



Using Compact Fluorescent Lamps (CFLs) Why do it?

Replacing energy-hogging incandescents with energy-saving fluorescents (CFLs) is a simple, effective way to slow the rate of global climate change while saving money. It's good for the environment, it's economical, it's efficient, and it's easy.

Why do it – Energy Savings



Cost - How much does it cost to run a light bulb? Are CFLs worth it?

Incandescent bulbs waste 90 percent of their energy generating heat. The "fuel" efficiency of a CFL is like replacing a car that gets 20 miles per gallon with one that gets 100 miles per gallon.

Replacing incandescent bulbs with CFLs lower the electrical bill for lighting up to 75%. If you replaced 20 75-watt incandescent bulbs with 23-watt CFLs, you would save 1,040 watts for every hour that the lamps burned. At five hours per day, this means saving over 2,000 kWh or about \$208 back in your pocket every year. (Replace them with a 20-watt CFL and save more – but slightly less light.)

If you know the wattage of any electrical device, you can figure out the cost with this formula:

$$\text{Cost to run} = \frac{\text{wattage} \times \text{cost per kilowatt hour} \times \text{average rated life}}{1000}$$

You can get your cost per kilowatt hour (kWh) from your utility bill. Many of Michigan residents pay between \$0.075 (7.5 cents) and \$0.097 (9.7 cents) per kWh. The rate may change from winter to summer.

Example:

A 75 watt incandescent lamp; run 2000 hours; at a rate of .10/kWh = average cost per year

$$\text{Cost} = \frac{75 \times .10 \times 2000}{1000} = \$15.00.$$

A 23 watt CFL bulb (same or better light than the 75 watt incandescent); run 2000 hours; at a rate of .10/kWh = average cost per year

$$\text{Cost} = \frac{23 \times .10 \times 2000}{1000} = \$4.60$$

If the CFL bulb cost less than \$10, the energy savings paid for it in the first year but the energy savings continue for the rest of its life - four or more years – and go in your pocket. If there are labor costs related to replacing the bulbs, these are also saved. The longer life CFL means up to 10 fewer light bulb changes.

Total Expenditures 4 years*	ENERGY STAR Qualified Light Bulb (23-Watt CFL)	Standard Incandescent Light Bulb (75-Watt bulb)
Initial Investment	\$9	\$0.50
Energy Cost	\$18.40	\$60
Replacement Cost	\$0	\$5.33
TOTAL COST	\$27.40	\$65.83

* Based on 8,000-hour CFL life and 750-hour incandescent life and 10 cents per kWh. If you want to compare the longer life incandescents, drop the watts on the CFL to 20 as the longer life incandescents provide less lumens. The savings may be even greater.

* NOTE: When comparing incandescent or halogen bulbs to fluorescent, compare the light output, or lumens, and not watts. Watts equal the energy used, not the amount of light.

* Generally if the CFL cost less than \$10, the first year's energy savings pays for the light bulb. That's a better return on investment than seen in most other programs, including stocks.

Cooling Costs

One additional area of potential savings is cooling. Ninety percent of the energy used by incandescents generates heat, to heat the filament in order to produce light. By replacing them, there will be less need for cooling the heat they generated during the summer season.



Why do it – Environment

The less energy used, the less needed to be generated. That means the less of all of these environmental effects. Residential demand uses 33% of all electricity generated.¹



Acid Rain

“The largest group of contributors to U.S. emissions of SO₂ was the electric utilities, accounting for 69 percent in 2001 (see Table U-1 and U-2)... Sulfur dioxide ...is a major contributor to the formation of urban smog and acid rain. As a contributor to urban smog, high concentrations of SO₂ can cause significant increases in acute and chronic respiratory diseases. In addition, once SO₂ is emitted, it ...returns to earth as the primary contributor to acid deposition, or acid rain. Acid rain has been found to accelerate the decay of building materials and paints, and to cause the acidification of lakes and streams and damage trees.”²

CO₂

Most of the electricity used in Michigan for lighting is generated by coal powered plants.³ These power plants pollute the atmosphere and emit CO₂, SO₂, NO_x, and mercury. In fact, “The process of generating electricity is the single largest source of CO₂ emissions in the United States (39%).”⁴ **One CFL replacing an incandescent can cut CO₂ emissions by 822 pounds in five years.**⁵ Replacing 17 bulbs reduces enough CO₂ to equal removing one car off the road for a every year.⁶

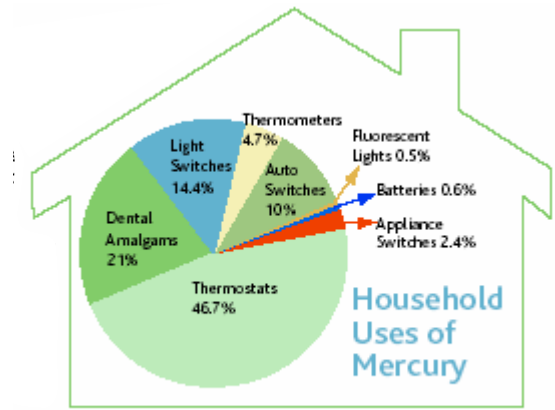


Global Warming

“There is a natural greenhouse effect that contributes to warming. Greenhouse gases trap heat, and thus warm the earth because they prevent a significant proportion of infrared radiation from escaping into space. Concentration of greenhouse gases, especially CO₂, have increased substantially since the beginning of the industrial revolution. And the National Academy of Sciences indicates that the increase is due in large part to human activity. Energy-related activities are the primary sources of U.S. man-made greenhouse gas emissions, representing about 85 percent of the U.S. man-made total carbon-equivalent emissions in 1998.” This and other information on global warming can be found on [EPA's Global Warming website](#). EPA also has [environmental calculators](#) you can use to help determine your impact on global warming and what to do to minimize it.

Landfills

In addition, for every CFL used, there are eight less incandescent light bulbs ending up in landfills.



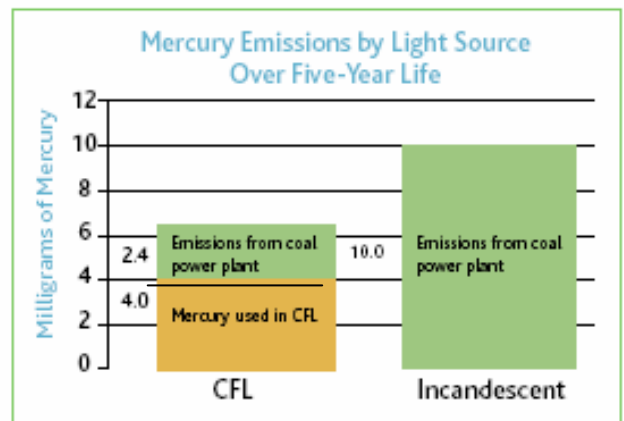
Source: North Carolina Department of Environment and Natural Resources

Mercury

Mercury is used in many household items:

thermostats, thermometers, fluorescent lights, batteries and switches for appliances, lights and automobiles. Exposure to large quantities of mercury in our air, water and fish we eat is a documented risk to human health. An extremely small amount of mercury—an average of four milligrams—is sealed within the glass tubing of a CFL. This is said to be about the size of the period at the end of this sentence. It is an essential, irreplaceable element in CFLs, and it's what allows the bulb to be such an efficient light source. The mercury in a CFL is no threat to the environment unless the glass is broken. For a basis of comparison, there are about one to three grams of mercury in your average home thermometer. It would take between 250 to 1000 CFLs to equal that same amount.⁴

Ironically, a regular incandescent light bulb actually releases much more mercury into the environment than a CFL. CFLs *prevent* mercury from entering our air, where it most affects our health by reducing energy demand at the power plant. The highest source of mercury in our air comes from burning fossil fuels such as coal, the most common fuel used in Michigan to produce electricity. A CFL uses up to 75% less energy than an incandescent light bulb and lasts up to 10 times longer. **A power plant will emit 10mg of mercury to produce the electricity to run an incandescent bulb compared to only 2.4mg of mercury to run a CFL for the same time.**⁷ (mg = milligrams)



Source: US EPA, June 2002

Disposal – Homes

Some communities offer disposal or recycling programs that accept fluorescents. Check with your local or municipal government entity responsible for solid waste or household hazardous waste collection. • Disposal through the household hazardous waste collection is preferred but you can lawfully dispose of CFLs in your household garbage. To reduce the risk of bulb breakage or contamination and to protect yourself and the garbage staff from cuts, wrap the bulb in a sealed plastic bag and discard it with your trash.

Nitrogen Oxides (NOx)

Nitrogen oxides (NOx), is the term used to describe the sum of NO, NO2, and other oxides of nitrogen. Emissions from electrical generation accounts for 24% of the NOx emitted in the U.S.⁸ NOx plays a major role in the formation of ozone in the atmosphere... It is also a matter of public health concern. NO2 exposure can cause problems for individuals with preexisting respiratory illnesses, as well as increases in respiratory illnesses in children 5 to 12 years old. Evidence suggests that long-term exposures to NO2 may lead to increased susceptibility to respiratory infection. (Note: Home heaters and gas stoves also produce substantial amounts of NOx in indoor settings.) Deposition of nitrogen from NOx can also lead to fertilization, eutrophication, or acidification of terrestrial, wetland, and aquatic (e.g., fresh water bodies, estuaries, and coastal water) systems.⁹

Why do it – Practical Reasons



Compact fluorescent bulbs are especially good for hard-to-reach or inconvenient places - particularly if these places are where the lights are on for long periods of time. Suppose a bulb is installed in a high ceiling light (not recessed or enclosed) that requires a ladder to reach. CFLs are great for this if left on for an hour or more at a time. CFLs used for short periods will not last their full rated life. But, let's say this is a hall light that is used for less than 30 minutes at a time. If you used a CFL, and it lasts only half the rated life of 10,000 hours, it lasts 5,000 hours. It's estimated that the lights are on for 2000 hours a year. That means the CFL would last 2.5 years. Using incandescent light bulbs for the same 5000 hours, you'd have to change the light at least 5 to 8 times. By using a CFL, even with a reduced life, that's 5 to 8 times someone didn't have to get on a nearby chair or pull out a ladder to change out blown light bulbs. There's also that much less a chance of an injury.



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