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## **Recycling Household CFLs**

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Since the 1940s, consumers have installed fluorescent lighting in their garages, kitchens, bathrooms, utility rooms, and recreation rooms. In the 1980s, lamp manufacturers developed a smaller, compact version of the fluorescent lamp as an alternative to incandescent bulbs for other areas of the home.

During the past ten years, technological advances in compact fluorescent lamp technology has greatly improved light quality, eliminated flickering, reduced size, reduced warm-up time, and reduced cost. As a result, the use of compact fluorescent light (CFL) in homes has skyrocketed during the past few years. Industry and government sources and the environmental community have heralded the CFL as a major part of the solution to consumers' energy woes.

This enthusiasm stems from the fact that fluorescent lamps, including CFLs, are substantially more energy efficient than incandescent bulbs, which lose most of their energy to heat. Fluorescents require 70 to 80% less electricity to operate, thereby reducing the burden on power plants and generating fewer emissions of mercury and other hazardous air pollutants from coal-burning power plants. According to the US EPA, if every home in America replaced just one incandescent light bulb with an ENERGY STAR<sup>1</sup> qualified CFL, the energy saved would be sufficient to light more than 3 million homes and prevent greenhouse gas emissions equivalent to those of more than 800,000 cars annually. Also, fluorescent light bulbs can last up to 10 times longer than incandescent light bulbs, which greatly reduces replacement costs.

Therefore, while CFLs currently cost more at purchase than incandescents, they produce dramatic long-term savings in both operational costs and energy use. It is for this reason that utilities in various regions of the US have promoted CFLs through product give-aways, discount coupons, and buy-down programs.

The growing market penetration of CFLs, however, has generated increased concern over their disposal. CFLs, like other fluorescent lamps, contain a small amount of mercury that is necessary to create light. To date, manufacturers have not been able to identify an energy-efficient substitute for the mercury. Because studies indicate that long-term exposure to large amounts of mercury vapor can pose health risks, there is general agreement that fluorescent lamps should be handled carefully and managed properly at time of disposal.

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<sup>1</sup> ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy designed to reduce energy costs and protect the environment through energy efficient products and practices. See <http://www.energystar.gov>.

## HOW SMALL IS SMALL?

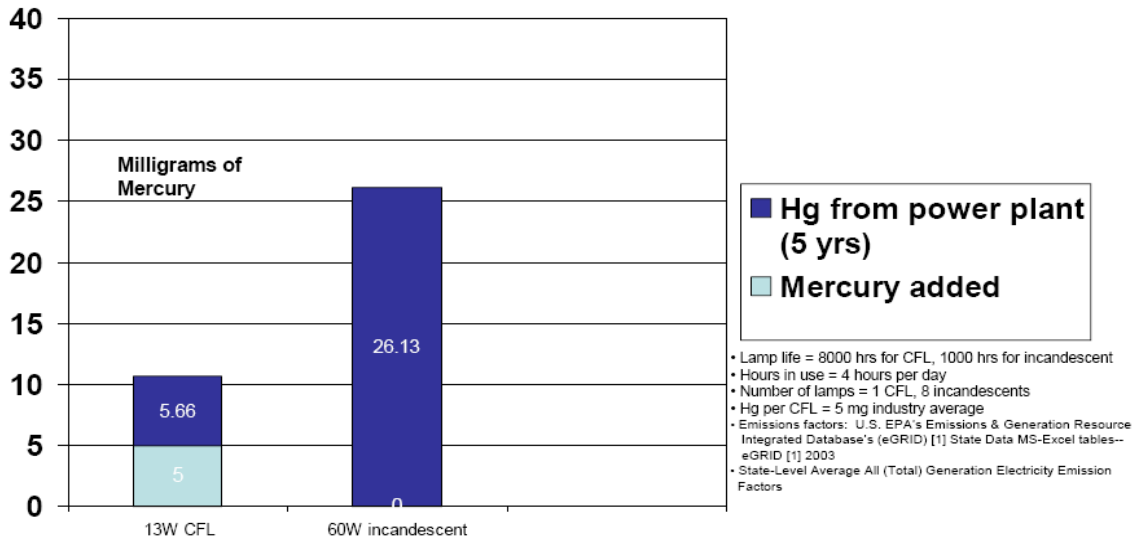
The amount of mercury in a compact fluorescent lamp is extremely small – barely enough to coat the tip of a ball point pen. To insure that this amount stays small, in April 2007 NEMA members announced agreement on a self-imposed limit on mercury content in CFLs of no more than 5 mg for standard wattages.<sup>2</sup> This limit has since been integrated into the US EPA’s revised ENERGY STAR specification for lamps and therefore must be met by manufacturers who seek ENERGY STAR certification for their products.

The NEMA commitment, however, represents a ceiling on mercury content—the actual average is estimated to be about 3–4 mg. Assuming a mercury level of 3 mg, one pound of mercury would make 150,000 CFLs. According to the U.S. Environmental Protection Agency (EPA), CFLs account for about 0.01% of anthropogenic emissions of mercury. An oral mercury thermometer, in comparison, contains 500 mg to 1 gram of mercury—or 100 to 200 times more than a CFL.

## NET MERCURY BENEFIT

Using CFLs produces a net environmental benefit. In the U.S., more than half of our electricity is generated from coal-burning power plants. Burning coal releases many air pollutants, including airborne mercury. CFLs are four to five times more efficient than standard incandescent light bulbs and thus need proportionately less electricity to operate. This eases the burden on power plants, thereby reducing air emissions of mercury and other hazardous pollutants.

## Mercury Total Over 5 Years Compact Fluorescent Lamp vs. Incandescent



Source: NEMA

<sup>2</sup> This applies to CFLs with wattages up to 25W. A maximum of 6 mg applies to CFLs with higher wattages.

As seen in the chart above, even accounting for the mercury contained in the bulb, there is less mercury vapor release associated with CFLs than with standard bulbs. Moreover, unless the CFL breaks, the mercury is fully contained within the bulb. And even when broken, CFLs release only a small percentage of the mercury as a vapor - the majority of the mercury will remain bound to the lamp fragments.

### **WHAT ABOUT DISPOSAL?**

Sales of ENERGY STAR rated CFLs in 2007 were estimated to be roughly 290 million units. This number is expected to increase dramatically in response to continued promotion of CFLs as an energy conserving option for consumers. In addition, the Energy Independence and Security Act of 2007 imposes stringent energy-efficiency standards on general service incandescent lamps, which will further enhance the market position of CFLs.

Because they contain mercury, the rising popularity of CFLs has led to growing concern about proper disposal. This issue has substantial cost implications, as EPA estimates the cost of properly recycling bulbs to be from \$0.50 to \$2.00 per unit. This makes the cost per gram of mercury recovered through recycling CFLs enormously high, given the *di minimus* amount contained in each bulb and the costs associated with collection and processing.

Moreover, efforts to adjust retail prices of CFLs to incorporate recycling costs could increase the price of CFLs by 50% or more. Higher prices could depress sales and hinder efforts to meet state and regional energy conservation goals, which increasingly reflect the transition by consumers to more energy efficient lighting.

Therefore, while proper disposal of CFLs is important, recycling is expensive relative to the price of the lamp and difficult to integrate cost-effectively into the purchase price. The environmental benefit potentially achieved by recycling CFLs is far less than that associated with higher mercury content products, such as mercury thermostats.

### **NEMA SUPPORTS LAMP RECYCLING**

Notwithstanding the high relative cost of recycling, manufacturers support efforts to recycle lamps as a way to reduce mercury vapor in the environment. Since 2003, NEMA has funded and maintained [www.lamprecycle.org](http://www.lamprecycle.org), a one-stop, on-line source for lamp recycling information nationwide. The website contains a list of recyclers as well as links to state environmental authorities, contact numbers, and documents related to bulb management. Recyclers, governments, and environmental groups actively promote the use of this website.

Manufacturers also label the packaging for every fluorescent lamp sold in the U.S. with the web site address and a toll-free information number, and a notice that the user should follow applicable disposal laws. Meanwhile the lamps themselves are marked with an “Hg” symbol enclosed in a circle as notification that they contain mercury. Individual manufacturers also have implemented their own bulb-recycling programs and education efforts.

### **EXISTING RECYCLING OPTIONS**

Convenient lamp recycling options for consumers are not yet widespread in all areas, but the situation is rapidly improving. Industry is working with several multi-stakeholder working

groups to examine the elements of, and impediments to, an efficient national framework for residential lamp recycling. Meanwhile, recycling mechanisms are developing independently in various regions and business sectors. Examples include the following.

- In June, 2008, the Home Depot Corp. launched a national in-store, consumer CFL recycling program at all 1,973 Home Depot locations. The service is free and applies to all brands of CFLs.
- IKEA furniture stores recycle CFLs at no cost at their store locations.
- All Orchard Supply Hardware stores in California are now taking back residential end-of-life CFL and fluorescent tubes
- Smaller, more localized outlets such as Ace Hardware, TrueValue, Menards, Orchard Supply, and Aubuchon Hardware are offering CFL recycling services, usually at no cost, either on their own or as part of utility-run programs (see below).
- Other retailers, such as Wal-Mart and Target sometimes run one-day events and are testing other collection options.
- Utility-run collection programs exist throughout or in parts of Maine, Vermont, Wisconsin, Illinois, Washington, Oregon, Florida, California and Minnesota. Operated by utilities or efficiency partnerships, these programs pay for the CFL recycling and recruit local retailers to offer collection. Funding for the programs stems from the ratepayer base, either through general revenues or through special project set-asides.
- In California, utility companies Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric included funding for end-of-life fluorescent light education, outreach, and collection in their 2009-2011 Rate Filings with the California Public Utilities Commission
- A pilot program in New Hampshire utilizes various funding sources to offer free collection at hardware stores throughout the state.
- Delaware's Energy Office has established a recycling program that enables state residents to take CFLs to numerous disposal centers within the state. Drop-off sites include Newark's municipal building, the Delaware Energy Office and environmental headquarters, and Delaware's Electric Cooperative office.
- Local jurisdictions, such as Dane County, Wisconsin and San Luis Obispo County in California, have retailer lamp collection programs in place. Dane County enacted an ordinance that requires lamps to be recycled and has established a network of more than 50 retail establishments that take back lamps from consumers. San Luis Obispo County's network contains more than 300 businesses ranging from national chains such as Costco and Kmart to local stores such as Farris Lighting.

- Many household hazardous waste collection centers will accept fluorescent lamps from consumers for recycling. The USEPA site [www.epa.gov/bulbrecycling](http://www.epa.gov/bulbrecycling) contains a list of household hazardous waste collection centers by state.
- [www.earth911.org](http://www.earth911.org), a privately-owned, web-based service, provides a national search engine, using zip codes, to help consumers find fluorescent lamp recycling locations in their area.

In June 2008, Veolia Environmental Services announced that it would offer free CFL recycling for the remainder of the year for its municipal waste center customers in the state of Massachusetts. Veolia also has a retailer-recycling network with a growing number of participating stores. A list of retailers participating in this network can be found at [www.recycleabulb.com](http://www.recycleabulb.com)

As several of these examples attest, utility funding is a potentially fertile source of support for lamp recycling activities. A recent report sponsored by the Alliance to Save Energy<sup>3</sup> on funding mechanisms for energy efficiency notes that “Ratepayer-supported funds can be a large source of revenue; Vermont’s fund exceeds \$24 million annually for a population of about 600,000, and California’s program is \$500 million annually for a population of approximately 36 million people.”<sup>4</sup>

In addition, State and local governments are becoming more active at growing consumer awareness of the need to recycle mercury-added lamps. The state of Minnesota, for example, passed a law requiring retailers who sell fluorescent lamps to post the following notice in 36-point type or larger: “Fluorescent bulbs save energy and reduce environmental pollution. Note: Fluorescent bulbs contain a small amount of mercury and must be recycled at the end of their use. Contact your county or utility for recycling options.” Meanwhile, in spring 2008 the California Public Utilities Commission approved a proposal by Pacific Gas & Electric Co. to partner with local governments to raise public awareness of lamp recycling and to stimulate recycling.

## **STAKEHOLDER DIALOGUES AND WORKING GROUPS**

While the recycling market has matured, manufacturers have been convening with other stakeholders in a series of working groups to evaluate the impediments to recycling, explore policy options, and develop recommendations. Through the first half of 2008, for instance, NEMA companies participated in a Lighting Task Force organized under statutory mandate by the California Department of Toxic Substances Control. The task force put forth several proposals for collection and recycling systems with the intent of presenting them to the California legislature for consideration in the 2009 legislative session.

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<sup>3</sup> The Alliance to Save Energy is a coalition of prominent business, government, environmental and consumer leaders who promote the efficient and clean use of energy worldwide to benefit consumers, the environment, the economy and national security (see [www.ase.org](http://www.ase.org)).

<sup>4</sup> “State Energy Efficiency Policies – Options and Lessons Learned” – Brief #1: Funding Mechanisms for Energy Efficiency, by Matthew Brown, InterEnergy Solutions, Sept 2008, pg 4.

During the same period, the Product Stewardship Institute convened a “national dialogue” on end-of-life management of fluorescent lamps. This project, which will continue into 2009, involves state and local government representatives, recyclers, industry members, and environmental advocates and is intended to generate collaborative strategies to increase the use of fluorescent lighting and ensure its safe disposal at end-of-life.

### **PRODUCER RESPONSIBILITY**

Some parties have argued that manufacturers should be responsible for financing and arranging the collection and recycling of CFLs. This type of arrangement is called “Manufacturer Take-Back” or “Extended Producer Responsibility.”

As discussed in detail in the NEMA White Paper entitled “Manufacturer Take-Back of Lamps,” manufacturer take-back systems are an ineffective and impractical approach for mercury containing lamps. The difficulties associated with such systems are magnified in the case of CFLs, which are a commodity product largely consumed and disposed of by households. Manufacturer take-back requirements could actually result in greater emissions of mercury to the environment – exactly opposite of the goal it seeks to achieve.

Problems with manufacturer take-back of CFLs include the following.

- 1) **It would be very expensive for the consumer.** To cover the costs of both collection and recycling, manufacturers would need to add recycling costs, collection costs, and administrative overhead into the purchase price of a CFL. This markup is then increased further by other parties in the distribution chain, adding even more to the final price to the consumer.
- 2) **Manufacturers are not set up to collect CFLs.** Unlike retailers, manufacturers do not have multiple locations designed for direct interaction with consumers and thus cannot readily and cost-effectively arrange for collection of used products.
- 3) **Consumers would not benefit from efficiencies in the recycling system.** There is no way to determine today what the cost of recycling a CFL will be in seven to ten years, when it is ready for disposal. This makes it impossible for manufacturers to estimate recycling costs and build them into the price of their product.
- 4) **It will increase the cost of energy-efficient lighting.** Light bulbs are very price-sensitive and recycling costs can add as much as 150 percent to the price of a single bulb. This greatly increased price would reduce overall CFL use increasing power generation and increasing pollution, including mercury pollution from power generation. Slowing the transition to more energy efficient lighting is counter to the nation’s energy reduction goals.
- 5) **Many stakeholders are designing recycling solutions.** As noted earlier, CFL recycling programs are being implemented in a variety of locations through the efforts of local governments, retailers and utility programs. While a uniform nationwide system has not yet appeared, it is clear that the most effective, cost-

efficient approaches are those in which many or all stakeholders play a role and costs are distributed to the broadest possible base.

- 6) **Lamp manufacturer take-back systems would be inefficient and duplicative.** As discussed in “Manufacturer Take-Back of Lamps,” manufacturer collection would cause many duplicative and non-competitive recycling systems to appear, which will raise recycling costs significantly. The fact that the US EPA ENERGY STAR web page lists more than 200 CFL manufacturers as ENERGY STAR partners indicates the extent of this problem (see manufacturers list at [http://www.energystar.gov/index.cfm?c=cfls.pr\\_cfls](http://www.energystar.gov/index.cfm?c=cfls.pr_cfls))

## CONCLUSION

CFLs benefit consumers and the environment. They save energy and produce cost-savings for the user. They also reduce air pollution and airborne mercury emissions from power plants. CFLs last six to twelve times longer than traditional incandescent lamps, meaning fewer resources are consumed by their use and fewer lamps need to be disposed of at end of life.

NEMA manufacturers are committed to achieving further reductions in the mercury content of fluorescent lamps. The industry also will continue to work with lawmakers and other stakeholders to advance the market for CFLs and other energy efficient lighting technologies, and to find optimal solutions to managing CFLs at end of life. We therefore support public policies designed to:

- Keep the cost of energy efficient CFLs affordable to consumers,
- Develop sensible, cost-effective solutions for bulb collection and disposal that fit the widely variable circumstances of consumers nationwide,
- Provide a variety of consumer lamp recycling options,
- Involve multiple stakeholders in the effort to design recycling solutions and establish programs,
- Build upon the existing recycling infrastructure, and
- Enable recyclers to pass the true cost of recycling to consumers and other stakeholders, allowing for price reductions as volumes increase and recycling technology improves.

In general, these principles can be applied on a regional, state, or even local level to implement convenient, cost efficient systems that serve consumers. NEMA also encourages efforts to design a national, federally mandated approach that adheres to this model, as it might promote greater uniformity and cost reduction.