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# **Extended Producer Responsibility in the United States: Full Speed Ahead?**

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## Extended Producer Responsibility in the US: Full Speed Ahead?

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**Summary:** Extended Producer Responsibility (EPR) is a policy approach that requires manufacturers to finance the costs of recycling or safely disposing of products consumers no longer want. This article describes the evolution of EPR policies in the United States, focusing on the role of states as policy actors. For their part, federal lawmakers have not embraced EPR policies except to remove some barriers to state-level initiatives. In the two-decade period from 1991-2011, US states enacted more than 70 EPR laws. In addition, manufacturers have implemented voluntary programs to collect and recycle products, but those efforts have proven largely ineffective in capturing significant quantities of waste products. With the help of new coalitions of diverse interest groups, recently states have renewed efforts to establish effective EPR programs, enacting 40 laws in the period 2008-2011. Several state initiatives suggest a more promising future for EPR.

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## Introduction

Extended Producer Responsibility (EPR) is a policy approach that requires manufacturers to finance the costs of collecting and recycling or safely disposing of products consumers no longer want (OECD 2001). Over the past two decades, the respective US states have demonstrated growing interest in EPR, enacting more than 70 laws that mandate this approach.<sup>3</sup> The pace of interest in EPR at the state level has also quickened, with 40 such laws enacted since 2008. In 2010 alone, 38 such EPR bills were introduced in state legislatures across the United States, and 12 were signed into law. For their part, federal lawmakers have not embraced EPR policies except to remove some barriers to state-level initiatives.

This article offers a status report of EPR in the United States. We examine the evolution of EPR legislation at the state level, focusing on what these laws require—and do not require—and the factors that over time have shaped their current form. We focus on *accountability mechanisms*: the requirements these laws impose on manufacturers for planning, performance, and reporting, and the authority they establish for states to sanction non-compliance. To provide a rough assessment of how these laws are working, we include information about amounts (weight or number) of products collected on a per capita basis. We address laws in five product categories that have been the main focus of legislative attention: rechargeable batteries, mercury thermostats, mercury auto switches, electronics, and leftover paint.

Overall, our analysis suggests that many state EPR programs are still at a fledgling stage. It also suggests that EPR is taking root across a broad spectrum of states and is becoming firmly established in a few cases. While only a handful of states such as California, Maine, and Vermont have distinguished themselves as EPR leaders by implementing laws for five or six

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<sup>3</sup> We analyzed the more than 70 state laws that require manufacturers to finance the costs of recycling or safe disposal of products at end-of-life as listed in an inventory maintained by the Product Stewardship Institute (PSI 2012a).

product categories, some 32 states have enacted at least one EPR law. Support for EPR is not necessarily confined to states that have historically supported strong environmental policies. For example, both South Carolina and Utah—whose citizens have elected US Senators with low environmental rankings according to the League of Conservation Voters (LVC 2011)—have respectively enacted laws for electronics and mercury auto switches that require producers to take responsibility for their products at end-of-life. The fact that many states typically considered as environmental “laggards” (Rabe 2010) nonetheless look seriously at EPR suggests the attractiveness of an approach that seeks, in part, to incorporate fuller pricing mechanisms and market incentives into product costs.

We find great diversity under the broader EPR umbrella, with room to accommodate different perspectives. State laws vary substantially, reflecting each state’s unique political dynamics as well as divergent perspectives about the best ways to run EPR programs. Some state laws require that producers submit EPR plans to state environmental agencies for review and approval before they implement their programs, as with EPR laws for batteries in Minnesota (1991 Minn. Session Laws Ch. 257) and New Jersey (N.J. Stat. Ann. § 13:1E-99.66 (LexisNexis 1991)). Others include no planning requirement, as with battery laws in Iowa (1996 Iowa Acts §§455D.10A-B) and Florida (Fla. Stat. Ann. § 403.7192 (2008)). Some states require producers to provide financial incentives to consumers or contractors who return a product to a collection site; for example, EPR laws for mercury thermostats in Maine (2006 Me. Laws 558) and Vermont (2008 Vt. Acts & Resolves 149). Others are silent on that point, as with mercury thermostat laws in Montana (S.B. 424, 61st Leg. Sess. (Mont. 2009)) and Pennsylvania (H.B. 44, Reg. Sess. (Pa. 2007)). Some states include ambitious performance goals, as with laws for electronics in Minnesota (2007 Minn. Session Laws Ch. 48) and New York (2010 N.Y. Laws

562), while others merely call on producers to establish programs and do not specify performance, such as electronics laws in Maryland (H.B. 575, 420th Leg. Sess. (Md. 2005)) and Texas (H.B. 2714, 80th Leg. Sess., Reg. Sess. (Tex. 2007)).

While we find substantial variation, we also find slow but steady movement toward state enactment of more rigorous and comprehensive EPR laws. Of note, many newer laws authorize state environmental departments to require manufacturers to submit detailed program plans and meet specific performance targets. Some laws require manufacturers to offer financial incentives to consumers to encourage them to bring products back for recycling. They authorize states to impose penalties on non-compliant manufacturers and require manufacturers to pay fees to cover state oversight costs. The list of products covered by EPR statutes is also growing. These developments suggest a growing sophistication among states about how to achieve EPR goals, and a growing awareness among some manufacturers that, if appropriately structured, EPR is a policy approach that they can live with.

### **Why EPR?**

The idea of extended producer responsibility has galvanized a coalition of interests including local and state governments, established environmental advocacy groups, and newer organizations dedicated to reducing the environmental and societal costs of consumer products. To varying degrees, many of these stakeholders worked together previously on waste management and other issues, but their current shared focus on EPR is significant, and suggests the extent to which EPR offers benefits to each set of interests.

Central to EPR is the idea of shifting the costs of managing products consumers no longer want from local and state governments to product producers (Lindqvist 2000, Lifset

1995, Tojo 2004). This promise is particularly appealing to municipalities, which in the United States typically shoulder the burden of paying for waste management, including household electronics, batteries, and paints, all of which require special and frequently costly handling. While local government interest in EPR is not new—Pacific Northwest states in the late 1990s formed the Northwest Product Stewardship Council to explore the feasibility of enacting European EPR approaches—increasing fiscal pressures at the municipal level in recent years has intensified that interest given the potential for savings in EPR programs. For example, Hennepin County in Minnesota reported saving \$681,982 during the first year of that state’s EPR law for waste electronics (e-waste) as producers assumed responsibility for collecting and recycling waste electronics that the county had previously managed (MN PCA 2009).

In the past decade, new groups have emerged to support and focus local government interest in EPR, notably the Product Stewardship Institute (founded in 2001) and the Product Policy Institute (founded in 2003). With help from these organizations, local governments in California, New York, Texas, and Vermont have formed product stewardship councils dedicated to passing state EPR laws for a wide range of consumer products. In addition, established organizations of state and local governments have adopted policies in support of EPR. The Environmental Council of the States—a coalition of state environmental agencies—passed a resolution calling for EPR in 2002 (ECOS 2002), as did the National Association of Counties in 2009 (NAC 2009), the National League of Cities in 2009 (NLC 2009), and the US Council of Mayors in 2010 (USCM 2010)

Shifting costs for managing products at end-of-life from government to producers does not just save government money. At least in theory, requiring producers to internalize end-of-life management costs creates incentives for them to make and market products that are more

durable, more recyclable, less resource-intensive, and less toxic (Lindqvist 2000; Tojo 2004). While it is unclear whether many EPR programs, as currently structured, actually establish such incentives, the idea of cost internalization has proven to be a powerful motivator for a wide range of interest groups. In 2001, the Silicon Valley Toxics Coalition—organized decades earlier to reduce the environmental impact from electronics manufacture—helped found the Electronics TakeBack Coalition (originally the Computer TakeBack Campaign) to spearhead state-level EPR legislation for electronics (Byster and Smith 2006). More recently, state-level chapters of national environmental advocacy organizations such as Clean Water Action and Sierra Club have helped to develop and support state-level EPR legislative campaigns, as has the Natural Resources Defense Council. Newer environmental and health advocacy organizations, such the Mercury Policy Project, Health Care Without Harm, and various state-level Public Interest Research Groups (PIRGs), have also become involved. As You Sow, founded in 1992 to promote corporate accountability through shareholder advocacy, and Future 500, founded in 1995 to encourage collaborations among large corporations and advocacy groups, have recently taken up the EPR cause, focusing on packaging (MacKerron 2012).

For consumers, EPR promises to provide a more convenient way to get rid of products they no longer want, even at the cost of slightly higher product prices. Convenience is broadly appealing, particularly as the number of electronic and battery-powered products purchased and discarded by US households continues to grow (EPA 2010; EPA 2011). Yet, in the US, government-run product collection programs are typically inconvenient for consumers to access (Galvin 2008). Cash-strapped municipalities often charge consumers a fee to drop off waste products (Bouvier and Wagner 2011), and many have limited operating hours or are

inconveniently located, discouraging participation (Tucker and Speirs 2003; Saphores et al. 2006; Domina and Koch 2002).

State and local elected officials see greater convenience as something positive to offer their constituents. As discussed below, some EPR laws require that manufacturers offer “convenient” collection programs, with at least one free collection site in each county or metropolitan area, for example. Such provisions can lead to significant improvements in consumer convenience. For example, in the period February 2010 (when Wisconsin implemented its EPR program for e-waste) to October 2012, the number of permanent e-waste collection sites increased by 70%, to over 400 sites (WI DNR 2012). Similarly, when paint producers enlisted retailers as collection sites as part of a new EPR system for paint in Oregon in 2010, they increased the number of permanent sites where consumers could drop off leftover paint from 15 to 98 (PaintCare 2011).

Desire to avoid the inevitable negative consequences of inconvenient product recycling—inappropriate and even illegal disposal—has broadened the base in support of EPR. Because product recycling is in most places currently difficult to access, the majority of products end up in landfills and incinerators designed for disposing of household paper, plastic, and organics, not for products containing toxic, corrosive, and ignitable materials. Environmental advocacy organizations and state environmental protection officials are concerned that leaking landfills and polluting incinerators have increased levels of mercury and other toxics in the environment, and that disposal of products that could be reused or recycled is a waste of natural resources.

Business responses to calls for EPR vary by sector and firm. EPR laws for electronics, for example, can impose different costs on manufacturers depending on whether they make televisions or printers (for which secondary markets are weak or non-existent) or computers

(which have higher residual value) (PSI 2012b). As a consequence, television and printer manufacturers often receive poorer grades for their EPR and recycling programs from EPR-advocacy organizations, compared to computer manufacturers (ETBC 2010). Some producers see programs that encourage consumers to bring back products for recycling as opportunities to strengthen brand loyalty (Toffel et al. 2008). In other instances, individual companies are promoting EPR in part to address criticism about their own products. For example, Nestlé Waters, a major producer of bottled water products, recently funded the startup of Recycling Reinvented, a new organization dedicated to advocating EPR for packaging (MacKerron 2012). Some waste management companies (e.g., Waste Management Incorporated) have provided financial support to organizations advancing EPR policies in the expectation that the specialized collection, transportation, sorting, and recycling that EPR requires could generate new business. One industry group representing major paint manufacturers, the American Coatings Association, has worked closely with state and local governments to develop model EPR legislation for paint.

Other business sectors actively oppose any type of state EPR laws. The plastics industry trade association and the American Chemistry Council, for example, argue that state-level EPR policies increase costs to business, government, and consumers, fail to reduce waste, and are less efficient than market-driven recycling programs (SPI 2010, ACC 2010). They make the case that EPR lays too heavy a responsibility for collection and recycling on manufacturers, when consumer behavior is key to program success. The Product Management Alliance, a coalition of firms from the carpet, electronics, packaging, and other sectors, was formed in 2011 in part to advocate for alternatives to state-level EPR requirements.

Even firms that are open to the idea of producer responsibility often oppose legislation that they view as overly restrictive or costly. They prefer laws that give them flexibility in how

they implement collection and recycling programs, and that preference is apparent in many of the laws in place today. A particular area of business concern is any requirement that manufacturers achieve specified performance goals or offer financial incentives to consumers who return products for recycling. While Dell has promoted EPR laws for electronic waste, for example, so-called “Dell Bills” implemented in some six states (discussed below) fail to specify any particular level of e-waste recycling. Thermostat manufacturer Honeywell worked closely with states in the early 2000s to develop EPR programs for mercury thermostats, but later backed away from that approach as pressure mounted for more comprehensive programs (EPA and Quicksilver Caucus 2009).

Such apparent industry-specific concerns do not negate a broader sense that EPR offers a way out of policy deadlocks about regulation and the overall role of government. Support for greater internalization of disposal or recycling costs into the full price of a good and for creating market incentives for more environmentally benign product design extend across the ideological spectrum, suggesting that the success of EPR may lie in figuring out how to make such programs effective, convenient, and efficient for manufacturers, retailers, governments, and consumers alike.

### **Characterizing EPR in the US**

The development of EPR policy in the United States has followed a distinct pattern. Once a few states enact relatively stringent laws requiring extended producer responsibility for a particular product, manufacturers looking to avoid such mandates typically announce a voluntary EPR program for that product or advance “model legislation” that lacks strong accountability mechanisms. Overall, such actions by manufacturers have tended to slow momentum to mandate

EPR at the state level. In turn, as state and local governments and environmental and product policy organizations that championed EPR have seen voluntary programs and weak laws fail to achieve anticipated results, these groups have introduced stronger laws. This general pattern holds for EPR policies for rechargeable batteries, mercury thermostats, and mercury auto switches. The pattern is somewhat different for electronics, where there is no single electronics industry perspective on EPR, and for paint, where paint manufacturers have collaborated with a diverse coalition of stakeholders to enact EPR legislation. The following discussion summarizes the development of EPR policies by sector and type of product.

### *Rechargeable Batteries*

Eight states have enacted EPR laws for rechargeable batteries to date, led by Minnesota and New Jersey in 1991—the first EPR laws in the country (1991 Minn. Session Laws Ch. 257; N.J. Stat. Ann. § 13:1E-99.66 (LexisNexis 1991)). In the early 1990s these states were planning to incinerate more of their solid waste, and environmental protection officials were worried that toxic metals in household products would be volatilized when burned. In 1989 the Minnesota legislature adopted recommendations from the Governor’s Select Committee on Recycling and the Environment to fund programs to collect hazardous wastes in household trash and encourage recycling among local governments. Minnesota State Representative Jean Wagenius, a key participant in that effort, drafted legislation requiring battery manufacturers to collect and recycle dry cell batteries containing mercury. Minnesota Governor Arne Carlson led negotiations with battery manufacturers to remove mercury from battery chemistries (Galvin 2008). At that time, household batteries accounted for nearly 90% of the mercury in municipal solid waste (MSW) streams despite constituting only a tiny fraction of the overall MSW volume (EPA 1992).

The early EPR battery laws in Minnesota and New Jersey are relatively detailed and prescriptive. Both state laws ban consumers from disposing rechargeable batteries in household trash and require that manufacturers only market products with rechargeable batteries that are easily removed and appropriately labeled. The New Jersey law requires rechargeable battery producers to submit plans to the state Department of Environmental Protection (NJ DEP) explaining how they intend to finance collection programs, educate the public, and provide for convenient collection. The law further requires that producers report “recovery rates” to the NJ DEP every six months. (The law does not define “recovery rate,” however.) The Minnesota law requires producers to establish a program to recover 90% of nickel-cadmium and small sealed lead acid batteries by September 20, 1995. It stipulates that in every odd-numbered year producers report to the Legislature the amounts of batteries sold in the state and amounts collected.

Manufacturers’ response to the Minnesota and New Jersey laws was swift. Hoping to avoid what they feared might be restrictive and expensive state and federal mandates, in 1994 battery producers established the Rechargeable Battery Recycling Corporation (RBRC) and took steps to roll out a nationwide network of collection sites where consumers and businesses could drop off rechargeable batteries at no cost. Creation of this nationwide voluntary program effectively dissuaded additional states from enacting laws with stringent requirements. Laws enacted in Maryland 1993 for mercuric oxide batteries (1993 (Md. Laws 462), and in Maine in 1995 for rechargeable batteries generally (1995 Me. Laws 465) lack the performance goals and reporting requirements included in the New Jersey and Minnesota laws. No further EPR legislation was enacted at the state level for more than a decade.

As legislative pressure waned, so did RBRC's program goals. In 1994, RBRC set the goal of collecting 70% of discarded batteries by 2001 (Fishbein 1997). In 1998, it extended to 2004 the date by which it would achieve its 70% collection rate goal and started reporting the number of pounds of batteries it collected instead of collection rates. RBRC later stopped discussing collection rate goals altogether (Sheehan and Speigelman 2005), or argued that estimating the number of batteries available for collection was impossible because consumers tend to store products containing rechargeables for years after purchase (Antler et al. 2007).

Table 1 summarizes key provisions in state rechargeable battery laws and shows a general trend toward less stringent planning and performance requirements following launch of the RBRC national voluntary program. Table 1 also shows the pounds of rechargeable batteries collected by RBRC programs per 100,000 people in 2010. Minnesota had the highest collection rate of all states with mandatory EPR programs, with collections of 2,804 pounds per 100,000 residents, which is about 1.8 times the collection rate for the United States overall of 1549 pounds per 100,000 people. All states with EPR laws for rechargeable batteries had collection rates above the national average, except New York, which implemented its program very recently, and New Jersey, whose low collection rate is unexplained.

[Insert Table 1 about here]

While EPR states did *relatively* well in terms of collections, five states without mandatory laws did better: Arkansas, North Dakota, New Hampshire, Washington, and Colorado (Call2Recycle 2012). Most important, in no state did RBRC collect significant quantities of spent rechargeable batteries. The Product Stewardship Institute estimates that as of July 2010 the collection rate for rechargeable batteries in the US was just 10-12%—a rate low by any

measure, and of concern given the sheer volume of batteries hitting municipal waste streams (PSI 2010a).

The perceived failure of the battery industry's voluntary program, and proliferation of products containing batteries, has spurred states to take renewed interest in mandating EPR for batteries (PSI 2010a). California enacted an EPR law for rechargeable batteries in 2006 (Cal. Pub. Res. Code §§42451-42456 (Deering 2006)), Florida in 2008 (Fla. Stat. Ann. § 403.7192 (2008)), and New York in 2010 (2010 N.Y. Laws 562). These laws differ from earlier efforts by emphasizing *retailer* responsibilities for collection, an expansion in responsibility beyond producers to the point of sale itself. More telling, legislation recently introduced in California extends producer responsibility to alkaline batteries, which constitute approximately 80% of all battery sales in the US. Such a change would align California with EPR systems in Europe and Canada that cover all portable battery types.

Concerned about this recent uptick in state interest in mandatory EPR programs, in 2010 and 2011 battery producers sponsored national meetings of producers, retailers, consumer groups, regulators, municipal officials, and recyclers to explore the feasibility of developing more comprehensive battery recycling programs, including model legislation that would harmonize state approaches. While these meetings generated proposals for increasing collection rates and reducing the environmental impacts from battery recycling (PSI 2010b, Blu Skye 2011), no action with respect to alkaline batteries has occurred to date aside from the initiation of several pilot programs.

Perhaps more promising, RBRC has recently supported legislation introduced in Washington and Oregon mandating EPR for all rechargeable battery types. Manufacturers are motivated by the large number of “free riders” in existing programs—companies that sell

products containing rechargeable batteries into US markets but are not members of RBRC and do not contribute to collection and processing costs. These bills include a private right of action to allow manufacturers to enforce the law's requirements. They do not include performance goals, however.

### *Mercury Thermostats*

In the early 1990s, as Minnesota was developing legislation to require producers to collect and recycle rechargeable batteries, state environmental protection officials began working to address another source of mercury in the waste stream, mercury thermostats. Each mercury thermostat contains about 4 grams of mercury, making these products a major potential source of mercury contamination when they come out of service (PSI 2004). In 1992, the state enacted a law prohibiting disposal of thermostats containing mercury in the solid waste stream and placing responsibility for compliance on heating and cooling contractors who typically remove thermostats when they repair or replace a furnace or air conditioner in the home (Minn. Stat. 116.92 subd. 5). At the request of thermostat manufacturer Honeywell (founded in and historically a major employer in the state), the Minnesota law does not require manufacturers to finance a collection program, so it does not fit the definition of EPR (Gilkeson 2012). It does, however, hold manufacturers responsible for educating homeowners and contractors and providing them with compliance incentives.

To meet the requirements of the Minnesota law and aware of pending actions in other states, thermostat producers Honeywell, General Electric, and White Rogers in 1998 established the Thermostat Recycling Corporation (TRC) to operate in Minnesota and eight other states, and in 2001 expanded the program to operate nationally. Under the program, thermostat wholesalers

pay TRC a fee (now \$25) for a mercury thermostat recycling bin to be kept in their stores and encourage heating and cooling contractors to drop off mercury thermostats they have removed while installing replacement thermostats or other equipment. Once the bin is full the wholesaler sends it to a designated TRC mercury recycler, which sends the wholesaler a replacement bin.

The producer-financed TRC program collected about 31,000 mercury thermostats in 2001 (PSI 2004), a small portion of what the coalition of manufacturers, governments, and environmental and recycling advocates believed was available for collection. Initially, representatives of these respective sectors worked collaboratively to increase collections. The Product Stewardship Institute convened meetings of representatives of these groups in 2004, 2005, and 2006 to develop strategies to increase HVAC contractor participation in collection programs and to extend collection efforts to local government-operated household hazardous waste programs. The coalition also ran a pilot program to test the impact of offering a financial incentive on the number of mercury thermostats returned (PSI 2004). In 2006 PSI negotiated model mercury thermostat legislation that included a menu of policy options from which states could choose to strengthen TRC's voluntary program, among them quantitative performance goals and recovery incentives. That same year elected officials in Maine used the PSI model as the basis for the first EPR law for thermostats in the country (2006 Me. Laws 558). Maine's law requires manufacturers to collect on an annual basis a specified quantity of mercury and to offer a \$5 bounty to anyone turning in a mercury thermostat for recycling. It also requires wholesaler participation, a key part of the collection infrastructure.

Eight additional states enacted EPR laws for mercury thermostats in the next four years. After passage of Maine's law, manufacturers withdrew from the coalition with PSI and expressed opposition to recovery incentives and performance goals. Subsequent state laws vary

widely in how they address those issues. As shown in Table 2, some laws specify the level of performance expected of manufacturers. Maine's law requires manufacturers to collect a specified number of pounds of mercury and Vermont's law includes a collection rate that manufacturers must achieve. Manufacturers prefer laws enacted in Pennsylvania and Montana, which merely require that overall collections increase year-to-year. Laws enacted in 2010 in Illinois and Rhode Island require manufacturers to collect a designated number of mercury thermostats. Vermont, echoing Maine, requires producers to provide a \$5 bounty to those who bring a mercury thermostat to a collection location. California, Illinois, and Rhode Island require manufacturers to offer an incentive if collection goals are not achieved.

[Insert Table 2 about here]

Table 2 shows the number of mercury thermostats collected in EPR states per 100,000 residents. Per capita collection rates are highest in Maine and Vermont (CA DTSC 2012), and are seven or eight times higher than the national rate of about 65 mercury thermostats per 100,000 people (TRC 2010). Rates are much lower in other states in Table 2, but most of those states implemented their laws only recently, often to improve the low collection rates of TRC's voluntary program.

While programs in Maine and Vermont are collecting the most mercury thermostats per capita, how effective are manufacturers' programs overall? California's law, enacted in 2008, sought to answer that question by requiring manufacturers to provide the state's Department of Toxic Substances Control (CA DTSC) with statistically valid data to assess the number of mercury thermostats available for collection (Cal. Health & Safety Code §§25214.8.10-25214.8.20 (Deering 2008)). In 2010, an assessment performed for TRC concluded that in 2010 between 237,000 and 490,000 mercury thermostats were available for collection in California,

or 636 to 1350 mercury thermostats per 100,000 people (Skumatz 2009). Assuming that the number of mercury thermostats per capita in other states is the same as in California, actual collections per 100,000 in Maine and Vermont, of 540 and 517 respectively, approach the low end of that estimate, while collections in other states appear seriously deficient.

Apparent shortcomings in the TRC program has led to renewed interest in more stringent state EPR laws regarding mercury thermostats. In regulations proposed in 2011 and still under review, the California DTSC called for assessing administrative penalties on manufacturers that fail to meet performance goals and banning the sale of products made by manufacturers that do not comply with its EPR law. Laws in Maine, New Hampshire, Vermont, Illinois, and Rhode Island also call for banning thermostat sales by non-compliant manufacturers. Such numerical performance goals and the opportunity for sanctions included in recent EPR laws may give state governments greater leverage with manufacturers to establish programs that collect significant quantities of mercury thermostats. To date, however, it remains to be seen whether states will be successful in using that leverage.

### *Auto Switches*

In the early 2000s, states enacted EPR legislation to address another source of mercury in the solid waste and scrap metal streams: the light switches that contain mercury found in automobile hoods, trunks, and anti-lock brakes. While automakers stopped using mercury switches after the 2002 model year, the devices still reside in the millions of cars sold in the United States before that date. Each switch contains about 1.2 grams of mercury. Prior to 2002, when states began to take action, auto switches were the primary source of mercury emanating

from electric arc furnaces used to smelt automobile scrap, by some estimates some 10 to 12 tons of mercury annually (NMVSRP 2006).

Maine enacted the nation's first auto switch EPR law in 2002 (2002 Me. Laws 656), requiring producers to pay auto recyclers and scrap recycling facilities at least \$1 for every switch removed as compensation for labor and other costs. New Jersey's law, enacted in 2004, goes further by requiring auto producers to submit to the state environmental agency an EPR plan and pay the state \$0.25 per switch as compensation for administering the program (2005 N.J. 54). Arkansas enacted similar legislation in 2005, raising the compensation to auto recyclers and scrap facilities to \$5 per switch and to the state environmental agency to \$1 per switch (2005 Ark. Acts 649). Maine's law set a goal of collecting 90 pounds of mercury per year from the switches, while other states established a 90% capture rate goal.

By late 2006, 13 states had established mandatory EPR programs for mercury auto switches. That same year, largely as a consequence, a coalition of automobile producers, the American Iron and Steel Institute, the Steel Manufacturers Association, the Institute of Scrap Recycling Industries, and the Automotive Recyclers Association, along with the Environmental Council of the States, the US EPA, and the advocacy groups Environmental Defense and the Ecology Center, announced the formation of a national voluntary program to recover mercury switches from scrap automobiles. The National Vehicle Mercury Switch Recovery Program (NVMSRP) extended recovery programs to all states except Maine, which operated its own program until late 2010, when NVMSRP took it over.

The NVMSRP program, like the voluntary program directed at household batteries, effectively pre-empted additional states from enacting mandatory programs. However, in late 2009, with General Motors in bankruptcy, the fund created to pay recyclers and scrap facilities

for the mercury switches they removed ran out of money, and incentive payments stopped in all states except where mandated by legislation. Not that the NVMSRP program had been a great success: according to the Environmental Council of the States, the collection rate for mercury switches in 2010 was about 25%, far short of the 90% goal set out in the early laws (ECOS 2010).

## **Electronics**

From 2001 to 2004, the US EPA convened meetings of electronics producers, retailers, recyclers, state and local government officials, and representatives of environmental advocacy organizations to develop a system to finance e-waste collection and recycling. That effort, known as the National Electronics Product Stewardship Initiative, collapsed when participants failed to reach agreement about financing collection and recycling of e-waste (GAO 2005). A chief obstacle was opposition by television manufacturers to any EPR program. States thereafter stepped in to fill the void in national policy.

As of 2011, 23 states have enacted laws requiring EPR for waste electronics. These laws use a wide variety of approaches in terms of products that are covered, how manufacturer responsibility is defined, whether and at what level performance is specified, and what happens should manufacturers fail to meet performance goals. Table 3 summarizes some of the key characteristics of these laws. Maine, Maryland, North Carolina, Oregon, Texas, and Hawaii have all expanded the scope of their e-waste laws over time, in many cases adding televisions and printers. Eight states include performance goals in their EPR statutes; two additional states will set performance goals through regulation. Thirteen do not include any performance

requirement, requiring manufacturers to establish and finance programs but not to achieve a particular collection rate or convenience standard.

[Insert Table 3 about here]

Maine's law, enacted in 2004, is considered the first EPR law for e-waste (2004 Me. Laws 661). As originally written, the law covered laptop (but not desktop) computers, computer monitors, and televisions; amendments in 2009 added printers (2009 Me. Laws 397). Maine's law limits producer financial responsibility to the costs of sorting and recycling e-waste, relying instead on local governments to finance the costs associated with e-waste collection. Notably, and unlike many EPR laws for electronics and other products, Maine's statute holds producers "individually responsible" for paying the costs of end-of-life management of the products they manufacture. Under Maine's program, a consolidator sorts products by brand and maintains an account of the weight of each producer's products. Consolidators use this information to invoice producers for the costs of sorting, transporting, and recycling their products. Maine's law does not specify a particular level of performance that must be achieved. In 2010, the state program collected about 4 pounds of e-waste per capita. As a point of comparison, the European Waste Electrical and Electronic Equipment Directive of 2003 (WEEE), covering a much broader set of products, set a performance goal of 4 kilograms (8.8 pounds) per capita – a target exceeded in many EU countries (Directive 2002/96/EC). The European Commission will likely soon increase the performance target to 65% of what producers introduced to the market the previous year.

Five states enacted e-waste laws in 2007, another eight in 2008, and three more in 2009. Laws enacted in Washington (2006), Minnesota (2007), Oregon (2007), and Wisconsin (2009) have achieved the highest collection rates in the country, at about six pounds per capita in 2010.

(Washington and Oregon’s collection data are for calendar year 2010, while Minnesota and Wisconsin’s collection data are based on the fiscal year July 2010-June 2011.) These laws cover a broader range of products than in Maine, and they require manufacturers to finance e-waste collection as well as transportation and recycling. They also establish performance goals. For example, Washington’s e-waste law establishes performance based on convenience; instead of being required to collect a specified amount of products, manufacturers must offer collection services in every county and at least one on-going collection site in every urban area of 10,000 people or more. A diverse coalition that included computer manufacturer Hewlett Packard and the Washington Retailers Association supported the law’s passage, while an association of television manufacturers opposed it. Oregon, in addition to requiring the same level of convenience as in neighboring Washington, calls on producers to collect at least 3.3 pounds of e-waste per capita in 2009, 5.8 pounds per capita in 2010, and 7.1 pounds per capita in 2012 (H.B. 2626, 74th Leg. Sess., Reg. Sess. (Or. 2007)) (NWPSC 2010). Minnesota’s law requires producers of televisions and computers to meet relatively ambitious performance goals: in the program’s first year they must collect 60% of the weight of what they sold in the state the previous year, a target that increases to 80% thereafter (2007 Minn. Session Laws Ch. 48).

These laws use a variety of approaches to encourage manufacturers to reach performance goals. Several states—Minnesota, Illinois, Indiana, Wisconsin, New York, and Vermont—require manufacturers that fail to meet goals to pay a surcharge for their shortfall. Several states have established the rate of \$0.30-\$0.50 per pound. The closer a manufacturer comes to meeting its goal, the lower the per pound surcharge. Laws in Indiana and several other states provide collection credits for recycling e-waste in rural areas, and New York’s e-waste law allows manufacturers to reach collection goals using surplus collection credits from previous years and

buying surplus credits from other manufacturers. All laws provide mechanisms to strengthen state enforcement capacity, for example by requiring manufacturers to register with state agencies and pay a fee to cover administrative and oversight costs. States often set these fees on a sliding scale based on the number or quantity of electronics sold in the state.

Laws in Texas, Missouri, Oklahoma, and Virginia, enacted in 2007 and 2008, do not mandate any particular level of performance, instead simply requiring that manufacturers offer a collection and recycling program for computers (H.B. 2714, 80th Leg. Sess., Reg. Sess. (Tex. 2007); 2008 Mich. Pub. Acts 394; S.B. 1631, 51st Leg., 1st Reg. Sess. (Okla. 2008); 2008 Va. Acts ch. 541). These so-called “Dell bills” are based on model legislation proposed by the Texas-based computer maker. The Texas law stipulates that producers offer service that is “reasonably convenient and available to consumers” and “designed to meet the collection needs of consumers.” (In 2011, Texas expanded the list of covered products to include televisions.) Collections in these states averaged about one pound of e-waste per capita in 2010. Laws in Pennsylvania and South Carolina, enacted in 2010, are similarly silent on the issue of performance.

While per capita collections have increased gradually over time in the United States, overall national collection rates remain low (ETBC 2011). According to the US EPA, nationwide about 1.4 pounds of electronics were collected for reuse and recycling per capita in 2010, a level about the same as in states with weak EPR laws for e-waste (EPA 2011). The remainder was disposed, primarily in landfills designed for MSW (GAO 2010).

## **Paint**

From 2003-2009 the Product Stewardship Institute convened a series of 11 national meetings to develop an EPR program for leftover paint. The meetings brought together paint producers and their trade association, the National Paint and Coatings Association (now the American Coatings Association), paint recyclers, retailers, state and local government officials, and the US EPA. Participants commissioned a range of research projects, including studies on the volume of paint available for collection, the effectiveness of efforts to discourage consumers from buying more paint than they need, and the life cycle impacts of manufacturing, using, and disposing of paint. Participants eventually drafted a leftover paint “work plan” that became the basis of legislation now enacted in three states.

Oregon’s law, enacted in 2009 as a pilot program (H.B. 3037, 75th Leg., Reg. Sess. (Or. 2009)), requires producers annually to submit to the Oregon Department of Environmental Quality information concerning the amount of paint collected and its fate—whether it was reused, recycled, landfilled, or incinerated. It requires producers to pay the state \$10,000 when they submit their EPR plan to the state DEQ and \$10,000 annually for program oversight, and mandates that the DEQ “actively supervise” producers’ implementation of the program. Producers, state and local governments, and the US EPA have developed a methodology for evaluating the Oregon paint program that includes an analysis of how the law has affected consumer behavior, paint collection and recycling, local government costs, and markets for post-consumer paint (ERG 2010). The Oregon pilot program is scheduled to sunset in June 2014, and results from the evaluation may help inform paint stewardship in the future.

The Oregon law does not include specific performance goals, requiring instead that producers establish a “convenient and available” program. Many local governments in Oregon ran paint collection and recycling efforts prior to enactment of the state’s EPR law, and those

programs continue to operate under the producer-sponsored program (and, to the surprise of those who collaborated in drafting Oregon's law, government continues to pay collection costs). In addition, some 75 retail stores now accept leftover paint from consumers. In a 2011 report to the legislature recommending that Oregon's paint law become permanent, the Oregon DEQ advocated that future legislation for paint include a collection convenience standard similar to the one used in the state's e-waste law (OR DEQ 2011). It also recommended that performance measures be developed for the generation, reuse, and recycling of leftover paint and consumer education and outreach, and that the full costs of paint stewardship, including collection costs and the full cost of DEQ oversight, be covered by manufacturers.

California in 2010 enacted an EPR law for paint modeled closely after that in Oregon (Cal. Pub. Res. Code §§48700-48706 (Deering 2011)), as did Connecticut in 2011 (2011 Conn. Public Act 11-24). The California law requires manufacturers to set goals for reducing, reusing, and recycling leftover paint, include those goals in the plans they submit to the state, and report progress annually. The Connecticut law incorporates Oregon's requirement that producers establish a "convenient and available" program. Several additional states are likely to adopt similar paint laws soon.

The evolution of EPR programs for paint has thus far followed a different path from batteries, mercury thermostats, or electronics. Here a negotiated approach, involving governments, manufacturers, and environmental advocates resulted in a mandatory program of extended producer responsibility that all participants seem to be able to live with. Concerns about loosely defined performance goals and insufficient funding for state oversight, as articulated by Oregon's Department of Environmental Quality, point to areas of contention that over time could weaken this base of support.

## **Framework Approaches**

Until recently, states enacted EPR legislation on a product-by-product basis, cumulatively resulting in some 70 EPR laws addressing the five products discussed here, as well as fluorescent lamps (Maine, Vermont, and Washington State), pesticide containers (California), and carpet (California). However, these laws do nothing to address the hundreds of other products that consumers dispose, and starting in the 2007, the coalition of interests that have championed EPR for individual products began promoting comprehensive or “framework” approaches to EPR that could be applied to multiple products at once. Framework approaches have been enacted in the Canadian provinces of British Columbia, Manitoba, and Ontario, and are the general policy direction for all of Canada (NWPS 2009). In the US to date, Maine has enacted a framework law, and other states have shown interest by initiating studies of the feasibility of framework for their states. Six framework bills were introduced in 2010.

Maine’s framework law and the framework bills introduced in various states are based on the Framework Principles of Product Stewardship adopted by product stewardship councils of local governments in several US states (e.g., Oregon, Washington, California, Texas) and British Columbia (PPI 2010). These principles outline the components of EPR legislation favored by these local councils and by the Product Policy Institute, a chief advocate of the framework approach. They call on producers to take responsibility for designing, managing, and financing stewardship programs; government to set performance goals and ensure accountability; and consumers to return the products they no longer want to retail stores and other designated take-back locations. Maine’s framework bill as originally drafted elaborated these components in detail. The bill signed into law was more limited, however, simply listing the criteria the state

would use for determining which products should be covered (2010 Me. Laws 516). The fact that no state as yet has aligned support required to implement a detailed and comprehensive framework approach suggests the limits of EPR at this time.

## **Conclusions**

Echoing experiments in other areas of environmental policy (see Rabe 2004), the US system has afforded states with opportunities to innovate in the area of product policy in ways that reflect local needs and conditions. The result has been a collection of state EPR laws of varying scope and design, creating in the process a natural laboratory for testing the efficacy of a range of approaches. This article offers a status report on state experimentation with EPR to date.

In some 32 states, the two-fold promise of EPR—to save municipalities the costs of product recycling and create incentives for manufacturers to design products with fewer adverse impacts on the environment—has galvanized diverse coalitions of interests dedicated to putting into place mandatory EPR programs. The combined effort of state and local governments, environmental organizations, and product policy organizations has created a new context for action and opportunities for EPR in a range of product areas.

EPR's promise can only be realized if programs capture significant percentages of the products consumers no longer want. Manufacturer-initiated voluntary programs for rechargeable batteries, mercury thermostats, and mercury auto switches have yielded disappointing results. Many mandatory state programs are new and fledgling. Still, results to date of many mandatory state programs, in terms of pounds collected per capita, are similarly disappointing. Nationally,

collection rates remain low, about 10-12% for rechargeable batteries, less than 25% for mercury auto switches, less than 10% for mercury thermostats, and about 15-20% for waste electronics.

These disappointments belie important successes noted in the text and tables of this article. We draw out just a few examples here. EPR programs for mercury thermostats in Maine and Vermont have achieved robust collection rates, has have EPR programs for electronics in Minnesota, Oregon, Washington, and Wisconsin. Laws in these states include relatively stringent accountability mechanisms and, in the case of mercury thermostats, performance incentives. But strong laws do not on their own lead to strong performance. For example, the performance goal set out in Minnesota's rechargeable battery law more than 20 years ago—to recover 90% of designated battery types by 1995—has yet to be realized. Success of EPR relies on the capacity of all policy actors to set high expectations for EPR programs and work in concert to achieve them. Such capacity is especially critical for state environmental agencies tasked with program oversight, which must have the institutional means to demand rigor and accountability when they review manufacturers' plans, assess progress toward performance goals, and pursue penalties as appropriate. Time will tell whether the new coalitions that have helped to enact EPR laws can sustain the focused attention upon which success depends.

State EPR policies are moving slowly but steadily away from voluntary approaches toward more demanding and specific EPR laws. The current patchwork of state EPR efforts in no way fully covers the nation or the range of products that consumers purchase and discard. The critical question now is whether the interests that have achieved some success at the state level will keep up their momentum, and if the more promising state programs highlighted in this review will be the foundation for effective federal legislation.

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YEAR ENACTED	STATE	POUNDS COLLECTED PER 100,000 PEOPLE (2010) (Call2Recycle 2012)	PLANNING REQUIRED?	PERFORMANCE SPECIFIED?	REPORTING REQUIRED?	PENALTIES SPECIFIED?
1991	Minnesota	2,804	No	Program must collect 90 percent of waste rechargeable batteries generated in the state	Manufacturers report to legislature on batteries sold and collected	No
1991	New Jersey	1,271	Yes; law details plan contents	Program must be convenient and economically feasible	Manufacturers report to department on "return or recovery rates." (sec 3d)	No
1993	Maryland	1,842	Yes	Program must be convenient	No	No
1994	-----Battery manufacturers implement nation-wide voluntary program-----					
1995	Maine	2,689	No	No	No	Violation of manufacturer responsibility may lead to fines of up to \$100. Sale of batteries containing mercury may lead to fines of up to \$100 per battery
1996	Iowa	2,651	No	No	No	No
2006	California	2,504	No	No	Department reports to public amount of batteries collected by retailers	No
2008	Florida	1,988	No	No	No	\$100 per violation
2010	New York	1,195	Yes	No	Manufacturers report to department amount of batteries collected, in number or weight, and costs	Penalties spelled out for retailers and manufacturers

**Table 1. Key provisions in state EPR laws for rechargeable batteries and pounds collected per 100,000 people**

YEAR ENACTED	STATE	MERCURY THERMOSTATS COLLECTED PER 100,000 PEOPLE (2010) (CA DTSC 2012)	PERFORMANCE SPECIFIED?	RECOVERY INCENTIVE?	SALES BAN FOR NON-COMPLIANCE?
<b>1998-2001</b>	-----Beginning in Mid-West, manufacturers implement national voluntary program-----				
<b>2006</b>	Maine	540	Manufacturers must recycle 125 lbs of mercury per year by 2009; 160 lbs by 2010 (by statute)	Yes (by statute)	Yes
<b>2008</b>	California	36	Department to set collection rate (by regulation)	Yes (by regulation, if goals not achieved)	Yes
<b>2008</b>	Iowa	73	Department to set collection rate (by regulation)	No	No
<b>2008</b>	New Hampshire	125	Department to set collection rate (by regulation)	No	Yes
<b>2008</b>	Pennsylvania	75	Manufacturers establish goals to ensure “an increase in the number...collected each year until 2015 or [until] the number...is declining” (by statute)	No	No
<b>2008</b>	Vermont	517	65% by 2010 (by statute)	Yes (by statute)	Yes
<b>2009</b>	Montana	28	“Increase in the number...collected each year until 2016 or [until] the number...is...declining” (by statute)	No	No
<b>2010</b>	Illinois	Not available	2011: 5,000 thermostats; 2012-2014: 15,000 thermostats; Department to determine collection rate for 2015-2020 (by statute)	Yes (by regulation, if goals not achieved)	Yes
<b>2010</b>	Rhode Island	Not available	2011: 2,000 thermostats; 2012-2,250 thermostats; 2013 and 2014: 2500 thermostats. Department to determine collection goals for 2015-2020 (by statute)	Yes (by regulation, if goals not achieved)	Yes

**Table 2. Key provisions in state EPR laws for mercury thermostats and thermostats collected per 100,000 people**

YEAR ENACTED	STATE	E-WASTE LBS COLLECTED PER CAPITA (2010)	PRODUCTS COVERED	PERFORMANCE SPECIFIED?
2004, 2009, 2011	Maine	4.02 (ME 2011)	TVs, laptops, monitors. Printers, digital picture frames, video game consoles added in 2009	No
2005	Maryland	2.95 (Mrgich, 2012)	Monitors, computers, laptops. TVs added in 2007	No
2006	Washington	5.87 (WMMFA 2011)	TVs, monitors, laptops, desktops	Manufacturers must have collection site in every county and in every city with population over 10,000
2007	Connecticut	Not available (Program began Spring 2011)	TVs, monitors, desktops, laptops. Printers added by regulation	To be set by Department
2007	Minnesota	6.27 (July 2010-June 2011) (MN PCA 2011)	TVs, monitors, laptops, desktops, printers, keyboards, fax machines, DVD players	In year 1, manufacturers must recycle amount equal to 60% of weight of TVs, monitors, and laptops they sold in previous year. In subsequent years, must recycle 80%
2007	North Carolina	2.5 (July 2010-June 2011) (NC DERN 2012)	Laptops, desktops, monitors, keyboards, mice. TVs added in 2008. Printers, scanners added in 2010	No
2007, 2011	Oregon	6.3 (OR DEQ 2012)	TVs, monitors, desktops, laptops. Printers, keyboards, mice starting 2015	3.3 lbs. per capita in initial year, which has increased to 7.1 in 2012. Manufacturers also must have collection site in every county and in every city with population over 10,000
2007, 2011	Texas	0.78 (TX CEQ 2012)	Laptops, desktops, monitors. TVs added in 2011, starting 2013	No
2008	Hawaii	2.38 (HI DOH Undated)	Laptops, desktops, monitors, printers. TVs added in 2010	No
2008, 2011	Illinois	2.35 (IL EPA 2012)	TVs, computers, televisions, cell phones, PDAs, printers, fax machines, game consoles, VCRs, DVD players, iPods, and other devices	Statewide per capita goals and individual manufacturer goals based on previous years' sales
2008	Michigan	1.67 (Oct. 2010-Sept. 2011) (MI DEQ 2012)	TVs, monitors, laptops, desktops	No (Non-binding goal to recycle 60% by weight of previous year's sales. Applies to TV manufacturers only)

YEAR ENACTED	STATE	E-WASTE LBS COLLECTED PER CAPITA (2010)	PRODUCTS COVERED	PERFORMANCE SPECIFIED?
2008	Missouri	0.37 (Pierce 2012)	Laptops, desktops, monitors. Not TVs	No
2008	Oklahoma	0.68 (OK DEP 2011)	Laptops, desktops, monitors. Not TVs	No
2008	Rhode Island	2.68 (2009) (ETBC 2011)	TVs, monitors, laptops, desktops	No
2008	Virginia	0.55 (VA 2012)	Laptops, desktops, monitors. Not TVs	No
2008	West Virginia	0.72 (WV SWMB 2011)	TVs, laptops, desktops, monitors	No
2009	Indiana	Not available	TVs, monitors, laptops, desktops, printers, keyboards, fax machines, VCRs, DVD players	In year 1, manufacturers must recycle amount equal to 60% of weight of previous year's sales. In subsequent years, must recycle 80%. Penalties for not achieving goals start in 2013
2009	New Jersey	Not available	TVs, laptops, desktops, monitors	To be set by Department
2009	Wisconsin	6.2 (July 2010-June 2011) (WI DNR 2011)	TVs, laptops, desktops, monitors, printers, keyboards, fax machines, DVD players, VCRs	80% by weight of products sold 3 years previously
2010	New York	Not available	TVs, laptops, desktops, monitors, printers, keyboards, mice, fax machines, DVD players, VCRs, video games	Statewide per capita goals and individual manufacturer goals based on previous years' sales. 2011 is 3lbs per capita; 2012 is 4 lbs; 2013 is 5 lbs. After 2013 based on experience. Manufacturers must also take back one unit for each unit sold
2010	Pennsylvania	Not available	TVs, laptops, desktops, monitors, printers	No
2010	South Carolina	Not available	TVs, laptops, desktops, monitors, printers	No
2010	Vermont	Not available	TVs, laptops, desktops, monitors, printers	2012 is 5.5 lbs; 2013 is 6 lbs; After 2013 goal is average weight of all electronics collected in the past two years multiplied by the previous year's goal attainment percentage

**Table 3. Key provisions in state EPR laws for e-waste and pounds collected per capita**