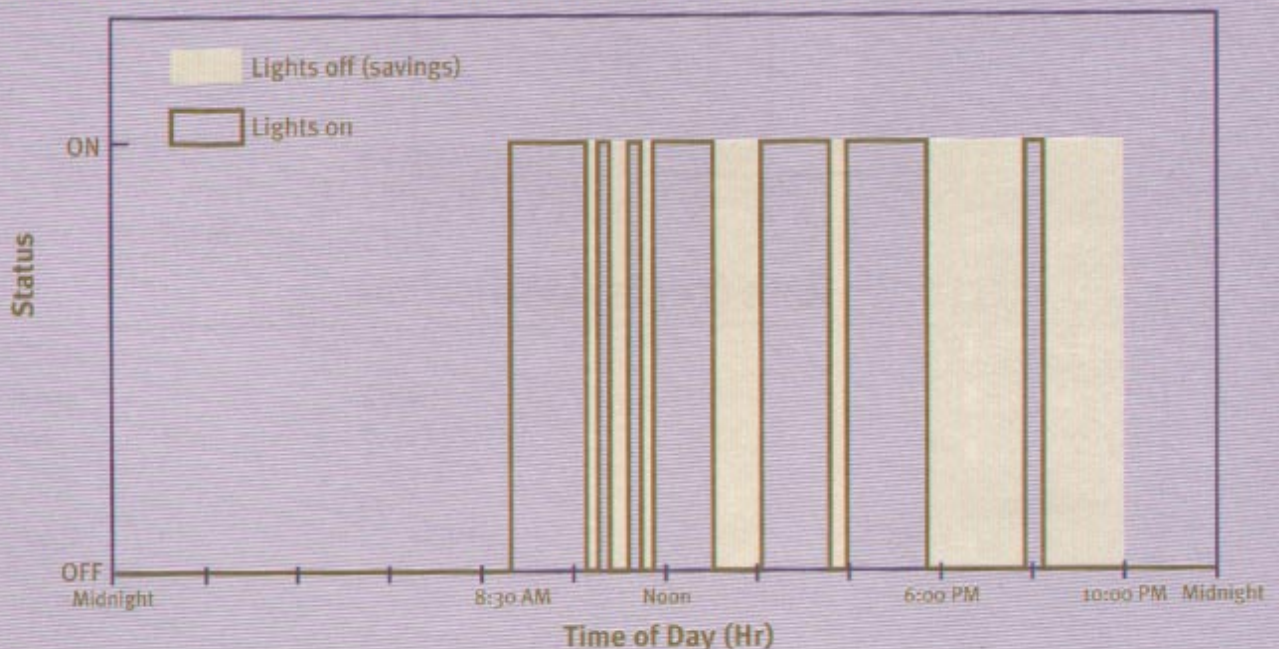
Levitron PIR wall-mounted sensors



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You wouldn't go into the store to get a few things and leave your motor running; so why do we leave the lights running?
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- Paul Gray
Senior Supervisor,
Facility Operations

Comparison of Lighting Hours With and Without an Occupancy Sensor

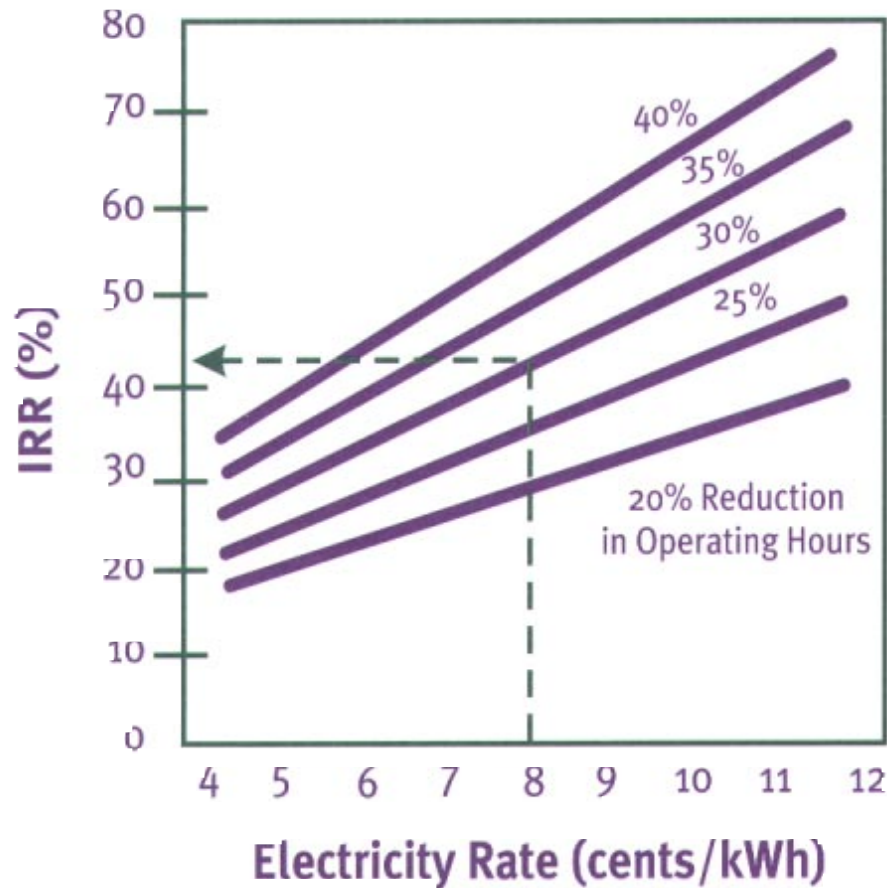


WILL IT WORK FOR YOU?

Use the following graph to estimate the cost effectiveness of installing occupancy sensors in your facility.

- Determine your average electricity rate. *For our example, the average electricity rate is 8 cents per kilowatt hour.*
- Draw a vertical line from this point until it intersects the line that represents the estimated reduction in lighting operating hours due to the installation of occupancy sensors. *For our example, it is estimated that a 30% reduction in operating hours will result due to the installation of occupancy sensors.*
- Draw a horizontal line from this point until it intersects the vertical axis that measures the after-tax internal rate of return. *Our sample upgrade earns an internal rate of return of 43 percent.*

PRIVATE OFFICE - WALL MOUNTED SENSOR



The Green Lights Program offers 2-day Lighting Upgrade Workshops, Application Profile brochures, and other technical support services to assist program participants in applying cost-saving lighting strategies. For more information, call the Green Lights Hotline at 1-888-STAR-YES.

Graph Assumptions

- Wall-mounted sensor controlling 3 fixtures, \$75 installed cost.
- 3,500 hr/yr uncontrolled system operation.
- Fixtures are 3-lamp F32T8 with electronic ballasts @ 91 watts/fixture. Maintenance budget assumes a group maintenance program.