



PRODUCT STEWARDSHIP INSTITUTE

The Product Stewardship Institute (PSI) is a national non-profit environmental institute with membership from 45 states, over 100 local governments, and over 50 businesses, environmental groups, and organizations. PSI's mission is to pursue initiatives to ensure that all those involved in the lifecycle of a product share responsibility for reducing its health and environmental impacts, with producers bearing responsibility for financing collection and recycling or safe disposal.

ECONOMIES OF SCALE ANTICIPATED

Cost estimates in this factsheet are based what it costs to collect, transport, and recycle products now. As extended producer responsibility (EPR) systems are established for more products and in more states, economies of scale will be achieved and per-unit costs will fall. In addition to relieving local governments of the considerable costs of managing products at end-of-life, EPR systems also yield lower societal costs. For example, the California Integrated Waste Management Board has found that paint management under British Columbia's EPR system costs 40% less per gallon compared to California's government-run system.

FINANCIAL BENEFITS TO LOCAL GOVERNMENTS FROM PRODUCT STEWARDSHIP

Product stewardship programs save local programs money. Financial benefits take two forms: **direct cost savings** and **no-cost expanded service**. Communities that offer product take-back services enjoy **direct cost savings** when product manufacturers take on the costs local programs are paying now to collect, transport, and recycle or appropriately dispose of used products. Communities without take-back programs enjoy **no-cost expanded service**—convenient product recycling or appropriate disposal without additional costs.

The purpose of this fact sheet is to help local programs estimate the magnitude of potential financial benefits from product stewardship using the best available national-level data and assumptions.

For a selection of products that are particularly costly for local programs to manage, this fact sheet estimates (1) amounts available for collection on a per capita basis and (2) average costs per unit to collect, transport, and dispose of each product. **Estimates are based what it costs to collect, transport, and recycle products now; as extended producer responsibility (EPR) systems become established and economies of scale are achieved, per unit costs will decrease.** Even when EPR systems are in place, local governments will still need to maintain program oversight. Actual costs to local governments are likely to differ from these national figures due to variability between municipalities.* For simplicity, we assume that 100% of products available for collection will be collected. In fact, collections rates will vary and will be lower. We also assume that it is possible to assign a dollar value to expanded services that will become available under a product stewardship approach. These benefits equal the costs local governments would have to pay to operate robust take-back programs.

Electronics

Used electronic appliances represent one of the fastest-growing challenges for local household hazardous waste facilities due to their quantity, fast replacement rate, and toxicity. Old electronic products such as televisions and computers contain a variety of hazardous chemicals including lead, mercury, cadmium, lithium, phosphorous, and brominated flame retardants. When e-waste is handled inappropriately, these substances can end up in the water, air, and soil, posing a threat to the environment and human health. The US EPA estimates that the United States produces about 7.1 pounds per capita of electronic waste, and experience from state electronics recycling programs indicates that disposal of electronic appliances at end-of-life costs about 30 cents per pound. This equates to an annual per capita cost of \$2.13.

To estimate your financial benefits from e-waste stewardship, multiply your county population by the \$2.13 per capita rate:
(County Population) x (\$2.13) = Magnitude of Potential Benefits

Paint

When disposed of improperly, unused architectural paint contributes a significant volume to the waste stream and has the potential to impact the environment and human health. About 10% of all purchased paint ends up unused and leftover. The 2006 Census indicates that over 750 million gallons of latex and oil-based paint are sold annually in the United States, creating approximately 75 million gallons of leftover paint each year. At a cost of about \$8 per gallon, managing all of this post-consumer paint as hazardous waste would cost municipalities around the country a total of \$640 million annually, a major financial burden for local waste management programs. This equates to about \$1.97 per capita.

To estimate your financial benefits from paint stewardship, multiply your county population by the \$1.97 per capita rate:
(County Population) x (\$1.97) = Magnitude of Potential Benefits

Medical Sharps

An estimated 3 billion syringes and over 900 million lancets are disposed of annually in the United States. This equates to approximately 13 medical sharps used per capita. Each of these almost 4 billion medical sharps poses the threat of a potential needle stick injury to waste industry and hospitality workers, homeowners, and the general public when improperly handled at end-of-life. The handling and disposal cost of medical sharps is approximately 5 cents per unit. This equates to an annual per capita cost of 64 cents.

To estimate your financial benefits from medical sharps stewardship, multiply your county population by 64 cents.
 (County Population) x (\$.64) = **Magnitude of Potential Benefits**

Phone Books

When improperly disposed of as garbage, telephone directories, due to their size, short intended lifespan, and sheer quantity of distribution can occupy a significant volume of landfill space. Phone books contribute about 660,000 tons to the waste stream each year, equaling roughly 4.3 pounds per capita. PSI estimates that the cost of recycling phone directories is about \$62 per ton. At this rate, annual per capita costs are about 13 cents.

To estimate your financial benefits, simply multiply your county population by the \$.13 per capita rate:
 (County Population) x (\$.13) = **Magnitude of Potential Benefits**

Fluorescent Lamps

Fluorescent light bulbs and tubes, though highly efficient alternatives to older incandescent models, contain mercury and therefore must be handled as hazardous waste to prevent release of mercury into the environment. PSI estimates that in the US, about .4 lamps are available for collection per person. The cost for collection and recycling is about 69 cents per bulb, or about 28 cents per person.

To estimate your local financial benefits, multiply the county population by the \$.28 per capita rate:
 (County population) x (\$.28) = **Magnitude of Potential Benefits**

Pesticides

When disposed of improperly, leftover pesticides can contaminate soil and water and pose a health hazard to the public and the surrounding environment. Many pesticides have been observed to cause neurological damage and developmental defects among those exposed, including humans and animals. Young children and developing fetuses are especially susceptible. PSI estimates that in the US about .8 pounds of waste pesticides are available for collection per person. (This is the amount generated by households; agribusiness generates considerably more.) The average cost for collection, transportation, and disposal is about \$1.58 per pound, or about \$1.26 per person.

To estimate your financial benefits from pesticides stewardship, multiply your county population by the \$1.26 per capita rate: (County Population) x (\$1.26) = **Magnitude of Potential Benefits**

Household Batteries—Primary

There are two main types of batteries: primary (single use) and secondary (rechargeable). All batteries contain heavy metals that when improperly disposed can contaminate the environment. While rechargeable battery manufacturers have established a program to finance collection and recycling of secondary batteries, local governments are on their own when it comes to paying for collection and recycling of primary batteries. PSI estimates that in the US about .8 pounds of primary batteries are available for collection per person. Collection, transportation, and recycling of batteries costs about \$1.00/pound, so the cost of collecting, transporting, and recycling all spent primary batteries is about 80 cents per capita.

To estimate your financial benefits from stewardship of primary batteries, multiply your county population by the \$.80 per capita rate: (County Population) x (\$.80) = **Magnitude of Potential Benefits**

Secondary (rechargeable) batteries and mercury thermostats are collected and processed by the Rechargeable Battery Recycling Corporation (RBRC) and the Thermostat Recycling Corporation (TRC). Although these programs do not currently recover a significant portion of the products available for recycling, they provide budgetary relief for local governments by financing and operating collection efforts.

Household Batteries—Secondary

Secondary (rechargeable) battery manufacturers established the RBRC in 1994 to collect and recycle Nickel-Cadmium batteries. RBRC expanded its programs to include other secondary battery types in 2001. Manufacturers established this product stewardship system because the metals in secondary batteries are especially toxic. PSI estimates that in the US about .24 pounds of secondary batteries are available for collection per person. Collection, transportation, and recycling of batteries costs about \$1.00/pound, so the cost of collecting, transporting, and recycling all spent secondary batteries is about 24 cents per capita.

To estimate the value of the manufacturer-financed program for stewardship of secondary batteries in your community, multiply your county population by the \$.24 per capita rate: (County Population) x (\$.24) = **Magnitude of Potential Benefits Available Now for Secondary Batteries**

Thermostats

Thermostat manufacturers established TRC in 1998 to collect and recycle mercury thermostats. Improper handling and disposal of these thermostats may result in a release of mercury to the surrounding environment, where it may harm humans and wildlife. A 2003 Frost and Sullivan report on thermostat sales indicates that over 10.2 million thermostats were replaced in 2002. If we assume that 90% of the thermostats replaced contain mercury, then the number of mercury thermostats taken out of service in 2002 is about 9.18 million (slightly over 40 tons of mercury). This equates to about .03 thermostats per capita. TRC estimates that its cost to collect and recycle a mercury thermostat is about \$5/thermostat, which is about 15 cents per capita.

To estimate the value of the manufacturer-financed program for stewardship of mercury thermostats in your community, multiply your county population by the \$.15 per capita rate: (County Population) x (\$.15) = **Magnitude of Potential Benefits Available Now for Mercury Thermostats.**

References & Assumptions

Electronics

- The 2008 EPA report entitled *Electronic Waste Management in the United States: Approach 1* offers a detailed breakdown of Estimated Annual Computer Products Ready for EOL Management and Estimated Annual Televisions and Cell Phone Products Ready for EOL Management for the years ranging from 1999 to 2007. In 2007, it is estimated that 1,321,900 tons of total personal computer products* were ready for EOL management, in addition to 910,600 tons of televisions** and 19,200 tons of cell phones. This sum is a little over 2.25 million tons, which equates to 4.5 trillion pounds. If we divide 4.4 trillion pounds by the US population of approximately 304,000,000, the figure for total electronics available for collection in 2007 is about 14.8 pounds per capita. 48% of this amount is generated by households (7.1 pounds per capita).

*includes desktops, laptops, hard copy devices, mice/keyboards, CRT monitors, and flat panel monitors.

**includes Color CRT monitors, flat panel monitors, projection units, and monochrome units.

Source: U.S. EPA: Office of Solid Waste. *Electronics Waste Management in The United States: Approach 1*. Washington, DC. July 2008. <http://www.epa.gov/osw/conserve/materials/ecycling/docs/app-1.pdf>

- The cost to collect, transport, and recycle waste electronics is based on PSI's informal survey of officials from states with electronics product stewardship laws, summer 2009

Paint

- The US EPA estimates that about 10% of all purchased paint ends up unused and leftover. Source: U.S. EPA Sector Strategies. *Quantifying the Disposal of Post-Consumer Architectural Paint*. April 2007. <http://www.productstewardship.us/associations/6596/files/PaintQuantityReportApril182007.pdf>

References & Assumptions (continued)

- The amount of paint manufactured in the US comes from the US Census Bureau. *Paints and Allied Products – 2005*. <http://www.census.gov/industry/1/ma325fo5.pdf>
- The cost to collect, transport, and recycle unused paint comes from SCS Engineers, *Paint Product Stewardship Initiative Infrastructure Project*, 2007. Prepared under contract to the WA DEQ as part of the Paint Product Stewardship Initiative. <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=131>

Medical Sharps

- The number of sharps available for collection annually is based on industry sales data provided to PSI by Becton Dickinson. See Product Stewardship Institute. Medical Sharps Home. <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=326>.
- The number of sharps in a one-quart container is derived from Waste Management's estimate that a 1.4 quart container holds 133 sharps, assuming a mix of needles and lancets.
- The cost to collect, transport, and appropriately dispose of waste sharps comes from Waste Management and assumes on-site collection in pharmacies and other locations.

Thermostats

- In 2002, 10,208,880 thermostats were sold for the replacement market (residential and commercial). This estimate is based Frost & Sullivan, *North American HVAC Thermostat Markets, 2003*. The number of thermostats sold for replacement equals the number being retired or "coming off the wall."
- The percentage of thermostats that contain mercury comes from US EPA. *Mercury Usage and Alternatives in the Electrical and Electronics Industries*. 1994. <http://www.p2pays.org/ref/02/01051.pdf>
- The estimate that each mercury thermostat contains about 4 grams of mercury comes from PSI. *Thermostat Stewardship Initiative Background Research Summary Final*. 2004. <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=98>

Primary and Secondary Batteries

- Amounts of batteries available for collection are taken from RIS International. 2007. *Canadian Consumer Battery Baseline Study, Final Report*. http://www.ec.gc.ca/nopp/docs/rpt/battery/en/c4.cfm#s4_3. We have used RIS's projected battery discard rates for 2010.
- Cost to collect, transport, and recycle batteries are based on industry averages provided by the Rechargeable Battery Recycling Corporation.

Phone Books

- The tonnage of phone books available for collection comes from Product Stewardship Institute. Phone Book Home. <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=186>
- The cost to recycle phone books comes from Product Stewardship Institute. *Action Plan for Phone Books*. August 2007. PSI estimates the cost for recycling phone books is \$50-75/ton. http://www.productstewardship.us/associations/6596/files/PSI_Phone_Book_Action_Plan_FINAL_8-28-07.doc

Pesticides

- The US EPA estimates that about 102 million pounds of pesticides were sold for "home and garden" (household) applications in 2001. See US EPA. 2004. *Pesticides Industry Sales and Usage 2000 and 2001 Market Estimates* http://www.epa.gov/oppbead1/pestsales/01pestsales/market_estimates2001.pdf. Stewardship Ontario estimates that 25% of the quantity sold is leftover and available for collection.
- Costs for collection, transportation, and disposal are industry average costs provided by Clean Harbors.

Fluorescent Lamps

- Information on the number of fluorescent lamps available for collection and the costs for collection and recycling are based on information contained in CA DTSC and CIWMB, *AB 1109 Lighting Task Force Report*, 2008. http://www.dtsc.ca.gov/HazardousWaste/UniversalWaste/upload/ab1109_final.pdf. We have calculated amounts available for collection based on per capita rates in CA. The report provides costs for collection and recycling based on a 50% collection rate; we assume the same cost per bulb would apply for a 100% collection rate.