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Product Stewardship in Maine

**Margaret Chase Smith Policy Center
University of Maine**

December 2010

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Abstract

This report examines the growing trend of recycling through product stewardship programs. Product stewardship programs attempt to keep potentially harmful products out of the waste stream, reduce pressure on landfills, and encourage manufacturers to reduce waste. Product stewardship is an approach in which producers and consumers bear responsibility for cradle-to-grave management of products. Currently there are 60 state laws on product stewardship in 33 states. Maine administers six product stewardship programs: electronic or “e-waste” products, cell phones, mercury-containing thermostats, CFL bulbs, mercury-containing auto switches, and certain types of rechargeable batteries. Maine rightly should be proud of its leadership in product stewardship, but not complacent. Much work remains to measure and improve the effectiveness of the existing programs and to implement the new framework law.

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The views and opinions expressed in this report are solely those of the individual authors. They do not represent those of Maine Department of Environmental Protection or any other individual or organization that has provided information or assistance.

EXECUTIVE SUMMARY

This report examines the growing trend of recycling through product stewardship programs. Product stewardship programs aim to keep prioritized products out of the waste stream, reduce pressure on landfills, and encourage manufacturers to reduce waste. Product stewardship is an approach in which producers and consumers jointly bear responsibility for the cradle-to-grave management of products.

Currently there are 60 state laws on product stewardship in 33 states. All are slightly different, reflecting differences in products, markets, demographics, consumer patterns, state government processes and political considerations. The State of Maine currently administers six product stewardship programs: electronic or “e-waste” products, cell phones, mercury-containing thermostats, mercury-containing lamps (including compact fluorescents, or CFLs), mercury-containing auto switches, and certain types of rechargeable batteries.

Many U.S. states have modeled their laws on those of the European Union and Canada. The U.S. has no federal legislation on product stewardship; states and some cities have implemented programs independently. Maine has been a leader in product stewardship by enacting the first electronic waste program and the first stewardship framework law in the US. The framework law sets up a pre-legislative process for considering candidates for new product stewardship programs as well as changes to Maine’s existing programs.

Most product stewardship programs address common elements: program financing, performance goals, enforcement mechanisms, and reporting requirements. At the same time, these programs vary in the way they define covered products, whether they apply to households or to all sectors, their incorporation of performance standards, product collection structures, definitions of consumer convenience and use of incentives.

In Maine, collection structure varies by product: CFL light bulbs are taken to retail or municipal collection sites; cell phones are returned anywhere cell phones are sold; rechargeable batteries are collected through retail stores, community collection centers and businesses; and mercury auto switches are collected by the auto dismantlers and recyclers.

Maine’s e-waste, auto switch and thermostat programs have kept approximately 8 million pounds of electronic waste and 64 pounds of mercury out of Maine landfills in 2009. At the same time, much better data collection, streamlining of programs and reporting guidelines are necessary. Most product stewardship programs have been operating for only a few years, and data on performance and costs are few. This lack of data complicates both evaluating programs and setting enforceable goals. Performance measures will also need to become more precise and accurate. For example, calculating e-waste in pounds per capita, while better than no measurement, reflects neither the generation of waste nor its potential hazard.

A variety of product stewardship financing mechanisms have been developed. It is apparent that different products require different financing and collection systems, and it is important

for states to work with each industry to determine the best structures. To the extent that municipal solid waste facilities should be part of the recycling process, they should be adequately funded.

This report also discusses the issues of voluntary recycling, regional coordination and consumer education. Voluntary recycling programs put the financial burden on local governments and local taxpayers, while product stewardship programs shift the financial burden of recycling to manufacturers and consumers. Regional coordination of recycling efforts is important for Maine which has many rural areas.

While states continue to pass legislation on product stewardship covering a wider array of products, it is not clear whether recycling rates remain low because of inconvenience or consumers' lack of awareness. Some state product stewardship laws mandate consumer education. In Maine, information for the public on collection and disposal varies by product and by municipality. For the average Maine resident, information on where and how to dispose of products banned from the trash is not easy to find.

Firm conclusions on the design and performance of Maine's EPR programs are hard to draw because most are quite recent. However, the auto switch program appears to be highly effective, in large part due to the centralization of collection by automobile recyclers and the lack of need for consumers to take definite action to recycle. In contrast, the mercury bulb (CFL) program is hampered by the need for consumers to take action on each and every bulb, the absence of enforcement procedures, and the lack of consumer awareness.

Finally, the role of regional cooperation and local input are important for solutions that fit Maine's varied demographics. Ultimately, coordination and consistency of both recycling and education across states and products could lead to greater influence with both manufacturers and consumers.

Maine rightly should be proud of its leadership in product stewardship, but not complacent. Much work remains to measure and improve the effectiveness of the existing programs and to implement the new framework law.

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INTRODUCTION

The new and growing field of product stewardship represents an effort to keep prioritized products out of the waste stream, reduce pressure on landfills, and encourage manufacturers to reduce waste. It involves manufacturers, retailers, consumers, and government agencies in shared responsibility for cradle-to-grave management of products. These programs are unlike standard recycling programs because they involve products which either present hazards in the waste stream but do not qualify as hazardous waste or present some difficulty in waste collection or disposal.

The terms “product stewardship” and “extended producer responsibility” (EPR) are sometimes used interchangeably, but there can be differences between the two. The term product stewardship generally indicates an approach in which multiple parties bear statutory and/or fiscal responsibility for the end-of-life management of products. Extended producer responsibility is a variant of “polluters pay,” in which primary or ultimate responsibility falls upon the producer of a product. Both include mechanisms for manufacturer financing of product recycling or disposal.

Product stewardship laws exist now in 33 states and New York City. In addition to legislation, numerous state and local recycling programs are in place, and many states have endorsed product stewardship principles.¹ State programs vary, differing from the products covered to financing systems to performance goals. Yet all share the goals of keeping prioritized and hazardous products out of the waste stream and of creating program financing that is self-sustaining.

This report examines recycling through producer responsibility programs in order to inform policy making. We do this first by describing Maine's six different product laws and framework law, and then by identifying essential elements in product stewardship programs. Most product stewardship programs have been operating for only a few years at most, and data on performance and costs are few. We do not make firm conclusions on which programs work and which don't, but rather identify some of the relevant issues that should be considered in improving the performance of current and future product stewardship programs.

MAINE PRODUCT STEWARDSHIP PROGRAMS

The State of Maine currently administers six product stewardship programs: electronic or “e-waste” products, cell phones, mercury-containing thermostats, mercury-containing lamps (including compact fluorescents, or CFLs), mercury-containing auto switches, and certain types of rechargeable batteries. These programs vary widely in their details, including definitions, reporting mechanisms, scope, utilization and enforcement. This variation is due in part to the different times and methods by which the programs came into being and in part to the nature of each product. This is not unique to Maine. There are currently at least 60 state laws on product stewardship in 33 states, all slightly different, reflecting differences in products, markets, demographics, consumer patterns, state government processes and political considerations.

¹ Product Stewardship Institute, 2010. State/Local Policy. Website accessed 7/20/10.
<http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=25>

The State Planning Office (SPO) is required by law to develop policy for recycling and waste management in Maine. All product stewardship programs in Maine are administered by the Maine Department of Environmental Protection (Maine DEP), through the Bureau of Remediation and Waste Management (RWM). Municipalities in Maine are responsible for handling consumer waste in accordance with state statutes. This responsibility encompasses some, but not all, of the products covered under product stewardship laws. E-waste collection, for instance, necessitates municipal involvement, whereas cell phone recycling does not.

The following table outlines characteristics of Maine's six product stewardship programs.

ELEMENTS OF MAINE'S PRODUCT STEWARDSHIP LAWS

Element	Framework	Batteries	Auto Switches	E-Waste	Cell Phones	Thermostats	Mercury Lamps
Scope of Products	N/A	Dry cell mercuric oxide and rechargeable batteries	Mercury switches	Household TVs & monitors screen size >4" diagonal, desktop printers, game consoles	Cell phones	Mercury thermostats	Mercury-added lamps sold for household use
Financing	Cost internalization	Cost internalization or fee	Cost internalization	Cost internalization	Commodity value	Cost internalization	Cost internalization
Target Population			Auto dismantlers and recyclers	Household consumer	Consumer	Contractor or homeowner	Household consumer
Education & Outreach Required	No	Manufacturer must educate purchaser	Manufacturer must provide info to facilitate removal & recycling	Originally required posting on website; eliminated	Retail must post sign	Manufacturers report annually on education & outreach strategies	Manufacturers must do "effective education & outreach"
End of Life Incentive	No	No	Yes	No	No	Yes \$5	No
Performance Metrics	No	No	No	No	No	Number collected; manufacturer evaluates effectiveness annually	No
Performance Goals	No	No	No	No	No	Yes, but no consequences for not meeting goals	No
Reporting Requirements	No	No	Yes	Yes	Yes	Yes	Yes
Sales Ban	No	No	Yes, on product	Yes, for non-compliant manufacturers	No	Yes, on product	Yes, for non-compliant manufacturers
Disposal Ban	No	Partial	Yes	Partial	Yes	Yes	Yes
Measured Performance	N/A		30% in 2009; total program = 45,284 switches; 99 pounds mercury	5.99#/capita in 2009; total program = 482,553 units; 22,035,837 pounds.		48.75# in 2009 = 26% of available	

Source: Carole Cifrino, Maine DEP, May, 2010.

ELECTRONIC WASTE (“E-WASTE”)

Maine’s “e-waste” law (38 MRSA §1610) was passed in 2004 as the first e-waste product stewardship program in the nation.² Covered products currently include televisions, computer monitors, laptops, and since 2009, video game console systems, digital photo frames, and desktop printers.³ The statute gives specific definitions for products, manufacturer and retailer.

Responsibility for the e-waste program is shared across multiple entities at multiple points in the waste stream. It flows essentially as follows: towns/municipalities collect material however they see fit and transport material to a waste consolidator – consumers and/or towns pay for collection and transportation at this stage. Consolidators count the materials by manufacturer and report these figures annually to Maine DEP, ship materials to a recycler that meets appropriate standards, and bill the manufacturers (unless the manufacturer chooses to take responsibility for their own products from the consolidator). Beginning with this point of the process, manufacturers are responsible for all costs associated with the program. Recyclers recycle materials. Retailers are prohibited from offering products from manufacturers who have been barred from selling in Maine based on non-compliance, as determined by Maine DEP.

Maine DEP sets standards for collection, consolidation and recycling; approves consolidators and allowable costs; manages all data on manufacturers, brands and program performance; provides training to municipalities; and monitors compliance and enforcement. The Maine legislature chose to share responsibility for recycling between manufacturers and municipalities by using the already existing municipal collection system for universal waste. Maine’s is the only state e-waste program in which manufacturers do not carry at least some responsibility for collection services.

In establishing a collection and disposal system, manufacturers have responsibility for their own branded products as well as a pro rata share of responsibility for “orphan products” (any product whose manufacturer cannot be determined, or any product whose manufacturer is no longer in business). These pro rata responsibilities are calculated based on the manufacturer’s national market share of the particular products in question (e.g., computer monitors, video game console systems).

Of the six existing EPR programs in Maine, the e-waste program is the most comprehensive in terms of the overall scope as well as the clearly defined roles for consumers, manufacturers, municipalities, and third parties such as waste consolidators and retailers. The e-waste program requires performance and reporting metrics of manufacturers, consolidators, and Maine DEP itself. Program performance is reported in pounds of products collected per capita.⁴ Maine’s e-waste law currently applies only to households.

² Maine DEP, January, 15, 2010. Report on Maine’s Household E-Waste Recycling Program.
<http://www.maine.gov/dep/rwm/publications/legislativereports/pdf/2010ewastereportfinal.pdf>

³ 38 MRSA §1610, section 5-A

⁴ Maine DEP, January, 15, 2010. Report on Maine’s Household E-Waste Recycling Program.
<http://www.maine.gov/dep/rwm/publications/legislativereports/pdf/2010ewastereportfinal.pdf>

CELL PHONES

Maine's cell phone recycling law (38 MRSA §2143) was implemented in 2007 and serves primarily as a supplementary program to existing voluntary cell phone recycling programs offered by a variety of non-profit organizations, cellular service providers, retailers, and cell phone manufacturers. The law includes a ban on disposal of cell phones in solid waste facilities; a requirement that any and all retail establishments that sell cell phones accept them back for proper disposal at no charge to the consumer; a requirement that retail establishments post appropriate signage advertising this service; and a requirement that cell phone service providers report data to Maine DEP annually on both total collection rates and the method of disposal, reuse or recycling. The law requires Maine DEP to report program statistics to the legislature annually.

Cell phones may be returned to any phone retailer, service provider or one of two non-retail voluntary recycling programs. Most voluntary recycling programs neither require nor attempt to track the source or origin of collected product, making it nearly impossible to establish a firm baseline of what precisely qualifies as "product available as waste."⁵ Used cell phones have market value; some charitable organizations collect used cell phones for purposes of re-use, donation, or recouping the value of their components. Donated phones may also be refurbished rather than recycled, further complicating the estimation of recycling rates and consequently, program success.⁶

MERCURY-ADDED THERMOSTATS

The thermostat recycling program was created by the legislature in 2006.⁷ The law imposes a ban on the sale or giveaway of mercury thermostats in the state. The objective of the program, therefore, is to keep existing mercury-containing thermostats out of the waste stream.

Maine's program is incentive-based and applies to both contractors and homeowners. Thermostat manufacturers pay an incentive for each mercury thermostat returned according to program rules.⁸ All wholesalers accept mercury thermostats from heating, ventilation, and air conditioning (HVAC) professionals, offering a \$5.00 mail-in coupon, and most will also accept them from homeowners. Homeowners may bring mercury thermostats to a participating retailer for an instant \$5.00 credit.⁹ The Maine DEP offers a listing of locations of both wholesalers and retailers who accept thermostats. The law set a collection goal of 125 pounds of recovered mercury by January 2009, and 160 pounds recovered by August 2010.

⁵ Maine DEP, Feb. 11, 2010. Update report to the Legislature on cell phone recycling in Maine. <http://maine.gov/dep/rwm/ewaste/pdf/2010cellphonereport.pdf>

⁶ Maine DEP, Feb. 11, 2010. Update report to the Legislature on cell phone recycling in Maine. <http://maine.gov/dep/rwm/ewaste/pdf/2010cellphonereport.pdf>

⁷ 38 MRSA §1665-B

⁸ According to the statute, "Manufacturer" means a person who owns or owned a brand of mercury-added thermostats sold in the State before January 1, 2006. "Mercury-added thermostat" or "mercury thermostat" means a product or device that uses a mercury switch to sense and control room temperature through communication with heating, ventilating or air conditioning equipment. This includes a thermostat used in residential, commercial, industrial and other buildings but does not include a thermostat used as part of a manufacturing process.

⁹ Maine DEP Bureau of Remediation and Waste Management. "Mercury Recycling Program". June 10, 2009. <http://www.maine.gov/dep/rwm/mercury/hgthermo.htm>.

While Maine had the highest per capita thermostat collection rate in the nation in 2007 and 2008, the program lags behind the statutory goals and has collected only 26% of what is currently estimated as available in a given year.¹⁰ Problems with the program include the Thermostat Recycling Corporation requirement that only HVAC technicians and homeowners be eligible to participate, excluding others who frequently obtain mercury thermostats (demolition contractors, housing authorities, handymen, solid waste personnel, electricians). The law requires TRC to include education necessary to reach collection goals, yet the TRC program has been ineffective in reaching key populations on why, where, and how to recycle mercury thermostats. The lack of compensation for wholesalers, who do the bulk of work to implement the program, is another shortcoming of the program. While the incentive may encourage homeowners or contractors to remove thermostats, it creates a reverse incentive for manufacturers to increase collection rates.

POUNDS OF MERCURY COLLECTED¹¹

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
TRC Program[*]	1.5	1.8	4.49	9.42	15.11	22.0	36.92	38.54	44.45
UW collection[*]	1.67	5.65	9.24	2.2	4.6	2.4	4.4	5.4	4.3
EPI Program[*]	0	0	0	0	0	0	2.4	2.3	0
Total	3.17	7.45	13.73	11.62	19.71	24.4	43.73	46.24	48.75

[*note: TRC, UW, and EPI are three different manufacturer-implemented recovery programs that meet the standards of the statute.]

Source: Maine DEP, 2010

MERCURY-ADDED LAMPS

The lamp law was passed by the legislature in 2009 (38 MRSA §1672). Mercury-added lamps include, but are not limited to, linear fluorescent, compact fluorescent, black light, high-intensity discharge, ultraviolet and neon lamps. This law applies to business and individual consumers.

Beginning in January 2011, the law directs manufacturers of mercury-added lamps to implement a program to recycle mercury-added lamps from households. The recycling program must include convenient collection locations throughout the State where residents can drop off their household lamps without cost, including municipal collection sites and participating retail establishments. Manufacturers are required to pay for collection from municipal sites and for recycling. Municipal costs include labor for local collection, handling, and storage. Handling and recycling equipment and practices must be in compliance with universal waste rules. The law requires effective education and outreach, including point-of-purchase signs and other materials provided to retail establishments without cost. Manufacturers are required to submit an annual report including the number of lamps recycled, the estimated percentage of lamps available for recycling that were recycled under the program, and the methodology used. Manufacturers must also submit an evaluation of the

¹⁰ Maine DEP, "Update report to the Legislature on mercury thermostat recycling in Maine," presented to Joint Standing Committee on Natural Resources, Maine State Legislature, Ann Pistell, March 15 2010.

¹¹ Table 2, page 2 from communication, "Re: Update report to the Legislature on mercury thermostat recycling in Maine," presented to Joint Standing Committee on Natural Resources, Maine State Legislature, March 15 2010. Ann Pistell, MDEP.

effectiveness of the recycling program, recommendations for increasing the number of lamps recycled and an accounting of the costs associated with the program.¹²

The current Maine law shifts responsibility and financing for recycling lamps from municipalities and the Public Utilities Commission to the manufacturers.¹³ The law also directs the Maine DEP to adopt rules governing mercury content standards for products sold in Maine by 2012, and directs the Maine DEP to base these rules upon standards in effect in California, unless no such standards exist in California.

Maine DEP notes that in 2008 only approximately 25% of fluorescent lamps discarded by Mainers were recycled.¹⁴ Though it is illegal to do so, most waste fluorescent lamps are dumped in the trash, with the mercury released into the environment when the lamps are broken.

Collection systems are in place throughout the state for mercury containing lamps, and there are now at least 200 retail locations in Maine, in addition to municipal recycling facilities, which accept lamps. Beginning April 1, 2011, sales bans will be applied to manufacturers not in compliance. Maine DEP is required to report back to the legislature on program collection data beginning April 1, 2013.

MERCURY-CONTAINING AUTOMOBILE SWITCHES

The mercury switch product stewardship program was created by statute (38 MRSA §1665-A) in 2001, replacing an earlier program. The law applies to “a mercury-added product that is a motor-vehicle component.” This law prohibits the sale of vehicles containing mercury switches unless the DEP issues a waiver.

Before vehicles are sent to a recycling facility all mercury switches and mercury headlamps must be removed. If a scrap recycling facility accepts a vehicle containing these, the facility is responsible for removing the mercury switches and headlamps before the vehicle is flattened, crushed, baled or shredded. Upon removal, the components must be collected, stored, transported and otherwise handled in accordance with universal waste rules.

The switches may be voluntarily removed during the normal life-cycle of the automobile by a vehicle dealer or a vehicle repair or maintenance expert. The switches must then be properly disposed of. With switches removed, the car is marked with special stickers provided by the Maine DEP stating that the vehicle is mercury switch-free. Any manufacturer in the state who sells automobiles with mercury switches who does not comply with these requirements faces a sales ban. Manufacturers must report to the Legislature’s joint standing committee on natural resources on fees collected on the sale of new vehicles for the purpose of carrying out the manufacturer responsibilities. The report must specify the amount of the fee collected and how the amount of the fee was determined.

¹² 38 MRSA §1672 [2009, c. 272, §1 (NEW).]

¹³ "Manufacturer" means a person who manufactures a mercury-added lamp and has a presence in the United States or a person who imports a mercury-added lamp manufactured by a person who does not have a presence in the United States.

¹⁴ Maine DEP, 2010. "Mercury-added Lamps: A Strategy for Improving Recycling Rates"
<http://maine.gov/dep/rwm/publications/legislativereports/pdf/lamprptfeb2010final.pdf>, 1

Consumers may be unaware of this program because auto dismantlers and recyclers are the ones required to remove the switches. According to the most recent performance report the program has resulted in the disposal of 45,284 switches and 99 pounds of mercury from 2003-2009.¹⁵

RECHARGEABLE BATTERIES

Maine's battery recycling program was created in 1991 for mercury oxide and rechargeable nickel-cadmium or sealed lead-acid batteries used in government agencies or industrial, communications or medical facilities. Maine law pre-dates the creation of the industry-sponsored Rechargeable Battery Recycling Corporation (RBRC). The national RBRC program currently recycles rechargeable batteries - commonly found in cordless phones and power tools - through retail stores, community collection centers and businesses across the U.S. and Canada. Recently, the program expanded and now accepts Ni-Cd, lithium, metal hydride and small sealed lead acid rechargeable batteries such as those found in cellular phones, laptop computers and other portable electronic products.

Maine law requires manufacturers to establish a collection system for rechargeable batteries.¹⁶ The national RBRC program fulfills this requirement. A Maine business must either use the RBRC system to return spent rechargeable batteries to the manufacturer or make other arrangements to ensure the battery is recycled. It is illegal for businesses to dispose of rechargeable batteries in the trash. While Maine homeowners are not required to recycle rechargeable batteries, they are subject to a disposal ban. The price paid for the battery enables the use of the RBRC service free of charge.¹⁷ The Maine DEP offers on their website a listing of locations accepting these batteries, but for many Mainers these locations are neither close nor convenient.¹⁸ Given neither enforcement nor penalty for consumers illegally disposing rechargeable batteries, it may be impossible to measure effectiveness of this program.

There is specific detail regarding battery characteristics and manufacture dates that are covered under the law, as well as definitions of a sales ban. The law requires manufacturers to establish and maintain a system for the collection, transportation and processing of the batteries and to include those costs in the sales transaction. Because rechargeable batteries are recovered through the RBRC rather than a state-based system, there is no requirement that data on collection or disposal be reported. There are no readily available Maine-specific data on rechargeable batteries.

¹⁵ Maine DEP, April 2010. Mercury Auto Switches Recycled in Maine 2003-2009.

¹⁶ 38 MRSA § 2165

¹⁷ Maine DEP Bureau of Remediation and Waste Management, "Rechargeable Battery Recycling" 2005.

<http://www.maine.gov/dep/rwm/recycle/nicad.htm>. accessed 9/17/10.

¹⁸ http://www.maine.gov/dep/rwm/recycle/maine_sitesasof031507.xls

PRODUCT STEWARDSHIP BACKGROUND

Many US states have modeled their product stewardship programs on those of the European Union and Canada. The first such laws were passed in Europe as the result of Directives enacted by the European Union. These Directives provide minimum standards and governing concepts. EU member states must establish their own programs to comply with the directive. The EU Directives impose compliance requirements on member states, not directly on companies or consumers, and can impose penalties on states that don't comply. Most European countries have transposed these directives into national law, but not all are consistent.

The European Union now has three directives covering product stewardship: the Packaging Directive, 1994; the WEEE Directive, 2002 (waste electrical and electronic equipment); and the Battery Directive, 2006. The WEEE Directive includes ten categories of products: large and small appliances, IT equipment, consumer equipment (radio, TV, stereo), lighting, electronic and electric tools, toy and sports equipment, medical devices, monitoring instruments (e.g., thermostats), and automatic dispensers (hot drink dispensers). In addition to recycling directives, the European approach has been to ban the manufacture of hazardous materials (e.g., mercury, lead, hexavalent chromium) in the Restriction of Hazardous Substances Directive (RoHS) adopted in February 2003 by the European Union. This ban has reduced the manufacture of products containing hazardous substances. The US has not followed this approach.

In Canada, provinces independently have implemented product stewardship legislation for specific products. There are product stewardship programs covering 11 different products in 12 Canadian provinces.¹⁹ At the federal level, the Canadian Council of Ministers of the Environment (CCME) established an Extended Producer Responsibility Task Group to provide guidance on the development and implementation of product stewardship programs. In 2009 the (CCME), representing all provinces, approved a Canada-wide Action Plan for Extended Producer Responsibility and a Canada-wide Strategy for Sustainable Packaging. The Canada-wide Action Plan will provide guidance on future implementation of province-level programs.

UNITED STATES

The U.S. has no federal legislation on product stewardship, and, as in Canada, states have implemented programs independently. Product stewardship programs in the U.S. are, however, framed in part by federal legislation. At the federal level, the Resource Conservation and Recovery Act (RCRA) regulates hazardous wastes and establishes reporting, handling, and transportation requirements for them from the point of generation to the point of disposition. Because certain hazardous wastes enter municipal waste streams from households and from small-quantity waste generators, the Universal Waste Rule was passed in 1995.

The Universal Waste Rule reduces RCRA regulatory burdens on businesses that generate specific wastes by simplifying regulations. In addition, it provides streamlined collection requirements for

¹⁹ Environment Canada, 2010. Extended Producer Responsibility and Stewardship: An Inventory of Waste Diversion Programs in Canada. <http://www.ec.gc.ca/epr/default.asp?lang=En&n=4BDD01C2-1>

these wastes, including certain kinds of batteries, pesticides, mercury-containing equipment and mercury-containing lamps. In 1999 hazardous waste lamps (e.g., fluorescent lamps) were added as a new category of federal universal waste.²⁰ The USEPA added mercury to the Universal Waste rule in 2005.²¹ States can modify the universal waste rule and add additional universal waste(s) in individual state regulation.

Because RCRA exempts household waste, the US Congress passed the Battery Management Act in 1996, aimed at manufacturers and handlers. The Battery Act establishes uniform labeling requirements for rechargeable and NiCd batteries, mandates easy removal from products, makes the Universal Waste Rule apply in all 50 states (establishing a system for handling universal waste), requires USEPA to establish a public education program, and limits the sale of certain mercury containing batteries.

Some manufacturers have created national initiatives for recycling their products. Secondary (rechargeable) battery manufacturers established the Rechargeable Battery Recycling Corporation (RBRC), a non-profit, industry sponsored group in 1994 to collect and recycle NiCd batteries. The programs expanded to other secondary battery types in 2001. RBRC founded “Call2Recycle” in 1994 as a program to take back and recycle rechargeable batteries, funded by manufacturers. The website (www.call2recycle.org) allows users to enter a zip code and find locations for recycling.

In addition to batteries, two other national initiatives for mercury take back are organized by manufacturers. Thermostat manufacturers established the Thermostat Recycling Corporation in 1998 to collect and recycle mercury thermostats. The National Mercury Switch Recovery Program is run by auto manufacturers and dismantlers for the removal of automotive mercury switches.

²⁰ USEPA 64 FR 36466

²¹ USEPA 40 CFR Part 273

STATE LAWS

In the U.S., product stewardship legislation has been passed by states and some cities. California in 2003 was the first state to create an e-waste program (though not EPR), based on an advanced recovery fee rather than manufacture financing. Maine in 2004 was the first state to pass an e-waste law making producers responsible for product recycling. The table below shows the current array of product stewardship laws by product and state.

U.S. STATES AND PRODUCT STEWARDSHIP LAWS

Product	Number of Laws in US	States with Product Stewardship Laws
Electronics	23 states* + 1 city	CT, HI, IL, IN, ME, MD, MI, MN, MO, NC, NJ, NY, OK, OR, PA, RI, SC, TX, VA, VT, WA, WV, WI and New York City
Auto Switches	13	AR, IL, IN, IA, ME, MD, MA, NJ, NC, RI, SC, UT, VT
Mercury Thermostats	8	CA, IA, IL, ME, MT, NH, PA, VT
Batteries	7	FL, IA, ME, MD, MN, NJ, VT
Fluorescent Lamps	2	ME, WA
Paint	1	OR
Pesticide Containers	1	CA
Framework Law	1	ME

Source: Product Stewardship Institute. July, 2010.

* California's e-waste program is not product stewardship since it is based on an advanced recovery fee.

FRAMEWORK LEGISLATIVE APPROACH

The process for designating products for product stewardship programs can take many forms and sometimes prove contentious. A framework or comprehensive approach establishes a consistent process for recommending additional products for stewardship programs. It can provide regulatory consistency as well as streamlining future legislation. Framework bills that have been introduced in several states include shared responsibility for the program, cost internalization, and specific performance goals.²² Canadian provinces have implemented framework legislation in British Columbia, Manitoba, and Ontario. The European WEEE directive for electronic products is a framework, providing minimum standards that member states have to meet and then implement in their own way.

Maine's product stewardship framework law was passed in 2010, as the first product stewardship framework legislation in the United States.²³ This law sets up a pre-legislative process for considering candidates for new product stewardship programs as well as any changes to Maine's existing product stewardship programs. It allows the Maine DEP to prioritize future products for consideration under EPR programs, and make recommendations to the Legislature annually. This

²² Product Stewardship Institute, 2010. Product Stewardship Framework Legislation.

<http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=691> accessed 6/12/10.

²³ LD 1631, "An Act to Provide for the Responsible Recycling of Consumer Products."

process provides the opportunity for municipalities, manufacturers, retailers, consumers, and non-governmental organizations to provide their input into the establishment and revision of product stewardship programs in Maine.

Case: The Canada-wide Action Plan:

On October 29, 2009, the Council of Environment Ministers (CCME) approved in principle a Canada-wide Action Plan for Extended Producer Responsibility and a Canada-wide Strategy for Sustainable Packaging. Under this plan the provinces must commit to developing EPR framework legislation and/or regulations for priority products. This includes timeframes for implementation. The Canada-wide action plan for EPR would seek full life cycle cost accounting by producers for their products, incorporated into product prices – an attempt to harmonize across Canada. CCME's Extended Producer Responsibility Task Group was established in 2007 to provide guidance on the development and implementation of EPR and product stewardship programs, and to consider packaging as a first priority.

The EPR Task Group's mandate is to:

- identify opportunities to harmonize, make consistent where appropriate, expand, and improve EPR programs;
- develop general guidance on EPR issues;
- identify and explore opportunities to forge strategies for new EPR initiatives; and
- facilitate EPR communications and information exchange among jurisdictions.

Under the Plan, Canadian jurisdictions commit to development of EPR framework legislation and/or regulations for identified priority products / materials:

- Phase 1 - Requirements must be implemented within 6 years (2015) for:
 - Packaging
 - Printed materials
 - Mercury containing lamps and other mercury-containing products
 - Electronics and electrical products
 - Household hazardous and special wastes
 - Automotive products
- Phase 2 - Requirements must be implemented within 8 years (2018) for:
 - Construction and demolition materials
 - Furniture
 - Textiles and carpet
 - Appliances, including ozone depleting substances.

ELEMENTS OF PRODUCT STEWARDSHIP PROGRAMS

There are currently at least 60 state laws on product stewardship in 33 states, all slightly different, reflecting variation in products, markets, demographics, consumer patterns, state governments and political considerations. Despite these differences, there are certain elements contained in all product stewardship programs. A brief examination of these issues suggests the need to provide consistent standards and regulatory flexibility.

FINANCING

Financing is a key feature in product stewardship programs. Most programs have some mechanism for manufacturers to pay for part of the program. Usually, manufacturers pay to set up and carry out the recycling program, and they may also pay a registration fee to the state to cover administrative costs. Program financing can be structured through visible fees, invisible fees, an advanced recovery fee or a tax. Fees may be at the point of sale, between retailer and manufacturer, or there may be full cost internalization on the part of the manufacturer. Recycling programs that do not specifically make producers pay still incur costs that are passed on to municipal and state governments. Consumer compliance costs, such as taking covered products to a recycling center, are not covered.

In Maine, towns receive e-waste from residents, store it, and then take it to consolidators who invoice producers for cost of handling, transport, recycling and consolidation.

In its e-waste program, California uses an advance recovery fee charged to the consumer and the state incurs much of the cost of administering the program. California consumers pay a fee at purchase to retailers who then remit the fee to the state, and the state reimburses collectors or recyclers. These fees may be used to improve the recycling infrastructure. In Maryland, producers pay a registration fee directly to a state fund, and counties can apply to this fund for grants to set up recycling programs. In Washington, producers can create their own take-back program, or participate in a state plan administered by a third party. In Maine, towns collect e-waste and then take it to consolidators who invoice producers for cost of handling, transport, recycling and consolidation.

The financing structure of a program has many potential impacts on program effectiveness as well as consumer and political acceptance. Experience in the European Union has shown that individual producer responsibility for their own brands is the most effective system for internalizing costs and getting manufacturers to make design changes, but it leaves unaccounted the logistical problems of free riders (producers who do not register with the system) and orphan products (from producers who have gone out of business).²⁴ For this reason the Netherlands switched to a system of market

²⁴ van Rossem, Chris; Naoko Tojo; Thomas Lindqvist; 2006. *Extended Producer Responsibility: An Examination of Its Impact on Innovation and Greening Products*. International Institute for Industrial Environmental Economics. Report commissioned by Greenpeace International, Friends of the Earth and the European Environmental Bureau (EEB)

share allocation of costs in their e-waste programs.²⁵ Producers favor individual take back, allowing them to benefit from their own design changes. It is apparent that different products require different financing systems, and it is important for states to work with each industry to determine the best financing structure.

Case: California E-Waste Advanced Recovery Fee System

In 2003, California enacted legislation that established a funding system for the collection and recycling of certain electronic wastes. Key elements of the *Electronic Waste Recycling Act of 2003* include the collection of an electronic waste recycling fee at the retail point of sale of covered products. Consumers paid fees of \$6 - \$10 at purchase of new devices, into special account to pay collectors and recyclers. Manufacturers are required to provide consumers with information regarding recycling opportunities. Retailers can keep 3% for administration. Manufacturers are required to notify retailers which products are subject to fee. Collected fees are remitted by retailers to the State and deposited into an account. Payments are made to approved collectors and recyclers of covered electronic waste (CEW) to offset the net cost of waste recovery, processing and recycling activities.

The program definitions of "covered electronic devices" and "covered electronic wastes" (video display devices with a screen size larger than 4 inches diagonal) include televisions and computer monitors that contain a cathode ray tube (CRT), laptop computers, and liquid crystal display (LCD) desktop computer monitors, plasma, LCD televisions, and portable DVD players. The fees are adjusted in order to maintain fund solvency and are currently \$8, 16 or 25, based on screen size.

California law is not considered EPR because the manufacturers do not pay for take back.²⁶

The California program has also been called a "magnet for fraud" as it attracts illegal material smuggled in from out of state. The state of California pays to recycle out of state materials (on which no fee has been collected) to the benefit of the haulers and consolidators. While it has been successful at creating a recycling industry for e-waste, the California system has rejected more than \$22 million in e-waste claims and some say the state may have paid as much as \$30 million in fraudulent claims.²⁷

The issue of who pays is central to financing product stewardship programs, particularly with e-waste. Currently 23 states and New York City have e-waste laws. In California consumers of electronics pay a fee at purchase to finance recycling, in Maine producers and municipalities share the cost, and in Maryland the counties pay for all recycling. A majority of states enacting mandatory electronics recycling programs have included some type of registration fee assessed to manufacturers to help pay for state program administration, outreach and enforcement costs. A comparison of

²⁵ Sachs, Noah, 2006. "Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States," *Harvard Environmental Law Review*, Vol. 30, 2006, p. 76.

²⁶ CalRecycle, May, 2010. Update on California's Covered Electronic Waste Recycling Program: Implementation of the Electronic Waste Recycling Act of 2003.

²⁷ Knudson, Tom, 2010. "California's Pioneering E-Waste Program a Model Gone Wrong" *The Sacramento Bee*, July 18, 2010.

states shows fees ranging from zero to \$23,000 annually.²⁸ Maryland and West Virginia also use proceeds from these fees as grant funding for local government e-waste collection and recycling activities. Most states have a flat fee; Oregon has a tiered fee. At least five states have no fee. In 2009, the Maine legislature added a flat registration fee to Maine's program starting July 1, 2010. Maine DEP will be proposing a lesser fee for small manufacturers.

PERFORMANCE GOALS, TARGETS, AND ENFORCEMENT

Setting goals and measuring outcomes are essential to evaluating program effectiveness. Program performance goals may be set in terms of a collection rate or a recycling rate. Collection rates can measure either material collected (e.g., pounds of mercury) or product collected (e.g., pounds of televisions). Recycling rates measure the percentage recycled of the total product sold or total estimated to be available for recycling. Laws that specify target amounts (in pounds or percentages) might mean states could stop collecting once they reach the target. To address this in their e-waste laws, Indiana and Minnesota estimate the amount available for collection based on sales of the previous year. New York bases target goals on the previous three year period. Maine's e-waste law requires reporting, but does not specify goals. Maine's thermostat law sets collection goals.

Some states have passed bills which have neither collection goals nor convenience requirements (VA, TX) and collection rates are low in these states. The Electronics TakeBack Coalition claims that states with convenience standards or collection goals show higher collection rates than states without, but because the products accepted vary from state to state, comparisons among programs is problematic.²⁹

METHODS FOR MEASURING PROGRAM PERFORMANCE

Collection Rate: Material	The absolute amount of material collected (e.g., pounds of mercury)
Collection Rate: Product	The absolute amount of product collected (e.g., pound of computer monitors)
Recycling Rate	The product recycled as a percentage of total product sold currently or The product recycled as a percentage of total product estimated to be available for recycling
Recovery rate	The product recycled as compared to the product collected
Recycling recovery rate	The amount of material recycled from the total amount collected (e.g., mercury recycled out of total amount of mercury collected)
Per capita collection	The total amount collected divided by the population

²⁸ The National Center for Electronics Recycling (NCER) estimates that the electronics manufacturing industry will pay approximately \$90 million in 2010 to comply with recycling mandates across states with e-waste mandates – \$71 million for collection, transportation and recycling of covered electronic products, \$14 million for internal compliance costs such as tracking, reporting, and \$4.5 million for government-incurred administrative costs. NERIC, March, 2009, website www.ecyclingresource.org.

²⁹ Electronics TakeBack Coalition, May 3, 2010. "How much e-waste is collected in the state-mandated recycling programs?" http://www.electronicstakeback.com/legislation/Collection_Volumes_by_State.pdf Accessed 6/7/10.

The amount of e-waste collected by state programs varies. Maine, Minnesota, Washington and Oregon have among highest per capita e-waste collection rates currently, all between 5 and 6 pounds per capita in 2009.³⁰ Some other states, however, have collection rates at less than 1 pound per capita. Most programs haven't been in place long enough to draw firm conclusions from the collection numbers. Products also change over time, and as electronics get smaller and lighter, setting the goal in pounds of product may prove problematic.

The amount of e-waste collected by state programs varies. Maine, Minnesota, Washington and Oregon have among highest per capita e-waste collection rates, all between 5 and 6 pounds per capita in 2009.

The table below on thermostat collection programs shows some of the different approaches taken in measuring performance. Differences in data, approaches, and assumptions illustrate the need for flexibility as well as the difficulty of comparison across programs.

APPROACHES TO MEASURING THE PERFORMANCE OF MERCURY THERMOSTAT COLLECTION PROGRAMS

Proponent	Approach	Assumptions	Data source
ME DEP	Collection rate with # of buildings in state as reference point	<ul style="list-style-type: none"> Residential buildings contain 1.5 thermostats and commercial buildings contain 1.25 thermostats Thermostat lifespan is 30 years 83 % of thermostats contain mercury 	US Census: # of residential and commercial buildings
King Co, WA	Collection rate with # of mercury thermostats observed in commercial buildings as reference point	<ul style="list-style-type: none"> Commercial buildings are an appropriate proxy for buildings generally Thermostat lifespan is 50 years 	Survey of commercial buildings in King County
Product Stewardship Institute (PSI)	Collection rate with sales for replacement as reference point	<ul style="list-style-type: none"> 83% of thermostats contain mercury (precise percentage to be determined through PSI contractor survey) 	Frost & Sullivan: # of thermostats sold for replacement
Thermostat Recycling Corporation (TRC)	Absolute collections or collections compared to base year		TRC collections

Source: Product Stewardship Institute, 2009. "Battery Performance Metrics: Recommendations for Best Practice." p.19.

REPORTING, ENFORCEMENT, AND PENALTIES

Related to performance goals and measures are the issues of reporting, enforcement, and penalties for non-compliance. Maine's product stewardship laws on e-waste, mercury switches, thermostats, and cell phones require reporting but the battery law requires neither reporting nor performance measurement. A sales ban is a common penalty for manufacturers. Vermont issues a sales ban on non-compliant manufacturers of thermostats, prohibiting them from selling their current product in the state. Maine requires retailers to implement a sales ban on non-compliant electronics manufacturers.

³⁰ National Center for Electronics Recycling (NERC), 2009 Per Capita Collections. Accessed 9/16/10. <http://www.ecycleclearinghouse.org/content.aspx?pageid=59>

Massachusetts offers an example of fines as a penalty for not meeting goals. With a statewide disposal ban on mercury containing products, computer monitors and TVs, manufacturers must identify all products that contain mercury. In addition, they must file a collection and recycling plan for their products in Massachusetts or face a sales ban. Under the Massachusetts mercury lamp program, if recycling efforts do not meet targets, the law requires lamp manufacturers to provide up to \$1 million per year to MassDEP for grants to municipalities or regional authorities that are collecting and recycling the lamps.³¹ A lack of data complicates setting enforceable goals. There are no data available on number of CFLs sold by state.³² Massachusetts estimated its program numbers using national data for lamps projected to the state population.

COVERED ENTITIES AND PRODUCTS

Comparisons between states and laws are complicated by the fact that some laws apply only to households, while others apply to schools, small businesses, non-profits, government or a combination of these.³³ E-waste is the broadest product category; there are at least eight different sets of “covered entities” defined by state e-waste laws. In California the e-waste program covers all sectors, including businesses. Vermont’s e-waste law covers households, charities, school districts and businesses with up to 10 employees. Maine’s e-waste law covers only households.³⁴

The definition of products covered also varies by state. Ten different sets of definitions are used by states to list their products covered under e-waste laws.³⁵ Maine’s e-waste law covers TVs, laptops, and monitors (all over 4 inches in diameter). California covers the same but with some TV exclusions. Other states take screens only over 9 inches, and some include computer peripherals, CPUs, and printers, while others exclude TVs.

STANDARDS

Standards for recycling programs can cover the recycling rate, environmental practices of recyclers, final disposal requirements, specifications on exporting waste to developing countries, or use of prison labor, for example. In electronics recycling in the US there are two voluntary standards: the R2 standard and the e-Stewards standard.

Some states have articulated elements of these standards in their product legislation, but not the standards themselves. Washington bans the use of prison labor in dismantling and recycling of e-

³¹ MassDEP, 2009. Toxics and Hazards. 2008 Massachusetts Lamp Recycling Rate Calculation. <http://www.mass.gov/dep/toxics/stypes/hgrecreat.htm> (accessed June, 2010).

³² Review of Compact Fluorescent Lamp Recycling Initiatives in the U.S. and Internationally” prepared by NEWMOA, June 9, 2009

³³ National Center for Electronics Recycling (NERC), Covered Entities Map. Accessed 9/16/10. <http://www.ecycleclearinghouse.org/content.aspx?pageid=53>

³⁴ Maine DEP, Report on Maine’s Household E-Waste Recycling Program. January 15, 2010.

³⁵ National Center for Electronics Recycling (NERC), Product Scope Accepted. Accessed 9/16/10. <http://www.ecycleclearinghouse.org/content.aspx?pageid=54>

Electronics TakeBack Coalition. State By State E-Waste Law Summary, Feb. 2010. http://www.electronicstakeback.com/legislation/state_legislation.htm Accessed 9/16/10.

waste. Maine consolidators must certify that environmental standards are met by recyclers. Canada has a single standard nationally relating to mercury and a voluntary standard for electronics.³⁶ British Columbia is developing a provincial standard that covers requirements on the re-use of e-waste.

Electronic waste is the largest and most rapidly growing category of universal waste, and the improper dismantling and disposal of its components (in developing countries, by prisoners, in unsafe conditions) have received widespread media attention. More guidelines have been developed for recycling and disposal practices of e-waste than for other products.

E-Waste Guidelines

Basel Convention guidelines 1992. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, known as the Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). More than 165 countries have ratified the Basel Convention, the US has not.

Responsible Recycling (R2) Guidelines - a set of guidelines for accredited certification programs to assess electronics recyclers' environmental, worker health and safety, and security practices. The voluntary R2 practices include general principles and specific practices for recyclers disassembling or reclaiming used electronics equipment including those electronics that are exported for refurbishment and recycling. Certification for recyclers and provides guidelines for handling e-waste. Critics say this program is too lax, allows prison labor.

e-Stewards – a certification started by the Basel Action Network, based on ISO 14001 standards. Recyclers can pay a fee to be licensed to use the logo certifying their participation. Certified e-Stewards recyclers adhere to the e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment® which addresses concerns of human health and the global environment. The e-Stewards standard prohibits the export of e-waste to developing countries.

“E-Waste Guides/Good Management Practices” from the US EPA. The EPA website offers a collection of resources on e-waste practices and standards.³⁷

CONVENIENCE, COLLECTION, AND INCENTIVES

Consumer convenience affects recycling rates: some states articulate the goal of convenient collection as a part of their product stewardship programs. Washington's e-waste program defines convenience by proximity to population; there must be at least one collection site for every county and for every city of 10,000 or more. In Europe convenience is defined by location of retail; there is

³⁶ Electronics Recycling Standard 2009. Electronics Product Stewardship Canada.
http://www.epsc.ca/pdfs/EPSC_ERS_June_2009.pdf accessed 9/18/10.

³⁷ <http://www.epa.gov/epawaste/consERVE/materials/ecycling/pubs.htm>

often a one-to-one exchange at the point of purchase of a product. Collection systems are often a patchwork of approaches. Towns may collect, counties may collect, there may be free-standing recycling centers, cities offer collection events, and some retail locations accept certain products.

In Maine, collection structure varies by product: light bulbs may be taken to participating retail locations or municipal collection sites, cell phones may be returned anywhere cell phones are sold, rechargeable batteries are collected by the RBRC program through retail stores, community collection centers and businesses across the U.S. and Canada. Mercury auto switches are removed and collected by the auto dismantlers and recyclers. Mercury thermostats may be returned to retailers or wholesalers. Some municipal sites also accept thermostats. Computers may be taken to municipal collection locations, a participating retailer (depending on brand), or a participating Goodwill donation center. Televisions are more difficult to dispose of, being collected only at specific municipal collection events or by drop off. Determining where to take a particular product is not simple. The website Earth911.com attempts to connect the consumer to recycling opportunities by zip code, and the Maine DEP website has a listing of municipal sites accepting universal waste. For the average consumer, information on where and how to dispose of products banned from the trash is not easy to find.

Consumer incentives play a role in collection rates. Nationally the thermostat recycling rate is estimated to be only 5%.³⁸ Maine thermostat recycling in 2009 was estimated at 26% of what was available for collection. Maine and Vermont, offering incentives, show thermostat recycling rates higher than states without incentives. In these two states, retail locations which collect returned thermostats offer a coupon toward \$5.00 off the purchase of anything in the store. Wholesale locations provide a coupon for a \$5.00 rebate check. Although the incentives appear to make return rates higher, many other variables impact return rates.³⁹

VOLUNTARY RECYCLING PROGRAMS

Voluntary recycling programs put the financial burden on local governments, while product stewardship programs shift the financial burden of recycling to the manufacturers and the consumers.

Massachusetts offers an example of a voluntary program. A disposal ban on mercury containing products includes computer monitors and TVs, but there is no law covering e-waste. Manufacturers must identify the products that contain mercury, and then file a Collection and Recycling Plan with the MassDEP. The targeted recycling rate for all mercury containing products is 75%.⁴⁰ Massachusetts does have an established collection structure, and MassDEP states that 90% of the state population is served by recycling centers. Over half of Massachusetts' 351 municipalities have

³⁸ Mercury Products Campaign, Feb. 2010. "Turning Up the Heat: Exposing the Manufacturers' Lackluster Mercury Thermostat Collection Program." <http://mercurypolicy.org/wp-content/uploads/2010/02/turning-up-the-heat-3.pdf>

³⁹ Maine Department of Environmental Protection, March 15, 2010. Update Report to the Legislature on Mercury Thermostat Recycling in Maine.

⁴⁰ MassDEP, Fact Sheet: Manufacturer Collection and Recycling Plans for Mercury-Added Products, March, 2009.

mandatory recycling. There are municipal and commercial drop-off centers throughout the state for mercury-containing items, e-waste and lamps.⁴¹

INDUSTRY RECYCLING PROGRAMS

Many of the products covered under state product stewardship recycling programs are also recovered through a patchwork of voluntary programs sponsored by industry at retail locations. The following table offers a sampling of retail recycling of electronics available in Maine. For a rural population, distance and convenience remain barriers to retail-based recycling.

ELECTRONICS RECYCLING AT RETAIL OUTLETS IN MAINE

Best Buy	Stores accept desktop and notebook computers and peripherals, DVD and VCR players, small electronics, telephones, and televisions and monitors up to 32 inches. A \$10 fee per unit recycling fee is charged for items with screens, such as televisions, laptop computers and monitors, but the consumer instantly receives a \$10 Best Buy gift card in exchange for the recycling fee.
Staples	Stores accept in-store drop-off of cell phones, inkjet and toner cartridges, pagers, PDAs and rechargeable batteries. Dell electronics products are accepted for free, other brands are charged a recycling fee.
Dell	Dell offers free recycling of Dell branded products at any time.
Goodwill Industries	Goodwill has partnered with Dell in the Reconnect Program so that residents in Maine, New Hampshire, and northern Vermont can recycle any brand of computer and computer equipment at any Goodwill store or donation center.
HP	HP offers customers the option to trade in, return for cash value, or donate any qualifying product. HP accepts cell phones, computer hardware, inkjet and laser printer cartridges, rechargeable batteries, and user-replaceable mercury-added lamp assemblies by mail-in or drop off.
Radio Shack	Radio Shack accepts electronics and cell phones either in store or by mail for trade-in value or free recycling.
Wal-Mart	Wal-Mart has partnered with Gazelle to accept 20 categories of electronics for trade-in value or recycling. Wal-Mart has hosted CFL take back events at some retail store locations.
Samsung	Samsung provides free take back of their own branded products by mail.
Apple	Apple accepts iPods and cell phones by mail-in or at retail stores.
The Home Depot	Home Depot started a voluntary national initiative for taking back CFLs in all of their stores in 2008 at no cost to the customer and without state or program support.

EVALUATION TOOLS

Although product stewardship programs are recent, some tools for evaluation have been developed. The Canadian Council of Ministers of the Environment (CCME) has produced a tool to help prioritize products suitable for EPR programs. This tool uses a matrix to score attributes of

⁴¹ Massachusetts DEP, 2010. About Electronics Recycling. <http://www.mass.gov/dep/recycle/reduce/electron.htm> and <http://www.mass.gov/dep/recycle/hgmap.htm>

products, ranking them for priority in an EPR program.⁴² The OECD Working Group on Waste Prevention and Recycling provides a methodology that could be used by individual countries or states as a starting point for ex-post evaluation of particular EPR programs.⁴³

REGIONAL COORDINATION

Retail distribution is coordinated regionally, and consumers in New England often cross state lines to shop. Legislation on product stewardship and recycling, however, is carried out state by state. Four New England states have product stewardship laws on thermostats, auto switches, and electronics. State laws on e-waste are found in CT, ME, RI, and VT. Laws on auto switches are in ME, MA, RI, and VT; thermostats in ME, NH, RI and VT; batteries in ME and VT only; and fluorescent lamps only in ME. All ten northeastern states have disposal bans, but no single material is banned in all states.⁴⁴ A system of regional coordination might help less populated areas find recycling markets and could make it easier for producers to take back products and to design for recycling. A clear, consistent message to consumers across a region regarding which products are recyclable and where to take them might improve recycling rates.

NEW ENGLAND STATES AND PRODUCT STEWARDSHIP

	RI	CT	MA	ME	NH	VT
Auto Switches	☑		☑	☑		☑
Batteries				☑		☑
Electronics	☑	☑	☐	☑		☑
Fluorescent Lamps			☐	☑		
Paint		☐				☐
Pharmaceuticals	☐					
Thermostats	☑		☐	☑	☑	☑
Framework Legislation	☐			☑		☐

KEY:
 ☑ = Law
 ☐ = Bill

Source: Product Stewardship Institute, July, 2010.

Consistency across states and products could lead to greater influence with manufacturers and consumers. For example, manufacturers might find efficiencies if they had to recycle their products in all New England states. Similarly, consumers might have higher recycling rates if recycling requirements were consistent and well known across a wider geographic region.

⁴² CCME, 2008. Extended Producer Responsibility Product Evaluation Tool.
http://www.ccme.ca/assets/pdf/pn_1397_epr_guidance_manual_e.pdf

⁴³ 2005, OECD. "Analytical Framework for Evaluation the Costs and Benefits of Extended Producer Responsibility Programs," OECD Working Group on Waste Prevention and Recycling.

[http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=ENV/EPOC/WGWPR\(2005\)6/FINAL&doclanguage=en](http://www.oecd.org/officialdocuments/displaydocumentpdf?cote=ENV/EPOC/WGWPR(2005)6/FINAL&doclanguage=en)

⁴⁴ Northeast Recycling Council, Inc., "Disposal Bans and Mandatory Recycling in the NERC States". April, 2010.

EDUCATION AND OUTREACH

According to the Consumer Electronics Association (CEA), Americans own approximately 24 electronic products per household.⁴⁵ The USEPA estimates that the US produces 7.1 pounds per capita of electronic waste⁴⁶ and recycles only between 15-20% of what is available for recycling.⁴⁷ The same report estimates recycling rates for paint, thermostats, and batteries to be all less than 5%. The Association of Lighting and Mercury Recyclers found 2% of all household fluorescent lamps were recycled in 2004.⁴⁸ These low averages do mask higher rates in some locations. Californians Against Waste estimates that for 2008, the recycling rate for covered electronics was 58%, almost triple the 29% of 2006.⁴⁹ While states continue to pass legislation on product stewardship covering a wider array of products, it is not clear whether recycling rates remain low because of inconvenience or the consumers' lack of awareness.

Some state laws mandate consumer education. In Massachusetts, mercury containing lamp manufacturers must implement an education plan for users about recycling. In Vermont, thermostat manufacturers incur a sales ban unless they participate in education and outreach for consumers. In California, a dedicated website directed to the consumer informs the public on e-waste. The site, eRecycle.org, is a partnership between government, manufacturers, retailers, and the environmental community.

In Maine, information on municipal collection and disposal varies; some towns provide flyers or websites with clear information on how to dispose of products, many do not. The disposal ban on cathode ray tubes went into effect in Maine in 2006 yet it remains common to see used televisions placed curbside for disposal. Not only do people not know where to take recycling, they do not know about disposal bans. Product stewardship programs need to fund public education not only at the initiation of the program, but with an ongoing commitment. Expansion of collection of products for recycling at retail locations may also provide an opportunity for education to a broader public.

⁴⁵ Consumer Electronics Association. "Market Research Report: Trends in CE Reuse, Recycle and Removal." April 2008.

⁴⁶ USEPA approach 1 (EPA fact sheet July 2008, Management of electronic waste in the United States)

⁴⁷ EPA used two different approaches to estimate quantities of products ready for end of life management in the US, one using industry sources and one using state waste studies. EPA Reports suggest that 15-20% of products ready for end of life management (by weight) were recycled, while 80-85% was disposed of, including landfill or incineration. (EPA fact sheet, July 2008, "Management of electronic waste in the United States")

⁴⁸ National Mercury Lamp Recycling Rate Study, November 2004, Association of Lighting and Mercury Recyclers, ALMR.

⁴⁹ http://www.cawrecycles.org/issues/ca_ewaste/existing_laws

CONCLUSIONS

Maine DEP, businesses, and municipalities are working together to implement product stewardship laws covering six separate products. Maine's product stewardship framework law (LD 1631) was passed in 2010 with unanimous support in the House and Senate, as well as with support from the Maine State Chamber of Commerce and the Natural Resources Council of Maine. The first report from this law is due to be released December 1, 2010.

As a result of Maine product stewardship laws, approximately 7.9 million pounds of e-waste and 64 pounds of mercury from thermostats and auto switches were kept out of landfills in 2009.⁵⁰ At the same time, these numbers only loosely gauge the impact and effectiveness of existing laws and regulations. Much better data collection, streamlining of programs and reporting guidelines are necessary. Most product stewardship programs have been operating for only a few years, and data on performance and costs are few.

Firm conclusions on the design and performance of Maine's product stewardship programs are hard to draw because most are quite recent. However, the auto switch program appears to be highly effective, in large part due to the centralization of collection by automobile recyclers and the lack of need for consumers to take definite action to recycle. In contrast, the mercury light bulb program is hampered by the need for consumers to take action on each and every bulb, the absence of enforcement procedures and the lack of consumer awareness.

The lack of data complicates both evaluating program performance and setting enforceable goals. Current metrics are based on assumptions developed from imprecise data, yet guidelines and goals are necessary. We don't know precisely how many mercury switches, LCD panels or cell phones consumers own nor do we know when people will be ready to dispose of them. Recycling goals based on percentage of products available for recycling are estimates at best and should regularly be revised in pursuit of more accurate measurements.

Performance measures will also need to become more precise and accurate. For example, calculating e-waste in pounds per capita, while better than no measurement, reflects neither the generation of waste nor its potential hazard. Different products require different financing systems, and it is important for states to work with each industry to determine the best financing structure. Overall, program goals must be realistic, feasible and cost effective, and they must be regularly re-examined.

There is a need for more adequate collection infrastructure at the local level and municipalities should not have to bear the financial burden. A quick look beyond Maine's cities and large towns reveals that many smaller municipalities have no convenient disposal options for many of these products. Municipalities are not mandated to take everything; to the extent that municipal solid waste facilities should be part of the recycling process, they should be adequately funded.

Regional cooperation and local input are equally important for solutions that fit Maine's varied demographics. Research is needed to determine how to improve existing infrastructure and how regional solutions could address collection problems. Coordinating programs with other New England states might yield higher collection levels and greater participation from both

⁵⁰ Electronics Take Back Coalition, 2010, and Maine DEP, 2010.

manufacturers and consumers. Ultimately, coordination and consistency of both collection and education across states and products could lead to higher program success.

Suggestions for Maine Programs:

- Improve collection infrastructure
- Pursue better data for measuring performance and setting goals
- Explore regional cooperation within Maine
- Pursue coordination with other New England states
- Harmonize metrics across programs and products
- Simplify and clarify message to consumers through public education
- Harmonize future legislative process

Consumer convenience directly affects recycling rates; some states articulate the goal of convenient collection as a part of their product stewardship programs. Other states mandate consumer education. Producers, however, have a reverse incentive to fund public education since greater education brings higher recycling rates, increasing costs to producers. Communication with the public is also critical to program effectiveness. Determining where to take a particular product is not simple. Maine DEP offers collection information on their website, the result being neither comprehensive nor user-friendly. Local governments communicate to residents with wide variation, some very effectively and others not at all. Both could make much more effective use of new forms of social media to reach and educate residents. An effective public education campaign combined with research could measure levels of consumer awareness, participation and impact.

Maine rightly should be proud of its leadership in product stewardship, but not complacent. Much work remains to measure and improve the effectiveness of the existing programs and to implement the new framework law. Maine has shown that it has the political infrastructure to be a leader in the development of product stewardship programs. With improved collection infrastructure, much better consumer education, and research to provide better data, Maine could also become a leader in the successful implementation of these programs.

GLOSSARY OF TERMS:

Computer monitor means a covered electronic device that is a cathode ray tube or flat panel display primarily intended to display information from a central processing unit or the Internet. "Computer monitor" includes a digital picture frame. *38 M.R.S.A §1610, section 5-A*

Consolidator means a person that provides consolidation and handling services for electronic wastes and that operates at least one consolidation facility. *38 M.R.S.A §1610, section 5-A*

Covered electronic device means a computer central processing unit, a desktop printer, a video game console, a cathode ray tube, a cathode ray tube device, a flat panel display or similar video display device with a screen that is greater than 4 inches measured diagonally and that contains one or more circuit boards. "Covered electronic device" does not include an automobile, a household appliance, a large piece of commercial or industrial equipment, such as commercial medical equipment, that contains a cathode ray tube, a cathode ray tube device, a flat panel display or similar video display device that is contained within, and is not separate from, the larger piece of equipment, or other medical devices as that term is defined under the Federal Food, Drug, and Cosmetic Act. *38 M.R.S.A §1610, section 5-A*

Desktop printer means a device that prints text or illustrations on paper and that is designed for external use with a desktop or portable computer. "Desktop printer" includes, but is not limited to, a daisy wheel, dot matrix, inkjet, laser, LCD and LED line or thermal printer, including a device that performs other functions in addition to printing such as copying, scanning or transmitting a facsimile. *38 M.R.S.A §1610, section 5-A*

E-waste: Electronic waste refers to old, waste, or discarded electrical or electronic appliances. E-waste is a generic term embracing all types of waste containing electrically powered components.⁵¹ E-Waste contains both valuable materials as well as hazardous materials which require special handling and recycling methods. Many components contain contaminants such as lead, cadmium, beryllium, mercury, and brominated flame retardants. Products may include televisions, computer monitors, communication equipment, and small and large household appliances. In state legislation, electronics are usually defined by product type and size. Computer peripherals may or may not be included in state e-waste take-back programs.

Extended producer responsibility (EPR): EPR is an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle. This is usually accomplished through legislation which mandates the producer's role in either recycling or disposal.

Extended Product Responsibility: The President's Council on Sustainable Development in the 1990s under President Clinton adopted the term "extended product responsibility" to reflect a shared responsibility (among producers, consumers, distributors, retailers) for environmental impacts from the products' end of life.

Framework: Producer responsibility framework bills have been introduced in six states. Typically these framework laws would require that manufacturers establish and finance a system for product

⁵¹ http://ewasteguide.info/e_waste_definition

collection and recycling. They would prohibit manufacturers who do not participate in the system from selling their products in state, require manufactures to submit a management plan to a state regulatory agency for approval, and report on progress toward meeting performance goals.

Manufacturer means a person who:

- (1) Manufactures or has manufactured a covered electronic device under its own brand or label;
- (2) Sells or has sold under its own brand or label a covered electronic device produced by other suppliers;
- (3) Imports or has imported a covered electronic device into the United States that is manufactured by a person without a presence in the United States; or
- (4) Owns a brand that it licenses or licensed to another person for use on a covered electronic device. *38 M.R.S.A. §1610, section 5-A*

Market share means a manufacturer's national sales of a covered electronic device expressed as a percentage of the total of all manufacturers' national sales for that category of covered electronic devices. *38 M.R.S.A. §1610, section 5-A*

Product Stewardship – Product stewardship is a term used to mean extending the responsibility for a product through the end of the product's life. This responsibility may be shared by various stakeholders. It is often stated that a goal is to change the way products are designed, though this may be considered a consequence of managing the product end-of-life. Product stewardship programs may be voluntary or mandatory. The Product Stewardship Institute, an advocacy group, has developed a set of principles for product stewardship. These include cost internalization, shared responsibility (with manufacturers bearing the greatest cost), life-cycle costs, performance goals and flexibility for producers.

Retailer means a person who sells a covered electronic device in the State to a consumer. "Retailer" includes, but is not limited to, a manufacturer of a covered electronic device who sells directly to a consumer through any means, including, but not limited to, transactions conducted through sales outlets, catalogs or the Internet, or any similar electronic means, but not including wholesale transactions with a distributor or other retailer. *38 M.R.S.A. §1610, section 5-A*

Television means a covered electronic device that is a cathode ray tube or flat panel display primarily intended to receive video programming via broadcast, cable or satellite transmission or video from surveillance or other similar cameras. *38 M.R.S.A. §1610, section 5-A*

Video game console means an interactive entertainment computer or electronic device that produces a video display signal that can be used with a display device such as a television or computer monitor to display a video game. *38 M.R.S.A. §1610, section 5-A*