IMERC Fact Sheet
Mercury Use in Lighting

This Fact Sheet summarizes the use of mercury in lighting devices, such as fluorescent lamps, high intensity discharge (HID) lamps (e.g., automobile headlights), and neon signs. It includes information on the total amount of mercury in all lamp products that were sold in the U.S. in 2001, 2004, 2007, 2010, 2013, and 2016.

The information in the Fact Sheet is based on data submitted to the state members of the Interstate Mercury Education and Reduction Clearinghouse (IMERC), including Connecticut, Louisiana, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The data is available online through the IMERC Mercury-Added Products Database.

Types of Mercury Lamps

Mercury is used in a variety of light bulbs. It is useful in lighting because it contributes to the bulbs' efficient operation and life expectancy. Fluorescent and other mercury-added bulbs are generally more energy efficient and last longer than incandescent and other equivalent forms of lighting, except for light-emitting diode (LED) lamps. While the bulbs are being used and are intact, the mercury within them poses no health risk.

Fluorescent Lamps

Fluorescent lamps[1] operate at a very low gas pressure. They produce light when electric current passes between two electrodes (also called cathodes) in a tube filled with low-pressure mercury vapor and inert gases, such as argon and krypton. The electric current excites the mercury vapor in the tube, generating radiant energy, primarily in the ultraviolet (UV) range. The energy causes a phosphor coating on the inside of the tube to "fluoresce," converting the UV light into visible light. Changing the composition of the phosphor powder inside fluorescent tubes changes the spectrum of light produced. Mercury is present in the lamp in both the phosphor powder and in the vapor.

Fluorescent lamps require a ballast, which is a device used to provide and control the voltage in the lamp and stabilize the current in the circuit. Fluorescent lamps are more energy efficient than incandescent light bulbs of an equivalent brightness because more of the energy input is converted to usable light and less is converted to heat. They also have a longer lamp life since there is no filament to burn out.

Depending on the type of fluorescent lamp, they can contain a wide range of mercury, from greater than 0 up to 100 milligrams (mg). According to the National Electrical Manufacturers

[1] Fluorescent Technology, Osram Sylvania: www.sylvania.com/LearnLighting/LightAndColor/FluorescentTechnology.

Association (NEMA)[2], about half of the fluorescent lamps manufactured by their members and sold in the U.S. contain 5 to 10 mg of mercury; while a quarter contain 10 to 50 mg.

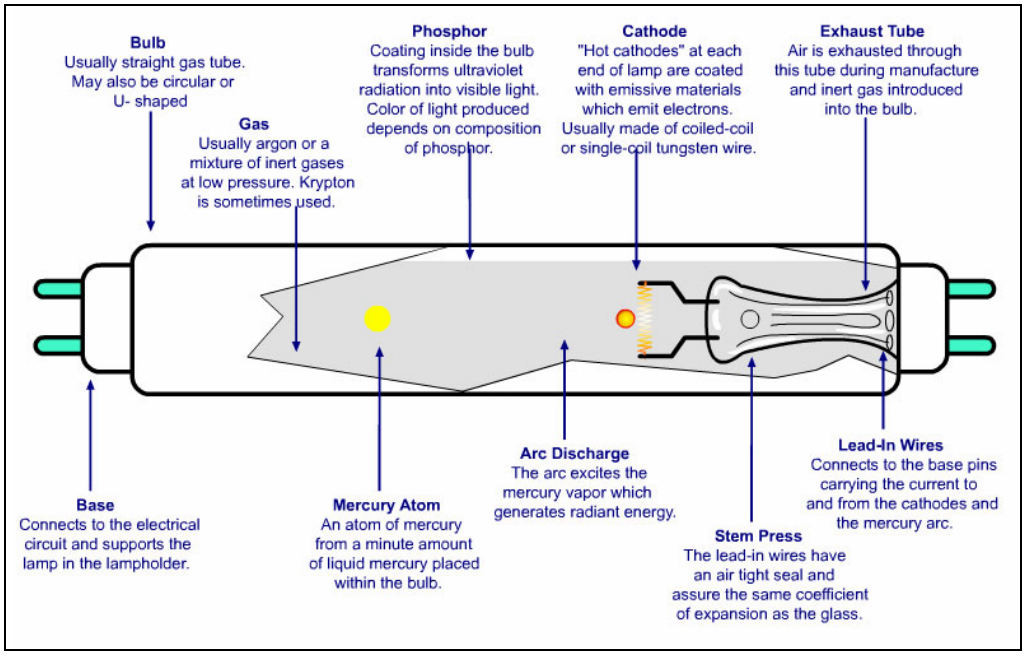
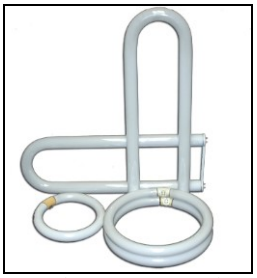


Figure 1: Illustration of the components of a fluorescent lamp and how they work
Source: Northeast Lamp Recycling, Inc.

The typical types of fluorescent lamps include: linear (straight), U-tube (bent), and circline (circular) fluorescent lamps/tubes; bug zappers; black lights; tanning lamps; germicidal lamps; high output lamps; cold-cathode fluorescent lamps; and compact fluorescent lamps as described below.

Linear fluorescent, U-tube, and Circline lamps are used for general illumination purposes. They are widely used in commercial buildings, schools, industrial facilities, and hospitals.



U-tube and Circline Lamps; Photo Source: Northeast Lamp Recycling, Inc.

Bug zappers contain a fluorescent lamp that emits ultraviolet light, attracting insects.

[2] NEMA is a trade association the electrical manufacturing industry. It has approximately 450-member companies that manufacture products used in the generation, transmission and distribution, control, and end-use of electricity.

Black lights use a phosphor composition that converts the short-wave UV within the tube to long-wave UV rather than to visible light. They are often used in forensic investigations.

Tanning lamps use a phosphor composition that emits primarily UV-light, type A (non-visible light that can cause damage to the skin), with a small amount of UV-light, type B.

Tanning Lamps; Photo Source: Northeast Lamp Recycling, Inc.

Germicidal lamps do not use phosphor powder and their tubes are made of fused quartz that is transparent to short-wave UV light. The ultraviolet light emitted kills germs and ionizes oxygen to ozone. These lamps are often used for sterilization of air or water.

Germicidal Lamp; Photo Source: Northeast Lamp Recycling, Inc.

High output fluorescent lamps (HO) are used in warehouses, industrial facilities, and storage areas where bright lighting is necessary. High output lamps are also used for outdoor lighting, because of their lower starting temperature, and as grow lamps. They operate the same as fluorescent lamps, but the bulbs are designed for much higher current arcs. The light emitted is much brighter than that of traditional fluorescent lamps. However, they are less energy-efficient because they require a higher electrical current.

Cold-cathode lamps are small diameter, fluorescent tubes that are used for backlighting in liquid crystal displays (LCDs) on a wide range of electronic equipment, including computers, flat screen TVs, cameras, camcorders, cash registers, digital projectors, copiers, and fax machines. They are also used for backlighting instrument panels and entertainment systems in automobiles. Cold-cathode fluorescent lamps operate at a much higher voltage than conventional fluorescent lamps, which eliminates the need for heating the electrodes and increases the efficiency of the lamp 10 to 30 percent. They can be made of different colors, have high brightness, and long life.

Compact fluorescent lamps (CFL) use the same basic technology as linear fluorescent lamps but are folded or spiraled in order to approximate the physical volume of an incandescent bulb. Screw-based CFLs typically use "premium" phosphors for good color, come with an integral ballast, and can be installed in nearly any table lamp or lighting fixture that accepts an incandescent bulb. Pin-based CFLs do not employ integral ballasts and are designed to be used in fixtures that have separate ballasts. Both screw-based and pin-based CFLs are used in commercial buildings. Residential use of these types of bulbs is popular because of their energy efficiency and long life. Individual CFLs generally contain less than 10 mg of mercury, with a significant portion (two-thirds) containing less than 5 mg. A small percentage of CFLs contains between 10 and 50 mg of mercury.

High Intensity Discharge (HID) Lamps

High intensity discharge (HID)[3] is the term commonly used for several types of lamps, including metal halide, high pressure sodium, and mercury vapor lamps. HID lamps operate similarly to fluorescent lamps. An arc is established between two electrodes in a gas-filled tube, causing a metallic vapor to produce radiant energy. HID lamps do not require phosphor powder, however, because a combination of factors shifts most of the energy produced to the visible range. In addition, the electrodes are much closer together than in most fluorescent lamps; and under operating conditions the total gas pressure in the lamp is relatively high. This generates extremely high temperatures in the tube, causing the metallic elements and other chemicals in the lamp to vaporize and generate visible radiant energy.

HID lamps have very long life. Some emit far more lumens per fixture than typical fluorescent lights. Like fluorescent lamps, HID sources operate from ballasts specifically designed for the lamp type and wattage being used. In addition, HID lamps require a warm-up period to achieve full light output. Even a momentary loss of power can cause the system to "re-strike" and have to warm up again – a process that can take several minutes.

The names of the HID lamps (i.e., metal halide, high pressure sodium, and mercury vapor) refer to the elements that are added to the gases that are generally xenon or argon and mercury in the arc stream. Each element type causes the lamp to have somewhat different color characteristics and overall lamp efficiency as described below.

Metal halide lamps (MH) use metal halides, such as sodium iodide, in the arc tubes, which produce light in most regions of the spectrum. They provide high efficacy, excellent color rendition, long service life, and good lumen maintenance, and are commonly used in stadiums, warehouses, and any industrial setting where distinguishing colors is important. They are also used for the bright blue-tinted car headlights and for aquarium lighting. Low-wattage MH lamps are available and have become popular in department stores, grocery stores, and many other applications where light quality is important. Of all the mercury lamps, MH lamps should be considered a complete system of lamp, ballast, igniter, fixture, and controls. The amount of mercury used in individual MH lamps ranges from more than 10 mg to 1,000 mg, depending on

[3] HID Technology, Osram Sylvania: www.sylvania.com/LearnLighting/LightAndColor/HIDTechnology/.

the power level. According to NEMA, about one-third of these lamps sold in the U.S. contain greater than 100 to 1,000 mg of mercury.

Metal Halide Lamp; Photo Source: Northeast Lamp Recycling, Inc.

Ceramic metal halide lamps (CMH) provide a high quality, energy efficient, alternative to incandescent and halogen light sources. Many are designed to be optically equivalent to the halogen sources they were designed to replace. They are used for accent lighting, retail lighting, and are useful in high volume spaces, with ceiling heights of 14-30 feet. The arc tube is made of ceramic. CMH lamps provide better light quality, better lumen maintenance, and better color consistency than MH lamps at a lower cost. CMH lamps contain less mercury than MH lamps. The majority contain from greater than 5 mg to 50 mg of mercury.

High pressure sodium lamps (HPS) are a highly efficient light source but tend to look yellow and provide poor color rendition. HPS lamps were developed in 1968 as energy-efficient sources for exterior, security, and industrial lighting applications and are particularly prevalent in street lighting. Standard HPS lamps produce a golden (yellow/orange) white light when they reach full brightness. Because of their poor color-rendering their use is limited to outdoor and industrial applications where high efficacy and long life are priorities. HPS lamps generally contain 10 to 50 mg of mercury. A small percentage contains more than 50 mg of mercury.

Mercury vapor lighting is the oldest HID technology. The mercury arc produces a bluish light that renders colors poorly. Therefore, most mercury vapor lamps have a phosphor coating that alters the color and improves color rendering to some extent. Mercury vapor lamps have a lower light output and are the least efficient members of the HID family. They were developed to overcome problems with fluorescent lamps for outdoor use but are less energy efficient than fluorescents. Mercury vapor lamps are primarily used in industrial applications and outdoor lighting (e.g., security equipment, roadways, and sports arenas) because of their low cost and long life (16,000 to 24,000 hours). Mercury vapor lamps generally contain between 10 and 100 mg of mercury. A small portion contains greater than 100 mg of mercury.

Mercury short-arc lamps are spherical or slightly oblong quartz bulbs with two electrodes penetrating far into the bulb so that they are only a few millimeters apart. The bulb is filled with argon and mercury vapor at low pressure. Wattage can range from under a hundred watts to a few kilowatts. With the small arc size and high power, the arc is extremely intense. Mercury short-arc lamps are used for special applications, such as search lights, specialized medical equipment, photochemistry, UV curing, and spectroscopy. The mercury short-arc lamps contain

relatively larger amounts of mercury, typically between 100 mg and 1,000 mg. Nearly a quarter of these lamps contain more than 1,000 mg of mercury.

Mercury Short-Arc Metal Halide Lamp; Photo Source: Northeast Lamp Recycling, Inc.

Mercury xenon short-arc lamps operate similarly to mercury short-arc lamps, except that they contain a mixture of xenon and mercury vapor. They require a shorter warm-up period compared with regular mercury short-arc lamps, and they have better color rendering. They are used mainly in industrial applications. The mercury xenon short-arc lamps can contain anywhere between 50 mg and 1,000 mg of mercury. A small percentage of these lamps contain more than 1,000 mg of mercury.

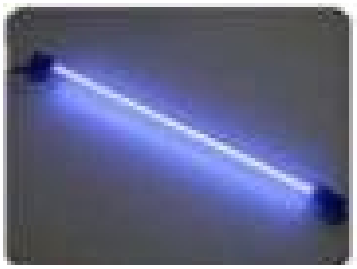
Mercury Xenon Short-Arc Lamps; Photo Source: Northeast Lamp Recycling, Inc.

Mercury capillary lamps provide an intense source of radiant energy from the ultraviolet through the near infrared range. These lamps require no warming-up period for starting or restarting and reach near full brightness within seconds. They come in a variety of arc lengths, radiant power, and mounting methods, and are used in industrial settings (i.e., for printed circuit boards), for UV curing, and for graphic arts. UV curing is widely used in silkscreening, CD/DVD printing and replication, medical manufacturing, bottle/cup decorating, and converting/coating applications. These specialized lamps contain 100 to 1,000 mg of mercury.

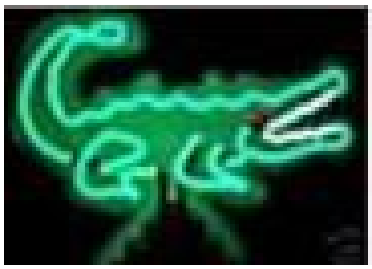
Mercury Capillary Lamps; Photo Source: Northeast Lamp Recycling, Inc.

Neon Lamps

Neon lights are gas discharge bulbs that commonly contain neon, krypton, and argon gasses (also called noble gasses) at low pressure. Like fluorescent bulbs, each end of a neon light contains metal electrodes. Electrical current passing through the electrodes ionizes the neon, and other gases, causing them to emit visible light. Neon emits red light; other gases emit other colors. For example, argon emits lavender and helium emits orange-white. The color of a "neon light" depends on the mixture of gases, the color of the glass, and other characteristics of the bulbs. Neon lights are estimated to contain approximately 250 to 600 mg of mercury per bulb, depending on the manufacturer's preference.



Neon Tube; Photo Source: NEWMOA



Neon Alligator Signage; Photo Source: NEWMOA

Although the term "neon light" refers to all gas discharge bulbs using noble gases, regardless of the lamp color, only the red bulbs are true neon lights (i.e., use neon). Red neon lamps do not contain mercury. Almost every other "neon light" color uses argon, mercury, and phosphor, in addition to other noble gases.

The neon light industry is a cottage industry. Artisans make each lamp individually in small workshops. The vast number of neon light manufacturers makes it difficult to identify them, and IMERC has not received Notifications from most of these companies.

Amount of Mercury in Individual Lamps

Table 1 summarizes the range in the amount of mercury in each type of mercury lamp manufactured and sold as new in the U.S. The state agencies permit manufacturers, importers, and distributors of mercury-added products to report the amount of mercury used in individual products as an exact number or as a range.

Table 1: Amount of Mercury in Different Types of Lighting (mg)

Fluorescent	0 – 100
CFL	0 – 50
Metal Halide (MH)	>10 – 1,000
Ceramic Metal Halide	0 – 50
High Pressure Sodium	>10 – 50
Mercury Vapor	>10 – 1,000
Mercury Short-Arc	> 100 – > 1,000
Mercury Capillary	> 100 – 1,000

Total Mercury Use in Lamps

Table 2 presents the total amount of mercury in lamps sold in the U.S. during calendar years 2001, 2004, 2007, 2010, 2013, and 2016.[4] More than 200 manufacturers have submitted Mercury-added Product Notification Forms to IMERC-member states for one or more reporting years, including companies represented by the trade associations, the National Electrical Manufacturer's Association (NEMA) Lighting Section and the Information Technology Industry Council (ITIC).

At least 49 companies have phased out their use of mercury in lamps since 2001, and therefore, no longer report to IMERC. As of December 2018, 12 companies have not yet submitted required data for 2016, and in Table 2 IMERC assumes that the mercury total for non-reporters for 2016 is the same as its most recently reported year. In addition, 3 manufacturers submitted 2016 data that had not done so for previous reporting periods. These "new" reporters are included in the total presented below. There are 178 companies included in the 2016 data analysis shown in Table 2.

Table 2: Data on Mercury Sold in Lamps in the U.S.

Triennial Year	2001	2004	2007	2010	2013	2016
Total lbs. Mercury	21,557 (10.78 tons)	20,332 (10.17 tons)	22,101 (11.05 tons)	17,072 (8.54 tons)	10,841 (5.42 tons)	6,205 (3.1 tons)
Companies Reporting	167	176	176	173	189	166
Companies Out of Compliance	0	7	21	33	11	12
Companies Phased-Out	0	2	6	5	17	19

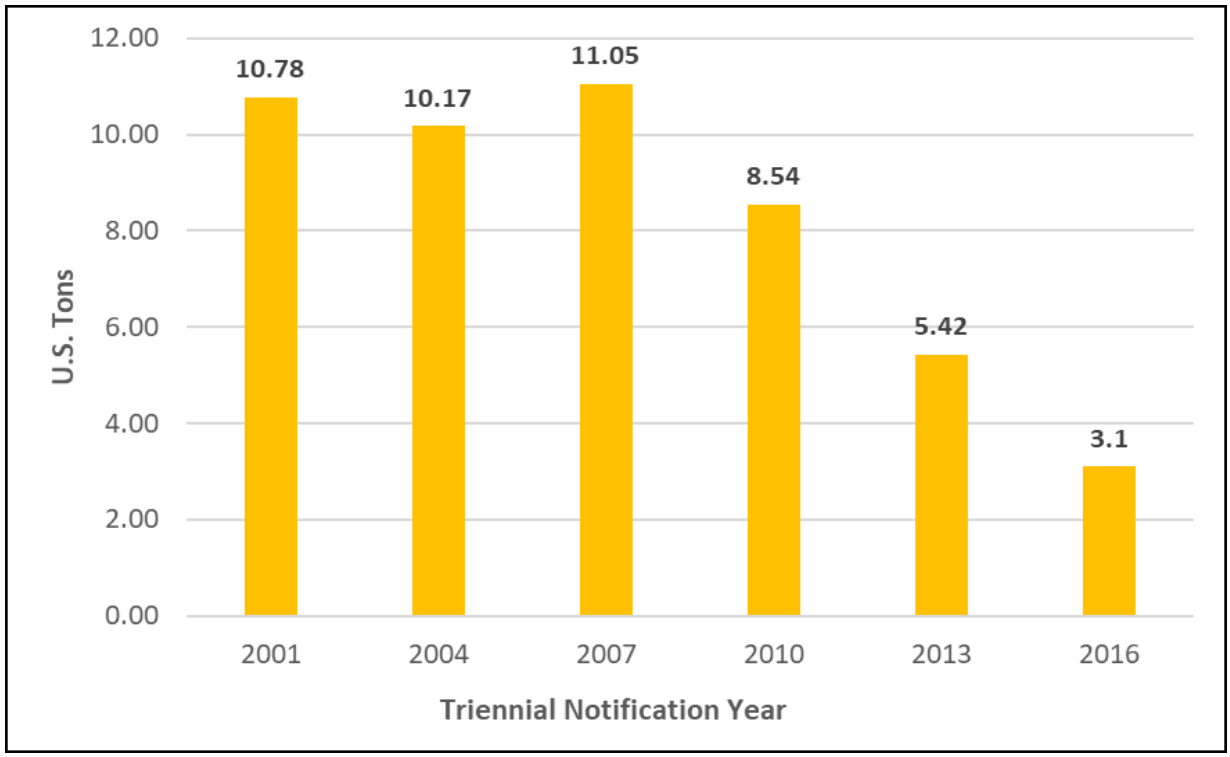
[Note: 453.6 grams = 1 pound; 2,000 pounds = 1 ton. All numbers are rounded to the nearest whole number.]

It must be noted that the amount of neon lamps sold in the U.S. is grossly underestimated in Table 2. As stated previously, the number of manufacturers that make up this sub-sector is vast, yet IMERC has only received Notifications from a small number. Therefore, the data presented in Table 2 and the graph below consists mainly of mercury from fluorescent- and HID-type lamps, with a very small percentage of neon lamps contributing to the total.

IMERC estimates that less than 10 manufacturers sold mercury-added neon lamps in 2016 as most are now converting over to light-emitting diode (LED) technology. The limited number of manufacturers included are the large companies, and most manufacture lamp types other than

[4] More detailed information on the 2001 and 2004 data can be found in the report, *Trends in Mercury Use in Products: Summary of the IMERC Mercury-added Products Database*, June 2008. (www.newmoa.org/prevention/mercury/imerc/pubs/reports.cfm)

neon. There are likely hundreds of small artisan neon sign companies that have not been identified by IMERC.



Overall, estimated mercury uses in lighting decreased from 10.78 tons in 2001 to 3.1 tons in 2016 in the U.S.– a decline of more than 71 percent. The greatest decline of more than 43 percent occurred in the most recent reporting cycles between 2013 and 2016.

In the early 2000s, there was a significant increase in the number of electronics utilizing fluorescent lamps for illumination in displays. Liquid crystal display (LCD) monitors contain mercury-added fluorescent lamps, and these were once standard with new computers and a wide variety of home and office equipment, including televisions, global positioning system (GPS) units, hand-held communications and entertainment systems, and digital cameras. Use of mercury-added lamps in automobiles and recreational vehicles also increased significantly during this time. In addition to HID headlamps, many automobiles started offering entertainment systems, navigation systems, and instrument panels that utilized LCD screens or backlighting that contained mercury lamps. Many recreational vehicles also offered option packages that included flat-panel televisions with fluorescent lamps and linear fluorescent lamp fixtures.

During this time, government agencies, companies, and environmental organizations heavily promoted the use of energy-efficient liner and compact fluorescent bulbs for general consumer use. The cost of CFLs declined dramatically so that they were more affordable for consumers and ubiquitous in the market.

In recent years, LED bulbs have become more available and affordable. LED lamps are significantly more energy efficient than fluorescent lamps and they do not contain mercury.

Many manufacturers that utilized mercury lighting in LCD screens for their products are now switching to LEDs. LEDs are also becoming more popular for consumers and therefore, the use of mercury in lighting is expected to continue to decline in the future.

Phase-Outs & Bans on the Sale of Mercury Lamps

The following IMERC-member states currently have restrictions on the sale and/or distribution of certain mercury-containing lamps that may apply due to their high mercury content: Connecticut (> 100 mg), Louisiana (> 10 mg), and Rhode Island (> 10 mg). Vermont bans the sale of neon lamps.

In response to the mercury product bans and phase-outs, many companies have ceased manufacturing mercury-added bulbs and/or stopped selling products in which mercury bulbs are a component. As of the 2016 reporting period, 49 companies have confirmed to IMERC a complete phase-out of these products with additional companies actively working toward phase-out.

Mercury Lamp Recycling & Disposal

According to the EPA, fluorescent and other mercury lamps must be managed as hazardous waste under the Universal Waste Rule[5] unless the bulb passes the Toxicity Characteristic Leaching Potential (TCLP) test. All of the IMERC-member states, including Connecticut, Louisiana, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, Vermont, and Washington have adopted the Universal Waste Rule. These states require businesses and other non-residential organizations to recycle mercury-containing lamps or dispose of them as either universal or hazardous waste. In most cases, residential households are exempt from these regulations. However, in some states, including Maine, Massachusetts, Minnesota, and Vermont, households must properly recycle or dispose of all mercury-containing lamps, including CFLs.

For more information on state lamp recycling and disposal requirements, visit www.newmoa.org/prevention/mercury/lamprecycle/requirements.cfm or www.lamprecycle.org. Homeowners and businesses can also call their state environmental agencies' hazardous waste bureaus for more information. There are a significant number of companies, government programs, and non-governmental organizations involved with collecting and recycling spent mercury-added lamps.

Table 3 summarizes the requirements of IMERC-member states for managing mercury-added lamps at their end-of-life.

[5] The Universal Waste Rule (UWR) is an EPA regulation meant to streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment, and lamps. The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. For more information: www3.epa.gov/epawaste/hazard/wastetypes/universal/lamps/index.htm.

Table 3: Regulations for Managing Mercury-Added Lamps				
IMERC State	**Prohibits Solid Waste (SW) Disposal – From Businesses**	**Prohibits SW Disposal – From Households**	**Manufacturer-Financed Collection**	**Other Collection / Recycling Requirement**
Connecticut	✓			
Louisiana	✓			
Maine	✓	✓	✓	
Massachusetts	✓	✓		✓
Michigan	✓			
Minnesota	✓	✓		✓
New Hampshire	✓			
New Jersey	✓			
New York	✓			
North Carolina	✓			
Rhode Island	✓			
Vermont	✓	✓	✓	
Washington	✓		✓	

The states of Maine, Vermont, and Washington have enacted extended producer responsibility (EPR) legislation for fluorescent lighting (also referred to as product stewardship programs). These laws require manufacturers to finance the costs of recycling or safe disposal of their products. Household hazardous waste (HHW) programs will also accept and recycle CFLs and other fluorescent lamps in many communities.

The states that have EPR programs often experience a boost in collection and recycling rates. For example, in the first year of its program, Maine DEP received manifests documenting the recycling of 155,159 household lamps from municipal waste collection sites in 2012. In addition, NEMA collected 50,492 residential mercury-added lamps as part of their product stewardship program that same year – or an additional 7.1 percent of lamps available for recycling. Together these programs yielded a recycling rate of 29 percent for household mercury-added lamps in Maine in 2012.[6] This is much greater than AMLR's national estimate of recycling for consumer-generated lamps of just over two percent.[7]

[6] Implementation of Product Stewardship in Maine, February 2014: http://digitalmaine.com/cgi/viewcontent.cgi?article=1026&context=dep_docs

[7] Lamp Performance Metrics, Product Stewardship Institute, December 2009: www.productstewardship.us/resource/resmgr/imported/Guidelines_for_States_on_Lamps_Performance_MetricsFNL.pdf

In 2010, Washington State passed the LightRecycle Washington Program, which is a product stewardship program for mercury-containing lamps. Statewide collection began in January 2015 and allows both businesses and residents to recycle up to 10 lamps per day for free, at designated collection sites. An annual report documenting the collection results of this program is expected in June 2016.[8]

Massachusetts also has a product stewardship program for mercury-added lamps, but it is slightly different than traditional EPR. In July 2014, the State enacted a law that requires the manufacturers of mercury-added lamps to make annual payments (i.e., registration fees) into a state-managed fund that will support municipal collection and recycling.[9]

Some lamp manufacturers and retail stores have also launched collection and recycling programs for fluorescents and other mercury-added lamps. For example, Home Depot has established a free program to collect and recycle CFLs from consumers, which allows consumers to drop-off their spent fluorescent lamps for recycling at almost 2,000 store locations. Other independent hardware stores and hardware store chains, including Ace and TrueValue, may accept CFLs and/or other fluorescent lamps for collection and recycling at some locations. Osram-Sylvania offers a mail-back program for consumers to return their spent CFLs for recycling. Consumers can order a "Mini RecyclePak" online. The kit is pre-labeled and comes with all the necessary packing material so consumers return the kit with the spent bulbs to any U.S. Post Office or mail collection center. They also offer recycling kits for businesses and distributors that fit other sizes of fluorescent lamps.

Clean-up of Broken Lamps

All glass mercury lamps can break if there are dropped, smashed, or mishandled, which can result in releases of mercury. As stated above, mercury is contained in a powder form and as a vapor in fluorescent lamps, and it adheres to the glass walls of lamps over time.

The Maine Department of Environmental Protection (Maine DEP) conducted a study on mercury releases from CFL breakage in February 2008. The Study found that mercury concentrations from a broken bulb may be above safe indoor air levels. As a result, Maine DEP revised its clean-up guidance for broken CFLs. The U.S. Environmental Protection Agency (EPA) and many state environmental agencies have reviewed the Maine Report and updated their broken CFL clean-up recommendations as well. The EPA continuously updates this guidance. For information about cleaning up a mercury spill from a fluorescent bulb breakage visit: www2.epa.gov/cfl/cleaning-broken-cfl.

For more information on possible mercury releases from lamps, visit: www.newmoa.org/prevention/mercury/landfillfactsheet.pdf.

[8] Mercury-Containing Lights: www.ecy.wa.gov/programs/swfa/mercurylights/professional.html#moreinfo
[9] Am Act Further Regulating Mercury Management, 2014: https://malegislature.gov/Laws/SessionLaws/Acts/2014/Chapter196

Non-Mercury Alternatives

LED technology is an alternative to fluorescents and HID lamps because they do not contain mercury. An LED is a semi-conductor diode that emits light when an electrical current is passed in the forward direction of the device through the LED circuit. The light emitted from LED lamps depend on the semi-conductor material used and may appear blue (cooler) or white (warmer) in color. They are significantly more energy efficient than incandescent and fluorescent lamps.

LEDs have been available since the 1960s for commercial applications and offer energy efficiency, maintenance savings, impact resistance, durability, and other benefits. Today's LEDs are commonly used in residential and commercial lighting applications, including stadium displays, billboards, traffic lights, streetlights, and, more recently, as indicator lights in automobiles and aircraft carriers.

Data Caveats

A number of important caveats must be considered when reviewing the data summarized in this Fact Sheet:

- The information may not represent the entire universe of mercury-added lamps sold in the U.S. The IMERC-member states continuously receive new information from mercury-added product manufacturers, and as a result, the data presented in this Fact Sheet may underestimate the total amount of mercury sold in this product category.

- In contrast, the data presented in this Fact Sheet may overestimate the total amount of mercury sold in this product category. In some cases, manufacturers supplied data for earlier reporting years but are out of compliance for one or more years. Rather than assuming that this non-reporting is a result of a company phasing-out its mercury-added lamps, IMERC takes a more conservative approach and assumes that the mercury total for non-reporters for 2016 is the same as its most recently reported year.

- The Notification requirement only applies to manufacturers and distributors of mercury-added lamps that are allowed to sell into one or more of the IMERC Notification States: Connecticut, Louisiana, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

- The information summarizes mercury use in lamps sold nationwide since 2001. It does not include products sold prior to January 1, 2001 or exported outside of the U.S., or products sold in-between triennial reporting years.

- Reported data includes only mercury that is used in the product, and does not include mercury emitted during mining, manufacturing, or other points in the product's life cycle.