

CONSUMER GUIDE



Energy Efficient Lighting Technologies for Multi-Unit Residential Buildings

Lighting technologies and controls are changing rapidly, providing options for lighting retrofits that reduce maintenance costs associated with lamp replacement, improve safety and security, reduce energy costs and contribute to a better lifestyle and environment.

Because multi-unit residential buildings require sufficient lighting 24 hours a day, lighting improvements typically provide an excellent return on investment. The cost of upgrading to Light Emitting Diodes (LED) lamps often pays for itself in energy savings in as little as two years, and the reduced cost of electrical consumption will be gained by the owners from their operating funds for years to come. At the same time, by properly illuminating your property's surroundings, lighting improvements give your building a modern upgrade, increase safety, and reduce long-term costs of changing lamps.

This guide addresses the key issues condominium and multi-unit residential building owners may consider when replacing their lighting system. While this guide focuses on multi-unit residential buildings the principles also apply to single family homes.

To help demonstrate the guiding principles outlined in this guide, details from a Case Study are presented as an example.

Case Study

In the fall of 2015, the common-area lighting at the Cypress Point condominium complex in Richmond, B.C., was converted to LED lights. Cypress Point is three, 35-year-old buildings that include 106 suites, parking garages, a common lounge, games room, fitness room, change room with showers, sauna, racquetball court, seasonal outdoor pool, and outdoor hot tub. The lighting upgrade cost was under \$30,000, and was recovered in two years from energy cost savings.



Cypress Point Condominium Complex

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Lighting Basics

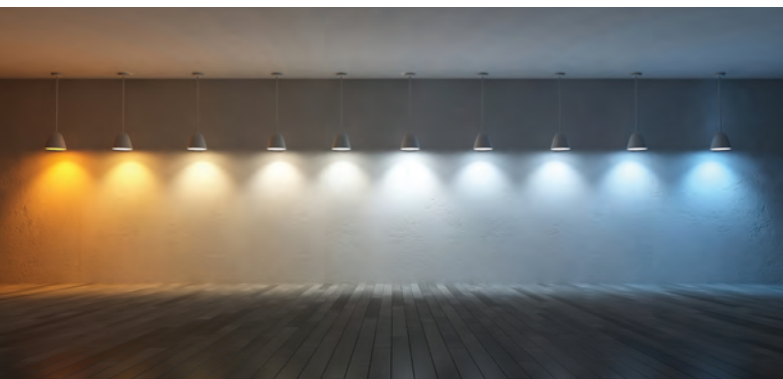
When designing a lighting system, experienced lighting contractors take into account the quantity and quality of light required for different applications and the energy efficiency. The following terminology commonly used is helpful in understanding the information in proposals and upgrades for your property.

Lamp is a term to define the light source (i.e the light bulb). *Luminaire* or *fixture* is the electrical device the lamp is installed in. Some retrofits are as simple as changing the lamp, whereas others require new fixtures as well.

Light output is measured in lumens—the total amount of light emitted by a lamp. Lumens per watt (*lighting efficacy*) measures the amount of light delivered per watt of energy. Today's technologies deliver three to four times more lumens per watt than incandescent bulbs, with LED technologies continuing to improve.

Illuminance (measured in Lux or Foot-candle) is the total amount of light incident on a surface, per unit area. Building codes may require specific illuminance levels for some building types and applications.

Another important parameter is the light quality. Colour temperature, measured in degrees Kelvin, accounts for the colour appearance of light sources. The higher the color temperature, the cooler or bluer the light. Light with a lower Kelvin temperature appears warmer or more yellow.



Light colour from 1,000 K on left (yellow) to 10,000 K on right (blue)

Energy Efficient Lighting

Early generation lighting retrofits consisted of going from incandescent bulbs to compact fluorescents, and T12 linear fluorescent to T8 linear fluorescent with electronic ballasts. Although conversions to T8 or T5 high-output (HO) linear fluorescent lighting can still be a cost effective option, Light Emitting Diodes or LED lighting is a better technology as it continues to improve performance, reduces electrical consumption and maintenance costs.

Lighting Controls

Another component of an energy efficient lighting is the control system. Occupancy sensors allow the lights to automatically turn on when motion is detected, and switch off after a specified time with no motion. There are different types of sensor and mounting options that need to be considered in the design to prevent false OFFs.

Many LED fixtures can be programmed to offer minimal way-finding and security light when an area is unoccupied and return to full brightness when occupancy is detected.

Daylighting control can be used in indoor areas with windows by measuring the light levels and adjusting lights accordingly. Photo cells can turn outdoor lights on and off automatically based on the amount of daylight present. Low light levels at dusk will turn lights on. When sufficient daylight returns at dawn, the lights automatically turn off.

The lighting retrofit was completed in common property areas at Cypress Point. Parking garages, lobbies, and hallways have lights on 24 hours a day, all year round. Some lamps and fixtures or ballasts were also upgraded to accept the new LED lamps. The changes included adding night-time activated LED lamps to all the tall, outdoor lamp posts that are around the building entrances and walkways.

Outdoor Lighting

Outdoor lighting is designed to create an environment around the property that makes residents and visitors feel safe and secure. Non-uniform lighting caused by poor fixture placement or distribution can limit peoples' ability to see. High levels of uniform light are typically desirable. However, lights shining to the sky, into the neighbours' properties, or into residents' eyes and windows can be problematic. An experienced lighting contractor can help you select lamps and fixtures that direct light where it is needed, distribute it evenly and avoid glare and reduce light pollution. The overall effect is better lighting at the ground level and reduced glare against buildings.

The greatest change noticed after the Cypress Point lighting retrofit was outdoor lighting. The 35-year-old outdoor lamp posts around the property grounds had round globes, which were inefficient because they emitted light in all directions. These lights provided poor downward lighting on the pathways, because much of the light was emitted upwards. The existing lamp posts were retained and new fixtures were installed on top. The new, downward-focused LED fixtures improved ground lighting and provided a modern appearance. The outdoor fixtures, which surround the outdoor pool that is open until 11 p.m., provide better visibility and improved safety and security.



Good light levels in and around pools and hot tubs improves safety and security

Overall LED lighting system benefits include:

- Substantial energy cost savings
- Minimal operation and maintenance
- Better quality lighting overall
- Improved outdoor visibility at night
- Marketable benefit when selling units
- Can be dimmed or switched on and off without compromising lamp life



Picture of previous (above) and new outdoor light fixtures

Process

Before the building owner, and/or strata corporation makes a decision on a lighting retrofit, they require an estimate on the cost and savings benefits of a project. A lighting audit completed by a lighting contractor will determine the current energy use associated with the lighting, as well as estimated savings from a lighting retrofit. Audits are often done at low to no cost with the expectations that many projects will move ahead to the implementation stage. The lighting audit may also be performed by an energy management consultant who can do assessments on lighting and other major building systems at the same time.

In early 2015, the office administrator at Cypress Point learned of a program to help building complexes convert their lights to LEDs. The strata council invited a lighting contractor to give a presentation, which included sample fixtures, and demonstrate to the council the benefits of LED lighting. The council engaged the contractor to perform a lighting audit, the cost of which would be applied towards the lighting upgrades if the project went ahead.

It took over two days to complete the audit of all the common-area lights. The auditor's spreadsheet showed the specifics of the existing lighting, along with a proposed upgraded LED replacement plan and estimated cost of \$22,000. The upgrade cost was anticipated to be recovered through energy savings over two years.

In June 2015, the owners voted in favour of the complete common-area LED lighting retrofit. The contract was awarded to the lighting contractor to complete the work, and the lighting retrofit was completed over the next six months.

The overwhelming support for the project was attributed to well planned communication. The owners received the information three weeks in advance, with the documentation of the project in the AGM package. The lighting contractor gave a presentation of the project to the owners present at the AGM including samples of the

light fixtures and lightbulb types, and the spreadsheet documenting the payback cycle.

EDUCATING YOUR OWNERS

Upgrading the lighting system is either a recommendation in the depreciation report or an optional expenditure of funds. There are a few options to pay for the upgrades. If the upgrade is recommended in the depreciation report, a majority vote is required to spend contingency funds. If the upgrade is optional, the strata corporation may approve the use of contingency funds, operating surplus funds or a special levy by $\frac{3}{4}$ vote at a general meeting.

Communication with owners as you investigate the options and prepare for a general meeting is essential. Financial benefits are the primary reason for the conversion; however, the benefits of increased safety, security and to the environment are also valuable. Confirm the information and details about the upgrades, costs and benefits are accurate and well communicated to your owners before you hold a meeting for a vote. Energy cost savings are only beneficial if the owners can benefit from those cost savings.

Cost Implications

The reduced energy consumption results in a decreased electrical utility bill, which generates operational cost savings. A well-executed lighting retrofit will recover the initial cost of the retrofit, and continue to produce energy savings compared against the original system. On top of energy cost savings, the LED lights and fixtures have a longer life, which reduces maintenance costs.

The Cypress Point project only considered common-area lighting in the retrofit. There were some lights that did not have as good of a payback as others. These were left out of the retrofit to improve the overall economics of the project and ensure approval at the AGM. These included the old Exit signs and fluorescent fixtures in the hallway, which will be scheduled for future upgrades as the systems reach their serviceable life.



LED pot lights and old Exit signs

“The light emitted by the LED appears to have a nice brighter, cleaner, clearer appearance in every type of application and location.”

Gordon Farrell, President, Cypress Point strata council

The hallway fixtures were relatively new, and were designed specifically for a fluorescent bulb. Replacing these with new LED fixtures would have cost more and it would have taken longer to recover costs through energy savings. The Exit signs were planned to be upgraded in the coming year with LEDs lighting the new international symbol of a running person.

The project cost of \$22,000 was covered by the strata’s contingency reserve fund. The LED system brought immediate savings, ranging from 30% to 40% on its monthly electricity bill. Over a 7-month period in the first year after the installation, BC Hydro PowerSmart estimated electricity savings of \$5,400. At that rate, the project costs would be on track to be recovered in just over two years. The savings will help to offset the cost of inflation over the long-term and release funds for other maintenance or increased contingency contributions.

Timeline	
Start	Owner/council identifies LED upgrade as an option
Proposals	Contact consultants for proposals to assess cost savings & benefits
Communicate	Inform your owners about the project and process
Assess	Review estimates and proposals to determine project feasibility and cost savings
Decide	Call a general meeting for the owners approval
Implement	Proceed with upgrades, monitor the results and communicate with your owners

System Performance

Look for a minimum 5-year product warranty on lights and fixtures. Examine the warranty terms and make sure to keep any documentation required in case the product fails during the warranty period.

More Information

The Lighting Field Guide – Upgrading to LEDs for Multi-Family Housing, available at www.lrc.rpi.edu

Guide to Energy Efficient Lighting Technologies for Multifamily Properties, available at www.nwlightingnetwork.com

BEFORE YOU PROCEED WITH YOUR CONTRACTOR

- Does the contractor provide a product warranty for the labour/installation?
 - Will the contractor help apply for any potential rebates?
 - Will the contractor provide a comparison showing the savings to operate your new lighting vs your old lighting system?
 - Is the contractor properly licensed, insured for liability and workers compensation?
 - Can the contractor provide references for previous completed lighting projects?
 - Have you researched the contractor on the Better Business Bureau to be sure you are dealing with a reputable company?
 - Does the scope of work include labour, materials, lifts required and lamp/ballast disposal costs?
 - Has the contractor evaluated both the quantity and quality of light, including colour, for each application?
- Are the proposed lights covered under product warranty? For what duration?
 - If you have to file a product warranty claim, do you understand how the claim is filed, what the warranty covers and the address for filing claims?
 - Before you proceed with the contract, have you considered increased lighting demands in security locations, and lighting controls to better manage energy consumption?
 - Have you engaged a legal review of the contract?



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1701-4555 Kingsway,
Burnaby, BC V5H 4V8

Phone: 778-452-6454
Toll-free: 1-866-465-6873

Email: research@bchousing.org
www.bchousing.org