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**LAMP INDUSTRY PRODUCT STEWARDSHIP**  
**A RECORD OF ENVIRONMENTAL ACCOMPLISHMENT**  
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The vast majority of fluorescent and high intensity discharge (HID) lamps (light bulbs) contain mercury, a naturally occurring element that is pervasive in the environment. This mercury is an important component of the lamp, and enables the lamp to operate much more efficiently than incandescent and halogen lamps. Government agencies actively promote the use of energy-efficient mercury-containing lamps to reduce greenhouse gas emissions. Ironically, this higher efficiency, due in part to the use of mercury, prevents the release of much higher amounts of mercury (and many other undesirable emissions) from power plants. The use of these mercury-containing lamps, instead of less efficient incandescent lamps, results in less mercury being released into the environment. At the same time, proper disposal of spent lamps can further reduce releases of mercury to the environment.

The members of the NEMA Lamp Section have a comprehensive product stewardship effort designed to produce better lighting products and systems, in a five-part program.

1. Minimize Mercury Content of Lamps
2. Increase Product Life
3. Improve Lighting Efficiency
4. Label Products, and
5. Encourage Recycling

1. Minimize Mercury Content

NEMA Lamp Section members have significantly reduced their use of mercury in lamps while increasing their production of lamps. In 1990, NEMA estimates that light section members used 23.6 tons of mercury in slightly less than 500 million mercury-containing lamps. This mercury usage declined to 17 tons in 1994, 13 tons in 1999, 9 tons in 2001 and 7 tons in 2003. In the same time frame sales by NEMA lamp section members have increased to 650 million mercury-containing lamps.

## 2. Increase Product Life

Manufacturers have significantly increased the product life of mercury-containing lamps. There has been a 20% increase in the life of some of the most common fluorescent lamps since the 1980s from 20,000 to 24,000 hours, with some premium types at 30,000 hours. There also has been increased life of lower wattage HID lamp types. This increase in life means fewer lamps and less mercury.

## 3. Improve Lighting Efficiency

The lighting industry has improved lighting efficiency. Manufacturers' use of rare-earth phosphors instead of halophosphates, and development of smaller bulb diameters (T8 and T5) together with the shift to electronic from magnetic ballasts have led to a 40-50% improvement in lighting system efficiency. This efficiency results in reduced emissions of greenhouse gases and air pollutants including mercury. The introduction of pulse-start technology and ceramic arc tubes has significantly increased efficiency of metal halide lamps. Manufacturers have also developed and promoted the use of compact fluorescent lamps to replace incandescent lamps.

## 4. Label Products

Lamp manufacturers have adopted a nationwide labeling program. A standardized label on lamp packaging informs the user if the product contains mercury, and encourages the user to visit the [lamprecycle.org](http://lamprecycle.org) website for lamp recycling information that applies to their jurisdiction. Since the mercury label is also present whenever someone purchases a replacement lamp, users are constantly reminded of their disposal obligations, without the necessity of retaining the existing packaging.

## 5. Encourage Recycling

NEMA lamp section members have undertaken a number of efforts to encourage lamp recycling, particularly among businesses, which use 85+% of all mercury-containing lamps. In 2000, NEMA established a website, [www.lamprecycle.org](http://www.lamprecycle.org), that provides a one-stop source for lamp recycling information nationwide. The website contains a list of recyclers as well as links to all state websites with information about spent lamp management. Lamp recyclers and lamp manufacturers actively promote the use of this website. NEMA also partnered with the Association of Lighting and Mercury Recyclers (ALMR) and the Solid Waste Association of North America (SWANA) to undertake lamp-recycling promotion for businesses on a nationwide scale funded by an EPA grant. The three groups have established a management committee and are beginning to implement the program.

NEMA and ALMR also developed a lamp recycling training module for the Department of Energy's Rebuild America program. This free module is available from the Department and material from the module will be incorporated into the EPA funded lamp recycling promotion effort.

Individual companies also have their own lamp disposal promotion efforts. As a result of these and efforts by all levels of government, lamp recyclers and lamp users, lamp recycling has increased from less than 10 million in 1990, to 70 million lamps in 1997, to 156 million lamps in 2003.

#### *Analysis of Lamp Industry Product Stewardship Efforts*

If NEMA lamp section members had made no changes in lamps from 1990, members would be using significantly more mercury than is used today and power plants would need to generate a great deal more electricity to meet demand, resulting in increasing level of emissions from these facilities.

The average mercury-containing lamp manufactured in 1990 contained 43 mg of mercury. In 2003 that level was 11.4 mg. of mercury. If manufacturers had used 43 milligrams of mercury in each of the 650 million lamps manufactured in 2003, those lamps would have contained 31 tons of mercury rather than 7 tons.

Increased lamp life also leads to mercury reduction. Lamps are now available with a 20 to 50% increase in lamp life compared with products available in 1990. Increasing use of longer life lamps has also helped to decrease total mercury use by lamp manufacturers.

Increases in lighting efficiency result in lower emissions of greenhouse gases and air pollutants. For example:

The 150 million T8 lamps and electronic ballasts that have now replaced the older style T12 lamps save *annually* 48 billion kilowatt hours electricity, 66.8 billion pounds of CO<sub>2</sub> emissions from the fossil fuel portion of the electrical generation, millions of pounds of each of the major air pollutants such as nitrogen-oxides, sulfur oxides, particulate matter, carbon monoxide, and volatile organic compounds and 1,262 pounds of mercury from the combustion of coal and oil.

The compact fluorescent lamps now being used to fill 150 million "incandescent sockets" save *annually* 6.750 billion kilowatt hours of electricity, 9.4 billion pounds of CO<sub>2</sub> emissions from the fossil fuel portion of the electrical generation, millions of additional pounds of sulfur oxides, nitrogen oxides, particulates and carbon monoxide and 178 pounds of mercury from combustion of coal and oil.

The lighting industry has also achieved additional power savings and emission reductions by increasing the efficiency of other lighting products such as metal halide lamps. . In summary, the lighting industry has contributed to significant reductions in the emissions of greenhouse gases, ozone and acid rain precursors, particulate matter, carbon monoxide and mercury (see attached chart).

Finally, lamp recycling in 2003 recovered approximately 5,720 pounds of mercury (22% recycling rate multiplied by 13 tons of mercury used in lamps manufactured in 1999, and lamps used for an average five-year period.).