

# EASY\$ TIP SHEETS

## Energy Advice Saving Yukoners Money

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## Indoor Lighting for Comfort and Savings

Well-planned lighting can enhance any home and be energy-efficient at the same time. Lighting allows you to create a variety of moods and complement your décor — providing both dramatic effects and security. By avoiding models and products that waste energy and choosing efficient alternatives, you can save money through reduced electricity costs.

### Types of indoor light sources

#### Compact fluorescent lighting

Compact fluorescent lamps (CFLs) have been designed with energy efficiency in mind. As a compact version of a regular fluorescent tube, they are intended as a direct replacement for traditional incandescent bulbs. Screw-in CFLs can be used in conventional lamp sockets. CFLs come in a variety of shapes and sizes to fit most lighting fixtures. They've also been designed with lighting characteristics – colour rendering and temperature – very similar to those of incandescent bulbs. And although they cost more initially, CFLs will cost you less than incandescent bulbs when energy savings and longer life are taken into account.

### Goal and Summary

If you are thinking of buying new lighting products for your home, remember to take energy use into account when making your purchase decisions. Buying with energy efficiency in mind means paying careful attention to the type of fixture or bulb purchased and to its location in the home— details that can provide both energy savings and improved quality of lighting.

This Easy\$ tip sheet will provide you with information that will help you select the most effective and energy efficient lighting for your home.

## Types of Incandescent lamps

### Long life incandescent bulbs

experience longer life because they provide less light per watt than a standard incandescent bulb making them even less energy efficient. These bulbs were meant for use in areas where light level is not critical for tasks and changing bulbs is difficult.

### Clear standard-sized bulbs

are often used to add sparkle in specialty fixtures or chandeliers. They should be low-wattage and preferably controlled by a dimmer. These bulbs should not be used in situations where they are visible as they have a visible bright 'hot spot' at the filament location, which can create glare.

**Frosted (IF) bulbs** are white-coated on the inside, diffuse light evenly and create softer shadows. They are designed for use in table lamps or any situations where the light source is visible.

**Reflector (R) bulbs** have an interior coating of aluminum to direct the light forward. These are used in recessed fixtures to project a cone of light out of the fixture and down into the room. Ellipsoidal reflector (ER) bulbs focus the beam of light two inches ahead of the bulb to reduce the amount of light trapped in the lighting fixture. In a recessed fixture, an ER bulb delivers more light than an R bulb.

Compact fluorescent lights use about 75 per cent less energy than incandescent bulbs, while giving the same amount of light as the higher wattage incandescents they replace.

Since they have a rated life of 6,000 to 10,000 hours, as compared to 1,000 hours for incandescent bulbs, maintenance requirements are dramatically reduced — particularly where fixtures are difficult to reach and burned-out lamps are time consuming to replace. While the use of electronic ballasts provides for flicker-free startup and operation, not all CFLs can be used with any control device. Most dimmers, electronic timers, and photocells require special CFLs. Incompatible use will result in premature failure of the CFL. Ask your retailer for help in selecting the right CFL for your application.

## Types of compact fluorescent lamps



### CFL – U-bend

Long life, energy-efficient compact fluorescent lamps designed for easy retrofit in existing incandescent sockets. May have 2, 3 or 4 tubes that are bent into a U-shape.



### CFL – Spiral

Spiral shape provides better light distribution than U-bend.



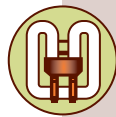
### CFL – Incandescent Shape

Have a cover over the CFL that looks similar to the A-line incandescent bulb it is meant to replace.



### CFL – Specialty

Special CFLs – for example dimmable or tri-light – are available for specific applications.



### CFL – 2D

This unique 2D lamp is used in a wide variety of specialty fixtures. Its ultra low profile allows the fixtures to hug the wall or ceiling to provide unobtrusive lighting.



### CFL – Circline

Comes with newer efficient fixtures. Not sold as a replacement bulb.

Source: B.C. Hydro Power Smart Tip Sheet, *Indoor lighting for comfort and savings*

## Incandescent lighting

The standard incandescent bulb is the original type of bulb used in the home. Incandescent bulbs have a low initial cost, are compact and produce a warm colour tone. However, they are not very energy-efficient, as only five to eight percent of the energy that goes into the fixture produces light, while the rest is dissipated as heat.

### **Tungsten halogen or quartz bulbs**

are a special type of incandescent bulb. They are used mainly for display lighting, floor lamps and track lighting. A conventional incandescent bulb has lower bulb efficiency partly due to a build up of filament deposits on the bulb—this is the blackening you see on incandescent bulbs as they near the end of their life. A halogen bulb has an inert gas and iodine or bromine added to the filling gas, which increases lamp life and efficiency by preventing darkening of the bulb. Halogen bulbs offer crisp white light and outstanding natural colours. A reflector is often incorporated into the bulb for better light dispersion and beam control. The bulbs are very compact, more energy-efficient than standard incandescents but less efficient than CFLs and they have a longer life than standard incandescents. Halogen bulbs are available in both line voltage (120V) and low voltage (mainly 12V) designs. There is more ultraviolet (UV) radiation generated from tungsten-halogen bulbs than from regular incandescent bulbs due to the higher filament temperature. Safety precautions must be taken when using these bulbs. For example, fixtures for these bulbs should have a lens or glass cover that, in addition to providing the required safety protection in case of bulb breakage, filters out most of the UV radiation. These bulbs also get extremely hot and must be kept clear of potentially flammable materials. Halogen bulbs should always be installed with the power switched off. It is also recommended that the bulb be held with a clean cloth, tissue or gloves to avoid fingerprints that can cause bulb discoloration, reduction in light output, short life, or violent failure. Follow bulb manufacturer's instructions on the package.

### **Fluorescent tubes**

Like CFLs, fluorescent tubes provide about four times more light (lumens) per watt than incandescent bulbs. This means that one 40-watt fluorescent tube produces about the same amount of light as three 60-watt incandescent bulbs, and lasts about eight times longer. Fluorescent tubes are connected to the power source through a device called a ballast. A ballast is a transformer-like device that delivers the starting and operating voltages and electric currents to the fluorescent lamp. A typical single electronic ballast can serve one to four fluorescent tubes. Fluorescent tubes are named according to the colour of light they emit (refer to Colour Temperature). "Cool" lamps are generally used in utility settings (laundry & shop areas) or in rooms where the decor is in blue or green tones or where mood lighting is not important. "Warm" lamps are generally best suited for living areas and more closely replicate incandescent lighting. Many lighting displays will demonstrate the difference between "warm" and "cool" lamps and can provide guidance on their appropriate use.

## Lighting terms

**CRI** — The Colour Rendering Index describes how well colours are represented under that light source compared to sunlight. Incandescent lamps have a CRI of 95+ while most CFLs are 80+. A light source with a CRI greater than 80 provides what is considered 'excellent' colour rendering.

**Colour Temperature** — This measures the slight differences in the colour makeup of light. "Warm" light sources have a low colour temperature (2000 to 3000K) and feature more light in the red/orange/yellow range. "Cool" light sources have a higher colour temperature (>5000K) and feature more blue. Standard incandescent bulbs are 2700K while halogen lamps are 3000K. Many CFLs fall within the 2700 to 3000K range.

**Bulb, lamp, fixture & luminaire** — Although 'bulb' and 'lamp' are often used interchangeably, the bulb shape was meant to refer to the shape of the incandescent light source. Lamp – which means, a device for producing a steady light – is the more correct term, particularly with all the different shapes today. A luminaire – most commonly known as a lighting fixture – consists of an electric light and its fittings.

### **Lumen efficiency**

A lumen is a measure of the amount of light produced. The efficiency of light is defined as the ratio of the light output (lumens) to the energy input (watts). The higher the lumens per watt, the more efficient the light.

## Control systems

One of the simplest ways to reduce your lighting energy consumption is to add automatic lighting controls that allow lights to be switched off when an area is unoccupied, or where lights may be inadvertently left on.

**Toggle switches** are the most common control for residential use. Three-way type switches, usually installed at entrances to rooms, stairways and hallways, permit the control of a light fixture from more than one location. Three-way

toggle switches can provide a pathway of light when going from one room to another and encourage energy savings by providing switches at more than one point of room entry so lights can easily be turned off when leaving rooms.

**Electronic Dimmer switches** can vary the level of light to create many moods while saving energy. Use of older-style dimmer switches which incorporate a rheostat does not result in energy savings.

Available in lamp-socket and wall-mounted varieties, electronic dimmers offer flexible control of light levels and economic operation. Using a dimmer at less than the full-bright position will prolong lamp life and conserve energy. Fluorescent lamps require special dimmers although dimmable CFLs can be used with conventional incandescent dimmers. Low-voltage halogen (mainly 12V) lamp systems can have magnetic or electronic transformers. A magnetic transformer can be controlled with a conventional incandescent dimmer but an electronic transformer requires a special dimmer. Ask your lighting supplier for the correct dimmer for your system.

**Time controls** are 24-hour electric clocks that can be set to switch devices on or off at predetermined times. Some time switches are equipped with a feature that automatically adjusts turn-on time according to season. They may, for example, be set to come on at dusk for a four-hour period. These are particularly well suited for controlling outdoor lighting.

**A portable plug-in time switch** can be used to turn a table lamp, radio or any appliance on and off automatically. These can help prevent accidents and can discourage intruders or vandals. When you are away, they can turn lights on and off at appropriate times to give your home a lived-in look or they can turn walkway lighting on for when you return at night.

**Occupancy and motion sensors** are electrical devices that can automatically turn lights on or off in response to the presence or absence of occupants in a space. Occupancy is sensed by ultrasonic, infrared, audio or optical means. Good applications for occupancy sensors include stairwells, long hallways, laundry rooms or other areas that are visited infrequently and where you are likely to have your hands full. Motion sensors are well suited for use outdoors to provide security (discouraging intruders), safety (to avoid obstacles) or for convenience reasons.

**Photoelectric controls**, commonly referred to as “photo-cells,” are activated by natural light for automatic dusk to dawn lighting. As it begins to get dark, the lights will go on and as dawn approaches the lights will turn off. They are useful for enhancing personal outdoor safety, security, lighting walkways, driveways, entrances and other areas where continuous night lighting is desirable. They are often used with timers to ensure that the lights do not come on during daylight hours.

## Colour and reflection

In all lighting systems, some of the light that reaches a task area is reflected from the walls and ceilings. Lighter paint shades reflect more light while darker paint shades absorb more light. It is therefore important to choose your room colour carefully, keeping in mind how much the colour will reflect the light within the room. In order to get maximum efficiency from a lighting system; consider finishing the room in light colours. Where possible, avoid high gloss finishes. These surfaces produce glare and can lead to visual discomfort and eyestrain.

## Cost of operation

Fluorescent lighting is more economical and efficient than incandescent, as it gives more light per watt used. When calculating the cost of operation, it should be remembered that in fluorescent fixtures the ballast uses a small amount of power (typically 3-4 W) that needs to be added to the wattage of the bulbs. To help you calculate the total cost of your lighting choices, see the example below.

<b>Comparing the costs of incandescent bulbs and CFLs of similar light output over 10,000 hours of use</b>		
	Incandescent bulb	CFL
Energy Use (in Watts)	60 W	15 W
Typical luminous flux (in lumens)	820	950
Bulb life (in hours)	1,000	10,000
Cost of bulbs over 10,000 hours of use	4 pack = \$3.00 1 bulb = \$0.75 x10 bulbs* = \$7.50 * 10 bulbs x 1,000 hours = 10,000 hours	3 pack = \$8.50 1 bulb** = \$2.83 **1 bulb x 10,000 hours = 10,000 hours
Cost of electricity	60 W x 10,000 hours = 600 kWh 600 kWh x \$.13/kWh = \$78.00	15 W x 10,000 hours = 150 kWh 150 kWh x \$.13/kWh = \$19.50
Savings		Bulbs (\$7.5 - \$2.83) = \$4.67 Electricity (\$78 - \$19.50) = \$58.50 <b>Approx. \$58</b>

Note: \*cost of bulbs and savings are estimates – use this chart as a guide only.

## Maintenance

When working with lights and electricity, always use caution. Ensure that the electric circuit to the fixture is turned off at the breaker, and be sure that bulbs are sufficiently cool before touching. Fixtures, bulbs and lamp parts should be unplugged and cleaned at least once a year. Dust and dirt accumulation reduces the light output and therefore the light's efficiency. Careful, frequent vacuuming is often all that is required to clean lampshades. Fixture covers should be wiped with a damp clean cloth or washed with soap and water, then thoroughly rinsed. Plastic parts should be allowed to drip dry because a drying cloth can create static electricity that will attract dust particles. Wet cloths should never be used to clean hot lamps as they may shatter.

This is a general guide only. Please ensure that all installations meet your requirements, manufacturer's instructions and all applicable codes, standards and regulations.

This Easy\$ tip sheet is provided by the Energy Solutions Centre.

If you have additional questions or comments, please contact the Energy Solutions Centre:

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