

Compact Fluorescent Lamps and Fixtures

A Pacific Energy Center Factsheet

How This Technology Saves Energy

Compact fluorescent lamps (CFLs) are simply miniature versions of full-sized fluorescent. CFLs are available in many sizes and shapes. They typically replace lower-efficiency incandescent lamps. Efficiency ranges from 25 to 75 lumens per watt (lumens per watt is a common measure of lamp efficiency). This is substantially greater than incandescent lamps, which range from 5 to 15 lumens per watt. CFLs achieve this advantage using an arc discharge through a phosphor-lined tube rather than heating a resistance filament.

Types of Compact Fluorescent Lamps



Twin-tube lamps consist of two straight, parallel, miniature fluorescent tubes. Major manufacturers refer to these lamps as "Biax" (short for biaxial) or "Dulux." Both terms describe the same two-legged lamp. Twin-tube lamps are very versatile for applications that do not need high light output. Their slender shape fits well in task lights, sconces (lights affixed to the wall), and recessed ceiling downlights.

High-output twin lamps approach the output of full-sized fluorescents. They are available in power ranges of 18 to 40 watts. The largest provide nearly as much light as a 4-foot full-size fluorescent lamp. They can be used in many fixture types that formerly used full-sized fluorescent lamps.



Quad-tube, also known as double-twin, double biax, PL "clusters" or "PLC" lamps—place four parallel tubes on the same base as twin tubes. They provide nearly the same light output as twin tubes of equivalent wattage in only half the length, though internal shading reduces total light output somewhat.



Triple biax lamps were developed to generate even more light from a shorter lamp. They pack very high light output into a small space and can be used in fixtures designed for incandescents lamps, such as table lamps.



F-Lamps have two twin tubes aligned in a single plane, shoulder to shoulder. They are well suited to task lights and low-profile surface and recessed fixtures.



Circular or "Circline" fluorescent lamps are not always considered members of the compact fluorescent family. They date from the 1940s and many give off the same cool white light as standard full-size fluorescents. However, at least one manufacturer produces circular fluorescents that give off warm light and contain electronic ballasts that can turn on instantly. The 20-, 22-, and 30-watt versions are among the few compact fluorescents that can replace 100- to 150-watt incandescents with comparable light output and still fit in residential reading lamps.



2-D or double-D lamps are available in five models between 10 and 38 watts. This configuration is ideal for low-profile surface and recessed fixtures

Benefits and Pitfalls

Certain fixtures are more readily retrofitted than others, and both fixture design and the number of hours that a lamp is used affect energy savings and cost-effectiveness. Both the benefits and pitfalls of compact fluorescent lamps should be considered before retrofitting existing fixtures or purchasing new fixtures.

Benefits

- CFLs typically use 60 to 75 percent less energy than the incandescents they replace. Nearly any lamp operating more than 1500 hours a year has good potential for a CFL retrofit or a new fixture designed for CFLs.
- CFLs come in several sizes and configurations, and can be applied nearly anywhere that incandescent sources are used for general area lighting. Applications include ceiling downlights, task lights, wall sconces, and pendant and decorative fixtures.
- Careful selection of CFL lamp and retrofit kits or the purchase of new fixtures designed for CFLs can overcome barriers to installation.
- Energy savings and lower relamping costs (because CFLs last longer than incandescents) outweigh the first cost of CFLs when lamps operate more than 2,000 hours per year.
- Recessed downlight fixtures are candidates for retrofit kits that use CFLs. The specific kit will depend on ceiling height, desired lumen output, and desired light distribution.
- Incandescent desk lamps can be replaced with CFL task lamps, many of which are inexpensive (under \$50) and use the small 13W twin-tube lamps.
- Table lamps can be retrofitted with circline or 2D lamps-some of which now are available in 3-way designs that have three different light output levels.
- Sconces can be difficult to retrofit, although many varieties of new fixtures with CFL lamps are available.
- Pendant or other fixtures with recessed lamps may be retrofitted with screw-in CFLs.

Pitfalls

- CFL lifetime is highly sensitive to lamp on/off cycling. Most CFLs have rated lifetimes of about 10,000 hours. But this can be dramatically reduced by frequent cycling.
- Most CFLs do not produce enough light for high-ceiling (above 12 feet) ambient lighting applications.
- CFLs are not appropriate for certain situations, such as accent lighting or glittery retail display, where tight beam spread or sparkle is needed.
- Reflectors in many fixtures designed for incandescents may not provide the desired quantity or distribution of light when retrofitted with a CFL.
- CFLs are valuable and may be stolen from public areas; theft-resistant devices are available.
- CFLs may be too long or wide to fit fixtures designed for incandescents.
- CFL light output and lifetime are reduced by ambient temperatures that are too hot or too cold.
- Some magnetically ballasted CFLs flicker and hum. Others emit infrared radiation that can interfere with the remote controls of televisions, stereos, and video players.
- CFLs cannot be installed on existing dimming circuits. Only 4-pin CFLs with dimming electronic ballasts can be dimmed, and these units are expensive.

For More Information

Contact your PG&E representative or call 1-800-468-4743 for more information about PG&E's energy efficiency programs and other services.

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