Basic Facts About
Residential Lighting

A bulb isn't just a bulb anymore...

The choice in light bulb shapes, sizes and brightness continues to grow as new and more energy-efficient light bulbs come onto the market. Fixtures for these light bulbs have been designed so that virtually any effect can be created – shadow-free lighting in the kitchen, flattering illumination in bathrooms, a soft chandelier glow for the dining room, mood and accent lighting for family and living rooms, and security lighting outdoors. And with today's advanced technology, these effects can be achieved in cost-effective ways.

So think twice the next time you need to replace a light bulb. Light levels and ambiance don't have to be sacrificed when buying economical energy-efficient lighting.

ENERGY STAR®

The international symbol for energy efficiency

Natural Resources Canada's Office of Energy Efficiency (OEE) promotes the international ENERGY STAR symbol in Canada. The symbol identifies products that use less energy, thereby helping you save money and help protect the environment. ENERGY STAR qualified products are sold at home improvement centres, hardware stores, local independent and regional retailers, and grocery stores.

Note: In this publication, the terms "bulb" and "lamp" can be used interchangeably.

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What's the difference?

Different types of light bulbs, such as compact fluorescent lamps (CFLs), deliver the same light output as incandescent light bulbs but use 75 percent less energy. When comparing different types of lighting, designers use the term "efficacy." The efficacy (or efficiency) of a light source is the ratio of lumens produced to watts consumed. Light output is measured in units called "lumens." In order to ensure consumers' satisfaction, ENERGY STAR qualified CFLs must meet minimum light outputs in order to claim to be a replacement for the higher-wattage incandescent light bulb, while meeting strict efficacy or lumen-per-watt requirements.

Light bulb efficiency varies from one manufacturer to the next, so it is always best to check the package for the manufacturer's recommended replacement wattage. The following table is a guide for selecting CFL replacements.

Look for the ENERGY STAR symbol to identify the best-quality CFLs

General Wattage Equivalency Guide for Replacing an Incandescent Bulb With a CFL	
Standard Incandescent (watts)	**ENERGY STAR Qualified CFL (suggested watts)**
40	10
60	15
75	20
100	29
150	38

Note: This table is provided as a guide only.

Cost Comparison of a 60-Watt Incandescent Light Bulb Versus a 15-Watt ENERGY STAR Qualified CFL		
	60-Watt Incandescent	**15-Watt CFL (ENERGY STAR)**
Initial cost (a)	$0.50	$6.99
Light output (lumens)	800	800
Life (hours)	1000	9000
Replacement light bulbs (b)	8 x $0.50 = $4.00	–
Lifetime electricity cost (c)	9000 hrs. x 60 x $0.08/kWh = $43.20	9000 hrs. x 15 x $0.08/kWh = $10.80
Total lifetime cost (a + b + c)	$47.70	$17.79
Savings	–	$29.91

Note: This table is provided as a guide only.

How many light bulbs does it take to save money?

A typical house has 30 light bulbs that use about $200 worth of electricity each year. Whether you are simply replacing burned-out light bulbs or designing a lighting system from scratch, the more you are willing to invest in energy-efficient lighting, the more you can save over the long term.

- Set a goal of replacing five standard incandescent light bulbs with ENERGY STAR labelled CFLs and you can save around $30 every year. Where would you put five new CFLs? You can base your decision on the following:
  - Where a light is on for more than three hours a day, such as the kitchen, family room, recreation room or workshop.
  - Where a light is in a hard-to-reach place, such as a recessed dome in a high ceiling.
  - Where exterior lights are on for much of the night (be sure that the CFL is labelled for exterior use).
- When purchasing for renovations, consider fixtures and light bulbs designed for task lighting that will concentrate light where you need it most.
  - Choose T-8 lamps with electronic ballasts when using linear fluorescent lamps. They are 25 percent more efficient than T-12 lamps and will save you money in the long run. Ask your electrician to retrofit your existing magnetic ballast to a suitable electronic ballast. Electronic ballasts minimize the flicker and noise of older lighting systems with magnetic ballasts.
  - You can also use photocells, motion sensors or timers to ensure that light isn't being produced when it isn't needed. A lighting retrofit will improve the quality of your home's lighting and could also save you over $60 each year in electricity costs.
- If you are building a new home, you have an opportunity for tremendous energy savings. By using only energy-efficient lighting systems, you can reduce the cost of lighting on your electricity bill by $100–$150 every year. After just a couple of years, you will have recovered the higher initial cost of the more efficient system. Ask your builder or contractor for help in choosing energy-efficient lighting.

How can you combat climate change?

Electricity generation emits harmful greenhouse gases (GHGs) that contribute to climate change. If you use less electricity to light your home, you are helping to reduce emissions of GHGs. If every household in Canada changed just one traditional incandescent light bulb to an ENERGY STAR labelled CFL, the country would save over $73 million in energy costs every year and reduce GHG emissions by 397 000 tonnes of carbon dioxide (CO_2) – which would have the same impact on climate change as taking 66 000 cars off the road for one year.

The Government of Canada has issued a challenge to all Canadians to reduce GHG emissions by one tonne a year. Choosing energy-efficient lighting is one way to help meet your One-Tonne Challenge. By replacing the light bulbs you use the most with two ENERGY STAR labelled CFLs, you can reduce the annual emissions associated with your lighting needs by 72 kilograms per year.

*1 tonne = 1000 kilograms

What's next on the horizon

There have been great leaps in efficient lighting over the past decades, from the traditional incandescent to halogen to compact fluorescent. The next technology on the horizon is light-emitting diodes (known as LEDs).

LEDs were introduced in the 1960s, but high costs limited them to a few niche applications such as "on/off" indicators on home and office electronics. There have been great advances in recent years, and LEDs are being commonly used for traffic signals, vehicle brake lighting and exit signs.

There are many advantages to LED lighting, the greatest being its efficiency. Many LEDs offer 90 percent efficiency that, when compared with 5 percent for traditional lighting sources, can offer significant cost advantages to consumers and help reduce GHG emissions.

Other advantages include

- long life
- low heat dissipation
- improved visibility
- resistance to shock and vibration
- reduced maintenance costs
- vivid colours
- high luminous intensity
- compatibility with integrated circuits
- compact size and light weight

The many potential applications for LEDs are only just being explored. These include street lighting, seasonal lighting, commercial signage and indoor/outdoor residential lighting. LEDs will not only revolutionize "how we light to see," but "how we see lighting." Stay tuned.

A word of caution

One popular type of light is the halogen floor lamp (sometimes called a "torchiere"). These lamps reflect light off the ceiling, providing indirect lighting. However, these lamps consume significant amounts of energy, using between 350- or 500-watt halogen lamps that become very hot. In the United States these floor lamps have caused over 350 fires and 32 deaths and are banned from many university dorms. Purchasing a torchiere with a cooler, more efficient light source, such as a CFL, reduces the risk of fire and saves significant amounts of energy.

For more information on the ENERGY STAR international symbol or tips on energy-efficient products, call Natural Resources Canada's Office of Energy Efficiency (OEE) toll-free at 1 800 387-2000, visit OEE's Web sites at oee.nrcan.gc.ca and energystar.gc.ca, or write to

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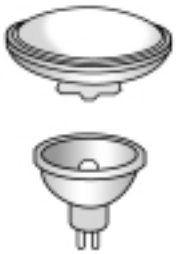
Choose the right type of light source for your lighting needs.

Compact fluorescent lamp (CFL) 	• CFLs give off the same amount of light as a traditional incandescent light bulb, but use 75 percent less energy and last 10 times longer (over 6000 hours, or roughly five years). They are the only light bulbs to carry the ENERGY STAR designation. • They can directly replace incandescent or halogen lamps in many fixtures. Although they are more costly than incandescent light bulbs, the energy savings can pay off the additional cost in less than two years when used in light fixtures that are on for more than three hours per day. • Modern CFLs provide the characteristic warm glow of incandescent light bulbs, making them suitable for any application in the house.
Fluorescent tubes 	• Fluorescent tubes are very efficient, but are sometimes not suitable for specific applications because of their length. • They are often used in light fixtures that are part of architectural or design features, for example, above or below a cabinet or in valances, soffits or coves. • Fluorescent tube lamps are best suited for areas where bright light is needed, such as kitchens, laundry areas and workshops. • T-8 (1” in diameter) or T-5 (5/8” in diameter) fluorescent lamps with electronic ballasts are more efficient than older T-12 (1-1/2” in diameter) lamps. Modern fluorescent lamps such as CFLs also have a warmer colour than older models. • You should consider fluorescent tubes when undertaking home renovations. They are easily installed by an electrician as part of a lighting retrofit.
Halogen 	• Halogens are a type of incandescent light bulb, but chemicals called “halogens” are introduced inside the lamp to minimize filament wear. This has the effect of increasing the lamp’s life to 3000 hours, or roughly two years. • Halogen lamps come in a wide array of shapes and sizes and are best suited for uses where focused light is needed in a small area, such as task, track or accent lighting. • Halogens operate at high temperatures, so they should be installed away from drapes or other flammable materials.
Incandescent 	• Incandescents are the traditional light bulbs we have been using for years. • They are inexpensive but very inefficient. (Only 4–6 percent of the electrical energy used by an incandescent light bulb is converted into visible light. The remaining energy is lost as heat.) • They have a very short life (750–1000 hours, or roughly half a year of normal operation). • Some incandescent light bulbs are marketed as long-life or as energy savers, but these light bulbs achieve this by producing less lumens (light output). They aren’t nearly as efficient as compact fluorescent lamps.

Leading Canadians to Energy Efficiency at Home, at Work and on the Road

The Office of Energy Efficiency of Natural Resources Canada strengthens and expands Canada's commitment to energy efficiency in order to help address the challenges of climate change.

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