



**HANDBOOK ON
HOUSEHOLD
HAZARDOUS
WASTE**



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Handbook on Household Hazardous Waste

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CHAPTER 7

Product Stewardship: Shared Responsibility for Managing HHW

Scott Cassel

Ending the Industry Unfunded Mandate

Product stewardship is a movement that seeks to change the way products are designed and how waste is managed and financed. It is a paradigm shift and a massive reorganization of relationships among those who make, supply, sell, import, transport, use, and manage products. It is about the need for manufacturers, retailers, consumers, and others to step up to take greater responsibility for the products they make, sell, and buy. It is about a product's transition from glory to garbage. Product stewardship seeks to provide that product with a new beginning or a safe ending.

Manufacturers produce billions of products each year, many only slightly updating a similar version that was sold the year before. We crave new, advanced, exciting, different, and more powerful items that make our lives easier, more productive, or just plain fun.

Retailers connect product manufacturers and importers to product users. They have mastered the art of distribution, as have many manufacturers and businesses selling over the Internet. They can pour out requisite quantities of stuff to satiate the thirst of a massive metropolis or reach remote residents in the countryside. Unaware of product impacts, consumers buy and use up products that have become more and more complex. And when the party ends—when those ever-so-desirable products lose their luster—they are tossed into the garbage, the recycling bin, or down the drain. Local governments are left to ponder how to manage it. They pick up where a product's life ends.

As corporate America designs and sells the next cool thing to meet or create customer demand, local governments are figuring out how to deal with the things that came before and are now cast aside. They must determine how they are to be collected; where they should be stored and consolidated; whether they can be reduced, reused, or recycled; and how to pay for it all. The special term used by many local governments for this predicament is an “industry unfunded mandate.” Just as local governments must be provided funding from their state if they are mandated to perform a public function, many local governments now demand new strategies and systems to fund the end-of-life management of used

products. By providing these services, government has subsidized part of industry's cost of doing business, which is no different from materials supply, production, assembly, shipping, and marketing. If these end-of-life management costs were included in a company's business decision, some products might never have been designed.

Waste Management at the Local Level

The way that waste is managed has changed over time. Long ago, local officials labored to avoid disease by removing horse manure from streets and finding a place on the outskirts of town for other discarded wastes. When these piles became too great, local government was expected to better manage the problem. They constructed space for landfill disposal and later built incinerators. Over time, as our society began to understand that "waste" meant inefficiency and environmental impacts, these garbage mavens were asked to become experts on waste reduction, reuse, and recycling. With each change, our public works officials took on more responsibility. They were well situated to become the front lines of the product stewardship movement.

The turning point came as government officials began to understand that some of the products purchased by consumers contained the same hazardous materials as those found in the industrial facilities they permitted. Retailers made it easy for us to bring these hazardous products directly into our homes. While the public outcry for recycling bottles, cans, and paper could be satisfied by providing a bin to fill with scrap, the public demand to manage household hazardous waste (HHW) required more. Product toxicity was flourishing, and government lacked the funding or the systems to protect the public health.

Hazardous products "tipped" the solid waste management scale. They brought to light the impossible task of local government to serve as a backstop for whatever consumers disposed. Local officials were being counted on to properly manage all types of hazardous products that could pollute our air, water, or land, such as paint, motor oil, automobile batteries, and solvents. They needed to collect more and more products, which were being manufactured and consumed at a faster and faster pace. No longer was it acceptable to collect HHW from a small percentage of the population with a goal to do better. Local officials needed to increase HHW collections and find the money to support it. They could not rely on satisfying this need by increasing taxes or raising trash fees owing to citizen opposition to taxes and big government programs. They needed a paradigm shift in how waste was managed and financed, and they wanted to ensure a more sustainable future. They turned toward product stewardship.

What Is Product Stewardship?

Product stewardship is an approach in which manufacturers, importers, retailers, government officials, consumers, and others share responsibility for reducing negative impacts to human health and the natural environment that result from the production, use, and end-of-life management of a product. While each stakeholder has a unique role to play, those with the greatest ability to reduce a product's impact over its entire life cycle (*i.e.*, manufacturers

and retailers) are viewed as having the greatest degree of responsibility. Only manufacturers have the knowledge about the hazardous materials contained in a product and have the power to reduce the hazard at its source.

Product stewardship systems seek to apportion responsibility for providing program information, logistics of end-of-life product management, and funding. These systems shift the cost of end-of-life management of products from the public sector to manufacturers (and in some cases, retailers) and by extension, to the consumer. By shifting costs, policymakers create the funding base needed to sustain end-of-life management programs that reduce public risk and create environmental benefits. In addition, shifting costs from the public to the private sector often creates efficiencies in operations that lower overall system costs.

Product stewardship can include actions taken by an individual manufacturer, importer, retailer, government agency, or any other actor in the product supply chain. It can include a manufacturer changing the design of a product so that it consumes less energy in its use; incorporates recycled content; uses less material or more recyclable material; or substitutes toxic materials with less-toxic or non-toxic materials. It can include a retailer taking back a product it sells at its store and paying for its recycling. Product stewardship could also include government passage of a law that requires manufacturers to eliminate the use of certain hazardous substances or to set up systems for collecting and recycling their equivalent share of the products they put on the market. Government could also develop an agency policy to procure products made with non-toxic ingredients. However, since the intent of product stewardship is to reduce lifecycle impacts, it has become associated with broad agreements that share management responsibility among a large group of actors connected by complex business relationships.

The concept of requiring manufacturers to take responsibility for the end-of-life management of their products was imported from overseas. In Europe and elsewhere, including Canada, the terms “producer responsibility” and “extended producer responsibility” (EPR) began to be used to extend the producer’s¹ obligation for reducing environmental impacts beyond the traditional manufacturing facility boundary to encompass products when they reach the end of their useful life.

In Europe, EPR was designed to provide incentives to producers to improve the environmental performance of their products and to involve them in the collection and recycling of products at the end of their life. The original intent of EPR systems was to encourage design changes that make products less wasteful, less toxic, and more reusable and recyclable. In an idealized EPR system, the cost of managing a product at the end of its life is included in the product purchase price in a way that is invisible to the consumer, similar to the costs of production and marketing. However, many EPR systems today, particularly those in Canada, include end-of-life product management fees that are visible to consumers. In either case, it is expected that product users, rather than all taxpayers, will pay for the end-of-life management services.

The common denominator of true EPR systems is that they provide a financial incentive to manufacturers to design environmentally superior products by internalizing end-of-life product management costs into the purchase price of products. In addition, manufacturers play a significant role in end-of-life management of their products even while the responsibility is shared among key stakeholders. EPR in Europe often includes retailer

take-back of end-of-life products and local government collection of end-of-life products from their citizens.

The term “product stewardship” was originally used by industry to describe the responsibility that companies assumed for managing facility operations—air and water emissions, waste management, worker safety, and other controls that, for the most part, take place within the confines of the manufacturing plant or on facility grounds. Product stewardship became the term of choice in the United States because it was simpler to understand and emphasized shared responsibility for reducing product impacts. Since “producer” was not in the term, it was also perceived as easier to engage industry in dialogue.

Product stewardship implies a broader set of systems in which the end-of-life management cost of a product is reflected in its purchase price, and is inclusive of the narrower EPR systems. Policymakers currently debate whether product stewardship systems that allow for visible fees can meet product stewardship goals even if the funds are managed by an industry-run stewardship organization. Some believe that visible fees collected by a government agency are only a funding mechanism and should not be called product stewardship because there is no industry involvement in establishing and managing the fees, and therefore little incentive to reduce costs. They also question whether citizens and politicians will accept a visible product fee that is often perceived as a tax, especially if such fees have been mismanaged by government in the past. Product stewardship expands beyond end-of-life product management to also include impacts across a product’s entire lifecycle. For example, product stewardship can include efforts that seek to reduce impacts from mining bauxite for aluminum as a component of a beverage container recycling program.

Product stewardship and EPR can still mean different things to different people, and we are in the midst of rapid changes in understanding what these terms mean and how they can be implemented. It is very possible that definitions presented here will change or blur over time so that product stewardship and EPR mean virtually the same thing, or that EPR comes to be understood as the best example of a product stewardship approach. There are a myriad of EPR and product stewardship systems operating around the world, and each system must be evaluated on its own merits. What is most important is that we seek changes in underlying roles and responsibilities along the product supply chain so that we reach the goal of product sustainability.

One thing is certain—all product stewardship systems represent a paradigm shift in how consumer products are designed and managed at end-of-life, and that each system must be negotiated among a different set of stakeholders under a different set of conditions. Each new program builds on the experiences of those before it, and the results of these negotiations have become the new waste management systems of today.

Product Stewardship and Corporate Social Responsibility

Product stewardship is part of the wider corporate social responsibility (CSR) movement, that seeks to extend a company’s responsibility beyond its statutory obligations. CSR emphasizes the interplay between economic, environmental, and social criteria (the

“triple bottom line”),² and seeks corporate changes that align with sustainability principles. The movement attempts to set standards to which companies should adhere if they are to be considered good corporate citizens and then sets up a process for accountability. CSR efforts promote change through positive press, corporate competition, and shareholder resolutions. They can also include industry-driven efforts through the establishment of environmental management systems, sustainability reporting, goal-setting, and other self-accountability measures.

Product stewardship, on the other hand, more narrowly focuses on the products that are manufactured and sold by corporations in an industry sector, but then takes a broad life-cycle approach within that purview. While product stewardship addresses an entire industry sector (*i.e.*, consumer electronics, paint, thermostats, or carpet), CSR efforts are often company specific, and address a full range of company activities. Although the main focus of the product stewardship movement has been environmental, it has begun to incorporate broader societal impacts. For example, the export of scrap electronics to third world countries has heightened awareness of the significant environmental and worker health issues pertaining to metals extraction from scrap material using harmful recycling practices.³ As more attention is paid to impacts related to production, end-of-life management, and other product lifecycle stages, product stewardship will likely expand in focus to cover additional social concerns.

Another difference between the two approaches is that product stewardship uses governmental regulatory power to leverage industry action. In product stewardship, while responsibility weighs heavily on manufacturers, government is still a key player involved in many aspects of program development, including planning, goal setting, oversight, monitoring progress, and enforcing laws that maintain a level playing field across an industry sector. CSR efforts are usually accomplished by industry with prodding from non-governmental organizations; government plays a more limited role. The lines cross between these two approaches to corporate change when companies, on their own, take significant steps to reduce emissions, change product design (*e.g.*, lightweight packaging), or meet voluntary standards in ways that address stewardship of the products they make or sell. The ultimate goal of both approaches is to change corporate culture so that environmental and social considerations are institutionalized and become as much a part of corporate decision making as profit-and-loss statements.

Goals of a Product Stewardship Approach

Product stewardship, in its broadest sense, seeks sustainable ways for products to be responsibly designed, manufactured, distributed, used, and managed after use to conserve resources and protect the environment and human health. In addition to this broad goal, product stewardship systems seek more specifically to accomplish the following: (1) internalize external costs into the product purchase price, (2) promote product design changes, (3) cover the costs of product collection, transportation, and end-of-life management, (4) diversify end-of-life management options, and (5) drive cost efficiencies in product end-of-life management.

Internalize Product Externalities

At its most basic level, product stewardship seeks to eliminate negative, external environmental and social costs imposed along the entire product lifecycle. These costs include, for example, mercury contamination of our nation's fish. The disposal of mercury-containing products, such as thermometers, thermostats, and fluorescent lamps is one of the sources of mercury released to our environment and contributes about one-third of mercury releases to air in the United States.⁴ Mercury in many of our nation's waterways has resulted in the need to restrict the amount and types of fish we eat. External costs also include pharmaceutical wastes and pesticides that pollute waterways and are suspected of causing male fish to take on female characteristics including egg production. And they include the cost to manage biosolids contaminated by hazardous materials, run-off from mining operations, water pollution from improperly disposed used oil and paint, and car exhaust from the transport of HHW materials to collection sites.

Product stewardship systems seek to incorporate the real product lifecycle costs into the product purchase price, and thus prevent future environmental and social costs. The cost to avoid lifecycle impacts should be no different from the costs to manufacture, transport, or market that product. By including this cost in the purchase price, the product user pays the price rather than all taxpayers, many of whom do not use the product. Internalizing costs to protect against external product impacts will raise societal awareness and shared responsibility. We may, in fact, discover that it costs more to dispose of some products than companies are charging customers for the privilege of using them.

Product Design Changes

Many product stewardship systems seek to reduce future environmental impacts by removing hazardous materials from product design and making them easier to reuse, recycle, or dispose when the consumer no longer wants them. For example, by requiring a manufacturer to remove hazardous materials from batteries and to make them as clean as a piece of steel, the hazard from heavy metals is removed. This is the highest form of product stewardship. European Union discussions led to a law phasing out the use of specific hazardous materials in electronic products. This law, the Restriction on Hazardous Substances Directive (discussed later), demonstrated that companies could begin to move down the path of sustainability.⁵

Making manufacturers responsible for the end-of-life management of their products theoretically provides them with a direct financial incentive to design products that are environmentally superior in order to minimize future management costs for which they are now responsible. By requiring a manufacturer to collect unwanted televisions or computers, and paying for their reuse or recycling, manufacturers are more likely to design future product models to make the product more easily reusable or recyclable.

However, in Europe the next phase of the debate has started. Some argue that product design will only be achieved under an "individual responsibility" model⁶ since environmentally innovative companies with the best product designs will benefit most through lowest end-of-life management costs. These advocates believe that "collective responsibility" provides no incentive to a company to improve environmental product performance

since all companies pay the same per unit cost to manage end-of-life products regardless of how environmentally superior their product design may be (see discussion of individual versus collective systems).

Others believe that product design will best be influenced by bans on specific hazardous materials, mandates to use a minimum percent of recycled content, or procurement preferences for products meeting specified sustainability criteria. Studies to date have not conclusively shown the effect of product stewardship policies on product design improvements.⁷ However, all agree that products need to be designed with fewer toxics and need to be more sustainable, and that this might take a combination of approaches to achieve. Some manufacturers have suggested that a reward for businesses that remove toxics and make cleaner products is to exempt them from collection responsibility.

One key to any sustainable waste management strategy is to minimize product toxicity so that scrap materials can more easily be turned into a raw material resource for the manufacture of new products. Products that are sustainably designed will retain all or most of their value at end-of-life. For example, current electronic waste has a greater concentration of metals than mined rocks. Mining scrap electronic materials from well-designed products is the future of sustainable waste management and needs to be built into the design of new products. The concept of using scrap materials to manufacture new products in a closed loop system is known as “cradle-to-cradle” product management.⁸

Cost Coverage

One of the key aspects of product sustainability is the need for a funding source to ensure that HHW is properly managed at end-of-life. Product stewardship systems therefore seek to cover the costs of collection, transportation, and end-of-life management of HHW products, most of which have a “negative value” where end-of-life management costs are greater than the value of the scrap material.

Currently, most programs that manage HHW are run by government and paid for through taxes, utility rates, or end-of-life fees. Product stewardship systems seek to shift the costs currently paid by all taxpayers through government-run programs onto product users, and to eliminate end-of-life recycling or disposal charges. If people are forced to pay to recycle a product, government officials find that they often will dump it illegally, bury it in their garbage, or store it.

End-of-life fees work for the small percentage of the population who understands the environmental ramifications of disposing of HHW, when other free options are available and the fee provides added convenience, or as a way to jumpstart a collection infrastructure. One goal of product stewardship programs, therefore, is to make the end-of-life program appear “free” for those whose behavior we seek to change, even though the full cost is embedded in the product price. While there are several ways in which end-of-life management costs are folded into the purchase price of a product, funding under a product stewardship system ultimately comes from the consumer, whether or not it is financed through producer responsibility or broader product stewardship systems.

As shown in Europe and Japan, when producers become financially liable for elements of managing products at the end-of-life, they ask for full control of the operation. In Europe, the compromise achieved is that each party finances those process steps under its

control. For example, household collection is financed by municipalities; retailer collection is financed by retailers; and producers finance product design, recycling, and disposal.⁹

Diversify End-of-Life Management Options

Once manufacturers, importers, and retailers agree that they have a role to play in end-of-life product management, they often believe that existing government programs can successfully handle the increase in HHW products that would need to be collected to make an environmental difference. While most governments agree that their infrastructure (*i.e.*, collection facilities and associated management and operations staff) should be a key piece to a product stewardship solution, many cannot handle an increase in volume even if their costs were covered. Most facilities collect HHW from an estimated 5 to 10% of the population. While some permanent facilities may have planned to eventually collect 80 percent of all HHW products, many sites are wedged into existing solid waste transfer stations or landfills. These facilities do not have the space to handle significantly increased volumes of HHW and greater drop-off traffic.

Many product stewardship systems, therefore, provide “collection payment incentives” for all entities, public and private, that wish to collect target products. This mechanism creates an incentive for existing HHW sites and new market entrants to expand opportunities for citizens to drop off their HHW, thereby diversifying the HHW collection infrastructure. For example, in 2007 the California Integrated Waste Management Board paid 20 cents per pound for electronic equipment collected by registered collectors. These payments have resulted in an increase in the private collection infrastructure (at non-profits, retailers, and other non-municipal locations), reducing the traditional management burden on government. Other product stewardship systems mandate the retail collection of particular HHW items to achieve this same result. A diversified system is a healthy framework for sustainable management of HHW.

Cost Efficiencies

If you were seeking the most cost effective product stewardship approach, would you hire a government agency or a private company? While there are a surprising number of savvy government officials with entrepreneurial attitudes, many observers of product stewardship systems (from government and the private sector) agree that the private sector is best positioned to deliver the most cost-effective product stewardship programs. Hence, many product stewardship systems authorize or enable producers or other responsible entities to discharge their obligations directly and individually or collectively through a non-profit producer responsibility organization that manages stewardship responsibilities on behalf of member manufacturers and/or retailers.

Responsible companies, when acting on their own or through collectives that they influence, have strong incentive to minimize additional costs imposed on themselves or their customers for end-of-life management, and drive system efficiencies in ways that government-run programs are less capable of achieving. With government assigned to planning, goal setting, enforcement, and oversight, manufacturers are free to innovate in

ways that the private sector does best—seeking lower costs and new methods to achieve the desired goals. However, as experienced in Europe, producer responsibility organizations that achieve market domination can also be run inefficiently once competition for efficient services is eliminated. European and Japanese programs have also shown that municipalities can play an important role by providing collection services of varying convenience to residents at the prices they are willing to pay. This dynamic adds another level of system efficiency.

Key Elements of a Product Stewardship System

Product stewardship and EPR systems have been implemented in a variety of ways around the world. However, several elements are central to all systems—product scope, performance goals, fair competition, individual and collective responsibility, and sustainable financing.

Addressing the Problem: Product Scope

The scope of the product stewardship system is an important first consideration, and one that should be commensurate with the problem. For example, U.S. electronics collection programs initially targeted the most toxic components of computers and televisions, namely cathode ray tubes—the heavy, leaded picture tubes in computer monitors and television sets that protect us from harmful radiation. Over time U.S. electronics laws began to include all computer and television components, including related equipment such as printers, scanners, keyboards, speakers, VCRs, and DVD players (collectively called “peripherals”). European laws, from the start, covered all electronic and electrical products with a plug and a cord, which also addressed other environmental impacts (*i.e.*, chlorofluorocarbons in air conditioners and refrigerators). To establish vibrant recycling industries, Europe, as well as Japan, increased the supply of scrap materials by including a wide scope of products in their product stewardship laws.

Although most electronic products do not contain obvious amounts of lead, many do contain other heavy metals (*i.e.*, cadmium, mercury, nickel), toxic materials (*i.e.*, brominated flame retardants), and other compounds that government officials believe should not be disposed or even used. By taking a full lifecycle approach, what is considered “the problem” has broadened. With this expanded viewing lens, the disposal of most products represents wasted energy and natural resources, as well as lost jobs and economic value since potentially recyclable material is discarded.

Product stewardship systems are careful to scope the category of products to be covered so that the development of the system is manageable. Too wide of an initial scope may result in the inclusion of too many stakeholders during legislative negotiations and delay program implementation on the highest priority items. In addition, some programs phase in the infrastructure over time, starting slowly to accommodate the increased supply of materials from collections and ensuring that sufficient funds are available to manage the program effectively. Phasing in the scope over time is often a prudent measure. Once the

initial system is set, it is often easier to increase products in the system over time, as long as those additional products are considered during the outset of the program. This more cautious approach provides greater assurance that program support can be built steadily over time, decreasing the risk of losing political support if problems occur.

Accountability through Performance Goals

Most stakeholders agree on the need for strict accountability in meeting program goals. However, they differ in how to measure program progress and success. Deciding when a program is a success can be controversial. Stakeholders often differ over how quickly results should be obtained, and how much progress can be achieved over a given period of time. Environmental groups and an increasing number of government agencies have begun to advocate achieving a “zero waste” goal to get the most use from materials and minimize inefficiencies and environmental impact. This full lifecycle approach includes getting as close as possible to 100 percent recycling, especially for HHW that are perceived as having greater health and environmental impacts than other non-hazardous solid wastes.

HHW programs in the United States traditionally collect a low rate of material. Goals are now being set for what it will take to make a significant environmental difference. Taking toxics out of the waste stream is understood to be of prime importance, and a greater priority than recycling bottles, cans, and newspapers. Increasingly, HHW collection goals are set at over 80 percent to reflect what is perceived as achievable and necessary from an environmental perspective. The recycling rate of lead-acid automobile batteries, for example, has already achieved a 98 percent recycling rate in the United States.¹⁰ This high rate is spurred by the value derived from the recycled lead, which is greater than the cost of collection and recycling, thus creating a strong financial incentive. Other stakeholders, however, still view zero waste goals (or high collection and recycling goals) as unattainable for most HHW and argue against setting goals that they feel cannot be achieved.

There is also disagreement over who should be responsible for achieving high collection, reuse, and recycling goals, no matter how they are measured. Many stakeholders believe that responsibility for meeting the goals should be shared, and that all stakeholders have a role to play. Some, however, believe that manufacturers ultimately should be responsible for program performance since they have the ability to increase program funding to pay for greater education, more convenient and abundant collection opportunities (along with retailers), incentives, and other program variables. They believe that, while consumers have a strong responsibility to manage HHW properly, manufacturers and retailers are responsible for providing the systems to enable the public to act responsibly.

Manufacturers, conversely, argue against being held responsible for meeting program goals that rely on consumer action for success. They emphasize that they cannot force consumers to make use of collection programs no matter how convenient they are, and believe that the key variable is whether consumers have developed a “separation culture,” which may be independent of the degree of outreach, convenience, incentives, or funding provided to gain consumer attention and motivate action. Some manufacturers argue that, in some cases, no amount of funding will achieve the goal, and that it is better to initiate a program early and start developing cultural change rather than spend time haggling over targets that might take many years to reach. Ultimately, they question whether the

economic, social, and environmental value of HHW collection, reuse, and recycling outweighs the cost.

Another factor is the consequences of failure if established goals are not met. For example, some programs might only include motivational goals with no punitive measures if they believe that responsibility is shared equally among stakeholders. Others might require manufacturers or other entities to provide additional education, collection sites, or incentives if program goals are not achieved on time. Still other programs might impose financial penalties on manufacturers if goals are not met, as is the case with Minnesota's electronics recycling law. Another penalty for not meeting a performance goal could be increased government intervention. If a performance goal is not met, for example, industry might lose program autonomy and flexibility as government becomes more prescriptive in its oversight. One illustration of this loss of flexibility might include a requirement on manufacturers and/or retailers to submit detailed program plans for agency approval.

Each product stewardship program must resolve competing interests among divergent stakeholders as well as the timeframe for increasing responsibility in relation to progress made. Programs in Europe and Japan, for example, rely on municipalities to influence consumer end-of-life behavior and often require that municipalities collect products. In addition, they often increase consumer convenience by requiring that retailers collect products, with manufacturers being responsible for recycling and transportation from collection sites. How this issue unfolds in the United States and other countries will be central to the development of the product stewardship field.

There are two main ways that quantitative goals are set, each with a different degree of accountability: (1) amount of material collected, reused, or recycled; and (2) a rate (expressed as a percentage) based on both the amount of material collected, reused, or recycled and another variable (*i.e.*, amount sold, amount available for collection, etc.).

Amount of Material Collected, Reused, or Recycled

This approach involves setting goals based on the volume or weight of the product or hazardous material collected, reused, or recycled from the target population (*i.e.*, pounds of electronic scrap, number of mercury thermostats, pounds of mercury recovered from the mercury thermostats). Goals for subsequent years could be set to increase material collected as compared to the prior year or to the base year. The benefit of this approach is that goals are set on actual amounts, providing a degree of certainty. However, a downside to this approach is that there is no context from which to evaluate the amount collected, reused, or recycled.

For example, a program can triple its annual collection rate of rechargeable batteries, from 1,000 to 3,000 pounds of material. However, if the number of rechargeable batteries that residents are disposing is 100,000 pounds per year, the program would only be collecting 3 percent of the amount that needs to be collected, with the rest being disposed. While the yearly increase is a significant improvement over the previous year, it might not be considered successful depending on program expectations.

Evaluating a program based on the amount of material collected is a good way to begin a program when attention should be focused on putting a system in place. These data can then be used to set more accountable program goals over time. Programs operated voluntarily by companies usually report progress in this manner. Electronics companies,

the Rechargeable Battery Recycling Corporation (RBRC), and the Thermostat Recycling Corporation (TRC) all issue reports on progress made based on pounds of material collected. In addition, Maryland's electronics law, which became effective in 2005, requires manufacturers to report the total weight and number of computer equipment devices collected, recycled, refurbished, and reused.¹¹

A variation of the approach that relies on actual amounts of material collected is to peg goals to the best performing programs in a given jurisdiction (*i.e.*, state, regional, or national). For example, goals for a national paint stewardship program might compare all state programs to the state that collects the most leftover paint per capita. A goal for each state might be to reach the level of recycling of that high-performing state in a given number of years. As the best performer increases its collection rate, other programs must stretch their goals to keep up with the best program. This variation broadens the horizon for what are considered the best performing programs and stretches the performance of other programs.

Percentage-Based Goals

Early programs in Europe and Canada, and others in the United States, calculate performance goals based on the amount of material collected as a percentage of what is generated. For example, if 100,000 tons of electronic equipment are generated annually, and 10,000 tons of equipment are recycled and 90,000 tons were disposed, this would represent a 10 percent recycling rate.

Performance goals specifying the percentage of electronics to be recycled appear in the Minnesota electronics recycling law passed in 2007. Under this law, manufacturers must meet annual targets for collection and recycling of specific electronic products equal to 60 percent (by weight) of sales to households/consumers in Year 1 and 80 percent in Year 2.¹² Maine also established recycling rate goals for mercury thermostats in its 2006 law that are equivalent to at least 70 percent by January 1, 2009, and 90 percent by January 1, 2010 (two and three years following program implementation).¹³ These high rates were chosen from environmental conviction rather than replicating existing experiences.

Europe's electronics recycling law (discussed below) sets a target of a minimum of 4 kilograms (8.82 pounds) per inhabitant, which is equal to approximately 25 percent of products sold. This minimum standard has allowed countries to establish different methods of achieving progress with maximum flexibility. While some countries (*i.e.*, Ireland) achieve almost 11 kilograms (24¹/₄ pounds) per resident, others still achieve only the minimal target of 4 kilograms without being out of compliance.¹⁴

Manufacturers often oppose percentage-based goals owing to concern about being held accountable for not meeting aggressive targets and financial implications for underachievement. Instead of debating a performance rate (*i.e.*, whether 25 percent or 75 percent) and the consequences for not meeting the rate, many companies have chosen to criticize the methodology behind establishing percentage goals by claiming a lack of accuracy.

By contrast, most government agencies and environmental groups believe that percentage-based performance goals are a foundation for any environmental planning, and that companies themselves rely on such projections for their own measure of company performance. Government agencies are well versed in measuring recycling results based on the percentage of material collected as compared to the amount generated. In the 1990s,

most state agencies challenged themselves, as well as local jurisdictions within their states, to meet ever-increasing recycling rates. In addition, the U.S. EPA has a long-standing goal, recently updated, to recycle 35 percent of municipal solid waste. While some might debate whether this is the correct national recycling goal, the point is that the agency has chosen to use a recycling *percent* rather than a recycling *amount* as the way to measure program performance. The agency uses the recycling percent goal as guidance to its staff in providing grant funds; grant proposals are judged to a large extent on whether they will help the agency achieve its recycling goal.

The major benefit of this approach is that it provides a more meaningful measure of how well a program is doing in its bid to collect, reuse, or recycle. A downside is that this method requires the development of a methodology for estimating the amount of material that is generated or available for collection, reuse, or recycling. Since this amount might become the basis for determining a manufacturer's legal obligation, it needs to be as accurate as possible. For example, while we know how many mercury thermostats are collected nationally through data collected by TRC, we can only estimate today the number of mercury thermostats that are being replaced each year. Since no one requires homeowners and heating and cooling contractors to keep track of the number of thermostats they replace, we can only estimate that number through manufacturer sales data, an estimate of the frequency of thermostat replacement, and other variables. To solve the issue of accuracy pertaining to a producer's obligation under the European Waste Electrical and Electronic Equipment Directive (WEEE Directive), the legislation requires producers to report the amount of electronic appliances they sell into the market. After these "WEEE Registries" are established, which will take several years, they will be used to establish performance goals based on a percentage of products sold into the market.

Next Steps in Performance Goals

Decisions about the type of performance goal (based on amount or a rate), the actual goal (low or high), who is responsible for achieving the goal (manufacturers or shared), and the ramifications of not meeting the targets will continue to be critical to product stewardship programs. Developing clear definitions that are harmonized among nations will be a first critical step to clarify program intent. It will also serve to increase program efficiency so that manufacturers and retailers do not need to translate among various programs in which they operate.

To the extent that these products originate from the manufacturer and are distributed by retailers, it is likely that public sentiment will hold manufacturers and retailers mainly responsible for providing consumers with adequate education, convenient and abundant collection opportunities, and/or incentives to motivate behavior. When these conditions are provided, the emphasis on responsibility for meeting performance goals is likely to shift to consumers, who are ultimately the ones needed to act in an environmentally responsible manner. Existing programs and their varied approaches to performance measures will guide the development of subsequent evaluation methods for incorporation in future product stewardship programs.

Fair Competition: Leveling the Playing Field

No company wants to step out ahead of the competition if doing so will put it at a competitive disadvantage. Why should they? All companies should compete on a “level playing field.” Therefore, product stewardship systems must be fair to all companies and not disrupt market dynamics. Voluntary systems, consequently, often contend with the problem of “free riders,” those companies that benefit from a program without having to contribute financially. Since there are no regulatory or statutory requirements that a company must adhere to in a voluntary agreement, some companies might not do so, thereby giving non-compliant companies an advantage. Some companies do the “right thing” by setting up take-back opportunities or paying for such programs, while other companies that are not part of the solution and do not make any financial contribution still have systems available to manage their end-of-life products.

Voluntary agreements might be possible when there is a strong trade association that has the power to speak on behalf of the entire industry, although anti-trust concerns must certainly be satisfied. While companies are allowed to convene and develop a mechanism for assessing fees for recycling and other purposes, anti-trust laws forbid them from colluding on the price they will charge consumers to recover their costs.

Most stewardship systems therefore rely on legislation and/or regulation that legally require the participation of all manufacturers (and perhaps retailers) across the industry, and provide government with the authority to enforce against those companies that are non-compliant. TRC’s four member companies, for example, represent only about 50 percent of the market for thermostat sales.¹⁵ Over the past decade, TRC paid for the collection and recycling of all brands of mercury thermostats brought into the program, with non-member companies bearing no financial responsibility for their products. As government attention focused on the lack of TRC program performance and the need to increase the number of thermostats recycled, TRC began to seek a legislative remedy that would require all manufacturers to become contributing members of the TRC program or set up their own equivalent recycling system.

Individual and Collective Responsibility

A major tenet of producer responsibility systems is that government should provide incentives to manufacturers to design environmentally superior products. One major objective of stewardship systems is to minimize environmental impact by removing product hazards or by collecting and properly managing end-of-life products. Companies that have adopted an EPR strategy as part of their business model, such as Hewlett Packard, Dell, Apple, and other members of the European Recycling Platform¹⁶ argue that “individual responsibility” is the best way to provide producers with incentive to redesign products. These companies believe that once a company is responsible for its own products, they can calculate the financial benefit of a new design feature. For example, if removing mercury from thermostats reduces a company’s recycling cost per unit, the company that invests in non-mercury technology has a financial incentive only if it receives the benefit of its investment directly. If a company with a mercury thermostat pays the same recycling cost as the premium-

brand company that develops a non-mercury thermostat, there will be little incentive for that design change.

One difficulty with an individual responsibility approach is the need to identify the brand of product collected. Research by the European Recycling Platform, a stewardship organization, seeks to solve that problem by using a “Return Share Model” as an interim step to full individual responsibility. This model recognizes that products lasting longer owing to better design require fewer resources to deliver service to the consumer. This value can be measured in the number of scrap products by brand returned by the consumer for recycling, or a brand’s “return share.” This approach requires statistical sampling methods that are under development. Electronics laws in Washington and Maine use a return share model.

Dell was the first electronics manufacturer in the U.S. to offer a free recycling option to all consumers for its brand of products. Sending a United Parcel Service (UPS) driver to a resident’s dwelling ensured that the company only received back Dell products. Other manufacturers also offer direct take-back programs, some with costs and others without. However, the consumer interest in these programs has not been very high. Apparently, many consumers find it more convenient to bring that Dell product to a special electronics scrap collection event, a retailer, or an HHW collection center that accepts consumer electronics, since Dell also requires residents to provide their own box and to package up the equipment. At HHW facilities, these products would likely be mixed with other companies’ electronics, diluting the design change benefit. The Return Share Model seeks to solve that problem by calculating the volume of each producer brand returned.

While some advocate for an individual responsibility approach to promote product design changes, others find cost efficiencies in joining with other companies in jointly managed systems. These collective systems are managed by a non-profit corporation through any one of many possible governance structures. Most often, these organizations are heavily represented by manufacturers, but sometimes they include retailers and other stakeholders. The organizations are known as producer responsibility organizations (PROs), stewardship organizations, and third party organizations (TPOs). Although pure collective systems result in efficiencies through their joint management framework, they will not promote environmental design changes as readily as individual responsibility systems. Others argue for collective systems to manage historic¹⁷ wastes to spread out the cost of retroactive liability among all manufacturers since a company cannot change the design of old products but only new ones. These people believe that individual responsibility should be pursued only when historic products are largely removed from the waste stream.

The key for product stewardship is to extract from these systems the best of both worlds—incentives for individual companies to make design changes while taking advantage of collective cost savings. While some believe that there is a conflict between individual and collective responsibility, the European Recycling Platform has demonstrated that the principle of individual responsibility can be realized in conjunction with a collective responsibility framework.¹⁸ Most product stewardship systems allow companies to choose whether they want to satisfy program requirements individually or collectively. The potential benefits of the various systems in operation around the world are the subject of evaluation, as they are too new for definitive results. As we move forward on product stewardship, one challenge for policymakers will be to develop systems that allow companies to directly benefit from the design changes in which they invest.

Sustainable Financing

Currently, most end-of-life management costs for HHW in the United States (*i.e.*, collection, reuse, recycling, disposal) are largely borne by state and local agencies through government programs, and are paid for through taxes. Other ways of funding programs are through end-of-life fees charged to consumers when they return a product for recycling or disposal, or through solid waste utility rates. There are two basic types of product stewardship financing systems that seek to cover end-of-life product management costs by incorporating these costs into the purchase price of a new product: (1) Advanced Recycling Fees and (2) Cost Internalization (or “producer responsibility”).

Europe and Japan have developed systems that share financial responsibility. In those countries, producers usually are financially responsible for the portion of the process on which they have influence, namely transportation and recycling of scrap products. Municipalities and retailers often pay for the collection of products at municipal depots or at retail, parts of the process on which they have most influence.

Advanced Recycling Fee

An advanced recycling fee (ARF) is a separate charge placed on a new product and paid by a consumer at retail to cover the cost of the product’s eventual end-of-life management. An ARF is paid in advance so that when a consumer is ready to recycle the product, a “free” system is available for its collection, transportation, and management. Buying a product and paying an ARF is like buying that product’s recycling service in advance. In reality, the ARF paid on a current product pays for the recycling of a product bought years before. One advantage of ARF systems is that the fund created can immediately cover the costs of recycling these past products.

An ARF can be either visible or invisible to the consumer. In the U.S., many state governments have placed visible ARFs on products such as tires, motor oil, and lead acid batteries. California’s 2003 electronics scrap recycling law, the first electronics product stewardship system in the U.S., is also based on a visible ARF. Some Canadian ARFs, however, are invisible to the consumer.

Funds collected in ARF systems can go into a government-managed fund or an industry-managed fund (handled through a producer responsibility organization). While most ARFs in the United States are paid into government funds, ARFs in Canada are most often paid into an industry fund and managed by a stewardship organization. A key disadvantage of government-managed funds is the possibility of state legislatures seizing these dedicated funds for other funding purposes. Another downside is the need for additional government staff to manage the fund collection, grant distribution, contractor services, and other operational functions.

Those supporting industry-managed funds believe that these functions can be provided more cost effectively when managed by the private sector. Some in Europe, however, believe that ARFs that pay into a single organization—whether public or private—provide little incentive to improve efficiency since central funds act as monopolies. These proponents believe that the most efficient systems are ones that provide competition among private organizations, which would exclude an ARF.

Cost Internalization

A second type of financing system involves manufacturers and importers that internalize end-of-life management costs into the cost of doing business so that they are invisible to the consumer, even though the costs may be passed on to the consumer. These are called “producer responsibility” systems. By internalizing end-of-life management costs, manufacturers and importers have direct management ability to increase efficiency, improve service, and cut costs. The ability to control management decisions is the biggest advantage for a producer responsibility system compared to an ARF, which does not become part of a company’s profit and loss statement and therefore does not result in company actions toward greater efficiency.

The two most common voluntary industry-wide programs in the U.S. are run by RBRC and TRC. Both of these programs were developed by manufacturers to fund collection and recycling programs that are free to consumers, who can bring their batteries and thermostats to participating public and private collection sites. These products do not have to be sorted by brand since the program accepts all manufacturer brands. Manufacturers’ costs to collect and recycle the batteries and thermostats, and to publicize the programs, are included in the purchase price of the products. The entire program is paid for by funds derived from manufacturers that pay according to a formula based on market share and established by RBRC and TRC. Most scrap electronics recycling laws recently enacted in the U.S. are following the producer responsibility model, including those in Maine, Washington, Minnesota, Texas, Oregon, Connecticut, and North Carolina.

In most European countries, the WEEE Directive is implemented through cost internalization, which fosters competition among several stewardship organizations in one country. For example, the establishment of four stewardship organizations in Austria in 2005 has reduced the take-back cost from 75 cents per kilogram of electronic product placed on the market to 8 cents per kilogram within a six-month period.¹⁹

Deposits

Deposit systems create an extra incentive for residents to bring their used product in for collection. Under such a system, consumers pay an extra charge, similar to an ARF, at the time the product is purchased at retail. However, unlike an ARF, if the consumer returns the used product, they will receive a return deposit, or a portion of the deposit. Deposits have been effective at increasing the rate of recycling, although they add significant costs and complexity to the program since part of the revenue must be paid back to consumers who return their products. Examples of deposit-related systems include state laws on beverage containers, and some state laws on automobile batteries, pesticide containers, and used motor oil.

End-of-Life Fees

End-of-life fees are charged by some government agencies and private entities at the point where a product is collected for recycling or disposal. They are used to obtain program revenue to collect used products. Government officials usually view these fees as inadequate long-term solutions because they charge residents for “doing the right thing” and often

result in illegal disposal. Given a mandatory fee for collection, many consumers dispose of products in the garbage, a vacant lot, or the woods rather than taking the product to a collection location. Fees are best used to jump-start programs, as a supplement to a product stewardship system, or to gain experience on a pilot project basis. In 2007, Staples became the first retailer to announce that it would take back computers, for an end-of-life fee, in all of its stores nationally.²⁰ This program is viewed as a supplement to, but not a substitute for, a funding system that will collect and recycle electronics equipment without an extra fee from residents.

Changing Behavior through Stakeholder Engagement

Product stewardship represents a fundamental shift in how products are managed and who pays. For this shift to occur, corporations and small businesses must change their behavior and embrace new responsibilities. Most often this dynamic is akin to the repositioning of a large vessel in a harbor. It occurs slowly, steadily, and with caution.

There are three basic approaches to changing corporate behavior: (1) mandates, (2) voluntary initiatives, and (3) negotiated agreements. The environmental movement in the U.S. has progressed along this path, starting with strong “command and control,” unilateral regulations, and moving to voluntary schemes to achieve corporate environmental improvements that go beyond regulatory compliance.

With its expanded focus beyond plant emissions to the entire product lifecycle, product stewardship requires a new approach that includes all entities that play a role in the lifecycle chain. No longer does government solely rule with a unilateral, regulatory fist, nor does it plead for voluntary actions. Product stewardship combines voluntary and regulatory approaches into a collaborative, negotiated process that seeks shared responsibility among key stakeholders.

For example, manufacturers are often called on to incorporate the end-of-life management costs into their product’s purchase price, set up producer responsibility organizations to manage collection and recycling programs, and become engaged in all aspects of reducing impacts across their product’s lifecycle. Retailers are asked to carry environmentally superior products, take back products in their stores, collect fees under ARF systems, and educate consumers about product choice and recycling options. Governments are expected to enact laws and regulations, set goals, enforce against non-compliant companies and citizens, and at times plan and initiate programs. And consumers ultimately need to buy environmental products and manage them safely at the end-of-life.

These collaborations are based on the premise that voluntary agreements are quicker and less costly to implement, but are often motivated by the fear of having to abide by a patchwork of state and local laws that will add cost and complexity. While the engagement of stakeholders under product stewardship appears to be voluntary, progress must satisfy the interests of all key stakeholders. Each party has the option of taking legislative or regulatory action if negotiations do not proceed quickly enough toward meeting joint goals set forth at the beginning of negotiations.

Shared responsibility has taken on different meanings in Europe, Canada, and the United States. In Europe, it is common for municipalities and retailers to pay for collection of products, whereas in the United States it is less common for municipalities and retailers to accept these roles within the context of newly developed product stewardship systems. However, in Canada, while municipalities often pay for collection, retailers do not collect. The concept of shared responsibility is currently highly fluid, as programs mature and as stakeholders seek common global definitions and systems. Each product negotiation, therefore, will result in a new alignment of resource sharing as all stakeholders seek to reach common product stewardship goals.

Facilitated, multi-stakeholder dialogues offer industry a way to reduce their environmental impact in a meaningful way. The meeting with stakeholders can occur in an objective forum that is devoid of the eleventh-hour posturing that pervades legislative wrangling. For each product sector, there is a different set of stakeholders. For example, those with the greatest stake in reducing impacts from leftover paint are the virgin paint manufacturers, recycled paint manufacturers, retailers selling paint, government agencies (local, state, and federal), painting contractors, homeowners, waste management companies, and outlets for reused paint (*i.e.*, Habitat for Humanity). Key stakeholders concerned about mercury thermostats are thermostat manufacturers, retailers, heating and cooling contractors and wholesalers, government agencies, environmental groups, and homeowners.

As government agencies engage in discussions with manufacturers and retailers about product responsibility, the traditional role that they play in waste management is also being re-negotiated. Transformation on all sides takes place as discussions follow a predictable trajectory. Most companies initially resist the massive change inherent in internalizing end-of-life costs into the product price. They push for more government programs, then “concede” and promote end-of-life fees. Slowly, on their own terms and with greater understanding through probing questions, they begin to accept greater responsibility. At the same time, as companies begin to engage meaningfully, governments loosen their prescriptive posture and allow companies greater flexibility to meet performance goals.

Product stewardship has thus become associated in the U.S. with the active negotiation of stakeholder roles through a collaborative dialogue process. In Europe, these are called consultations. By agreeing to participate in a facilitated process, each stakeholder agrees to seek fair and justifiable ways to reduce product impacts. Each stakeholder has a unique role to play. Each one has critical information that other stakeholders do not have, and it takes the molding of input from these experts to develop the best product stewardship solutions.

Manufacturers, for example, have the best knowledge about production costs, the function of materials incorporated into the products, market dynamics, and product performance. Retailers are the closest to consumers, knowing how and why they purchase items, how they can be motivated to purchase products, and transportation and distribution mechanisms. Government agencies are expert at understanding the logistics and costs of collection, the markets for recycled materials, and ways to reduce environmental impacts. And environmental and consumer groups know which products and systems factor in health and safety considerations, identify the need for change, and push for new ways of thinking. A stakeholder group’s best ideas are incorporated into jointly developed agreements. By involving all parties early and often in the process, each stakeholder will be more committed to implementing the agreements.

A key to the success of stakeholder approaches is that the process must focus on a limited industry sector to make the dialogue manageable. If too many interests are included, it is more difficult to address them all within a given dialogue. For example, fewer manufacturers would be involved in a dialogue that focused solely on household paint than if the dialogue also addressed paint for industrial and marine applications. Another product example, packaging, could involve manufacturers and recyclers of glass, plastic, paper, metal, and other materials. More voices mean greater complexity in developing solutions to satisfy interests, increasing cost, and the timeframe for reducing impacts.

Product stewardship involves a delicate dance. If government forces progress too quickly, it can create an industry backlash. But if companies proceed too slowly, government might pursue the traditional, unilateral, prescriptive legislative path. If progress is consistent and meaningful, the result can be measurable environmental improvements about which all stakeholders can feel a sense of achievement. Many times, product dialogues also result in personal changes in individual stakeholders, as relationships strengthen over time, even among traditional adversaries.

The Paint Product Stewardship Initiative (PPSI) is one such stakeholder dialogue. Starting in 2003, the non-profit Product Stewardship Institute has facilitated a national dialogue aimed at reducing the generation of leftover paint, increasing reuse and recycling opportunities, and improving methods of marketing recycled paint. Following extensive research that included interviews with over 35 key stakeholders, the PPSI brought together participants from over 60 companies, industry associations, and government agencies. The discussions and collaboration resulted in an April 2005 Memorandum of Understanding (MOU) to conduct 11 projects. Dialogue participants jointly contributed \$880,000²¹ to complete nine of those projects²² that will help develop a nationally coordinated leftover paint management system. In 2007, the National Paint and Coatings Association Board of Directors issued a Resolution that committed the paint industry to take responsibility for managing leftover paint. The Resolution formed the basis for a second MOU that includes a demonstration project in one state and a plan for rolling out a national system for the management of leftover paint in other states.

What Motivates Industry to Make Product Stewardship Changes

There are five fundamental reasons that manufacturers, retailers, and other industry stakeholders are motivated to make changes that reduce the health and environmental impacts of their products: (1) to gain competitive advantage, (2) reduce business risk (including threat of legislation), (3) create/maintain an image of sustainability, (4) corporate ownership control, and (5) company leadership.

Competitive Advantage

Implementing product stewardship initiatives usually will not result in initial financial savings or profits for a company. However, in some instances it might give a company an edge over its competitors. Small retailers, with closer ties to their communities and an emphasis

on service, have begun to take back products such as thermostats and fluorescent lamps in their stores. Product take-back is considered an added service for customers and can counter lower prices offered at large retailers. Even big retail chains, however, can find a competitive advantage in taking greater responsibility. In 2007, after a five-state pilot project and a two-year permanent program, Staples, Inc., began to collect all brands of computer equipment in its stores nationwide. While they currently charge an end-of-life fee, the service is free in states with electronics laws that provide payments to collection locations.

If all companies in an industry have end-of-life responsibilities, companies might see relative savings compared to the competition if they get involved early, develop government partnerships, and gain experience through early leadership. When HP, Sony, Electrolux, and Braun established the European Recycling Platform in Europe in 2002, their objective was to gain a competitive advantage by smart and effective management of their take-back obligation. Over 900 other companies have since joined the ERP end-of-life management scheme.

Reduce Business Risk

Corporations seek certainty, which creates stability and efficiency, resulting in greater confidence in the company and an ability to attract financing, good staff, and satisfied customers. Attempts to “rock the boat” and create uncertain business conditions will often be met by resistance. One of the great motivators in changing company behavior has been the threat or issuance of product stewardship legislation.

According to Bette Fishbein, an early proponent of producer responsibility, “Battery legislation in states such as New Jersey and Minnesota was a driving force behind the RBRC program ... It is far more efficient to have a single national program to collect and recycle Ni-Cds rather than different requirements and programs in different states. But without legislation at the state level, it is doubtful that a national program to recycle Ni-Cds would have been implemented. Conflicting state laws on labeling and mandatory collection actually led the battery industry to encourage federal legislation ... The RBRC take-back system enabled industry to comply with the mandatory take-back requirements already legislated in some states and to pre-empt legislation in other states.”²³ Although the federal battery legislation does not require take-back, it did assist the industry in setting up its voluntary collection program.

The more legislation that is proposed on a product, the more interest there is likely to be in a product stewardship solution. However, companies need to perceive legislative activity as fair (*i.e.*, that it will impact competitors equally and provide sufficient freedom and flexibility to implement the legislation). For example, to prepare for passage of Europe’s WEEE Directive, the four founding companies in the European Recycling Platform viewed the manufacturer take-back obligation as a business opportunity, not a burden, and sought ways to minimize the impact on their markets. Having the same conditions imposed on all companies was viewed as a positive aspect of the legislation. Once they knew the basic details of the WEEE legislation, their objective was to turn the obligation into a business strategy.²⁴

For this reason, many companies and trade associations have been willing to meet in national dialogues to develop one basic approach that is agreed upon by all key stakehold-

ers. Many have been willing to take responsibility for recycling their products at end-of-life in exchange for the certainty of one law, regulation, or program that must be met by all companies in that industry sector. However, if multiple bills seek different outcomes, companies might decide to fight all legislation to maintain the status quo.

Create/Maintain an Image of Sustainability

No company wants bad press. Most strive to be good neighbors in the community and want to be perceived as a company that cares about reducing its social and environmental impacts. Those that are most successful in creating a solid image of sustainability are able to back their claims with real examples. They continually strive to connect to their customers by conducting research and developing technologies that keep them ahead of others. But a company does not have to be a leader to stay out of trouble, nor be perceived as a “green” company. A positive image will often keep regulatory officials from coming down hard if there is room for flexibility and discretion.

Failure to keep up with social norms of what is expected, particularly if one is perceived as a leader, puts the company at risk of being singled out for bad press and appearing on an environmental group’s hit list. Environmental groups are expert at exploiting a company’s aversion to being held up as a “bad actor.” For example, battered by the environmental group ForestEthics for selling wood products from endangered forests, Staples responded. The company created a new position—Vice President for Environmental Affairs—with broad latitude on environmental initiatives. The person who filled that position created the Staples computer take-back program, among other company take-back initiatives. The Greenpeace Guide to Greener Electronics ranks the best and worst companies according to a range of environmental criteria, and receives extensive press attention. Another of the ForestEthics efforts, its Dirty Secret Campaign, embarrassed Victoria’s Secret into talks that led to an agreement to reduce the impact of the company’s catalog production on Canada’s Great Boreal Forest. These tactics, while risky and not mainstream, have often kept companies engaged in finding product stewardship solutions.

Corporate Ownership Control

Companies often move toward sustainability more slowly than some people would like. In such cases, several organizations have refined a new tool called shareholder resolutions that seek shareholder support to wrest control over company decisions. These resolutions seek to force a company’s leadership to take certain actions that they have been unwilling to do on their own. Many of these organizations are faith-based, and seek changes that are not only environmental, but also social. One non faith-based organization, As You Sow Foundation, develops resolutions against leading electronics manufacturers to urge them to develop take-back systems and take greater corporate responsibility for electronics scrap. To date, while an increasing number of resolutions have been floated over the past few years, they have served more to draw attention to the issue and embarrass the company than actually voting to force change. However, as the public becomes better versed on the goals of producer responsibility efforts, these resolutions are likely to gain greater support.

Company Leadership

Almost every industry has its leaders and laggards, and the leaders play a key role in moving that company, and often the entire industry, forward. Charismatic champions often drive companies, leading with experience and ability, personal confidence to take a risk, and company support owing to staff respect and high performance. Leadership companies are role models for other companies. They become the one to watch, the one to emulate, or the one to outperform, and their practices are used by government to prod other companies to move in the same direction. At times, company leadership programs form the basis for industry standards that formalize the aspiration of what others seek to achieve. One notable leader of the corporate social responsibility movement, Interface, established its “Mission Zero” goal to eliminate any negative environmental impact by 2020, which has refocused other companies on the social imperative to move aggressively toward sustainability.

Several organizations work with companies to seek change by linking environmental and social performance to long-term business value. One such organization, Ceres, is a coalition of investor, environmental, and public interest organizations seeking to advance corporate responsibility through stakeholder engagement, public disclosure, and performance improvements. It established the Global Reporting Initiative (GRI) in 1997 “...with the mission of developing globally applicable guidelines for reporting on the economic, environmental, and social performance of corporations, governments and non-governmental organizations (NGOs).”²⁵ GRI seeks to set a standard for leading companies to follow, setting a strong pace for others.

Company leadership can also be translated into business advantage directly through the procurement of products that are environmentally preferable. The Electronic Product Environmental Assessment Tool (EPEAT) “... help[s] purchasers in the public and private sectors evaluate, compare and select desktop computers, notebooks and monitors based on their environmental attributes. EPEAT also provides a clear and consistent set of performance criteria for the design of products, and provides an opportunity for manufacturers to secure market recognition for efforts to reduce the environmental impact of its products.”²⁶ Industry was a strong member of the team that created EPEAT.

Other multi-stakeholder, industry-driven product sustainability standards are starting to penetrate the marketplace for carpet, textiles, and office furniture, largely in response to the “green building movement.” This is new territory for all stakeholders (governments, manufacturers, retailers, NGOs, and consumers), especially as it relates to the criteria to be considered in such standards, where to set the bars, and how the standards should be tightened over time. These standards are a starting point for a long journey toward better practices in a much broader economic system that itself is far from sustainable. These efforts, however, are starting to draw attention from other industries interested in also starting a voyage toward sustainability. It will be important for government, NGOs, and others to engage deeply in these efforts to help them gain and sustain credibility.

In addition, individual companies have initiated their own efforts to green their supply chains and educate consumers. Wal-Mart is a prominent example because it is the largest retailer in the country and one of the largest companies in the world. Its actions potentially have enormous impact on the marketplace. Wal-Mart has developed a packaging scorecard that will “... allow Wal-Mart buyers to have all the information about packaging alternatives or more sustainable packaging materials in one place, allowing them to make better

purchasing decisions.”²⁷ Wal-Mart will grade suppliers and make buying decisions aimed to help the company save money by reducing excess packaging and to spur developments in more sustainable packaging design. Wal-Mart is also looking at ways that it can recover packaging to help close the loop by incorporating these materials back into its products.

Home Depot has developed an Eco Options label program that it hopes will help consumers in identifying products that have “... less of an impact on the environment than competing products.”²⁸ Whole Foods has also introduced its Whole Trade Guarantee that “... ensures environmentally responsible practices, more money for producers and farmers, and better working conditions and higher wages for workers.”²⁹ All of these efforts represent the rising consciousness of the retail sector in an attempt to meet growing consumer demand for environmentally sustainable products. It also offers an opportunity for governments and NGOs to work with this powerful sector to further drive the product stewardship movement.

In Europe, the four founding companies of the European Recycling Platform invented a new way of running a WEEE take-back program. They took a high risk by challenging the conservative industry position of a one-system monopoly and lowered costs by managing take-back systems using business principles and competition, which will benefit industry, government, and consumers.³⁰

What Motivates the Public to Take Greater Environmental Responsibility

Product stewardship is based on the premise that companies need to provide better products and services so that consumers can make better choices that move our society toward a more sustainable future. There is only so much a resident can do if there are barriers to action, such as if there is only one annual HHW collection event and it operates when the person is on vacation. Similarly, we cannot expect consumers to buy “greener” products when none exist that are comparable in price, quality, and/or availability. The public relies on government and industry to provide them with information on the problem and on convenient opportunities to “do the right thing.” This reliance on government and industry is the reason why product stewardship began its focus on businesses.

Manufacturers, importers, and retailers need to provide better options. Without those options, we cannot expect consumers to do anything more than small, individual acts that, no matter how innovative, will not be enough to change personal and societal norms. The solutions provided need to be basic enough so that the vast majority of the public can take meaningful action. These actions have been sorely lacking in the management of HHW since hazardous products were first recognized as a problem. Product stewardship can greatly contribute to positively changing that scenario. However, it is the consumer’s responsibility to ultimately use the new services, buy the “greener” products, and return the end-of-life products to the appropriate collection systems.

While there are many variables affecting motivation, three of the basic ways to help motivate citizens to make better environmental decisions are: (1) Information, (2) Convenient Actions, and (3) Incentives and Disincentives.

Information

The consumer needs to be educated on the problem created by the product they consume, and what they can do to contribute to solving that problem. They need to know where to take leftover paint and mercury thermostats, and where to buy recycled paint and a non-mercury thermostat. But beyond the basics, consumers must come to understand the life-cycle impacts of consumer products and the importance of their role in each context.

In some cases, this will be easy. A growing number of people know that they should limit the amount of fish they eat owing to its mercury content. Fewer people know the sources of mercury, including which household products contribute to that problem and which fish have the lowest mercury content. But how many people know about the life-cycle impacts from mining titanium dioxide, a key ingredient in latex paint? Armed with information, people will have the best reasons to take advantage of the best choices companies and governments give them. This information needs to be meaningful, easy to understand, and something with which the public can identify. As multiple product stewardship solutions develop, it has become increasingly important to simplify information to the public through a single website and toll-free telephone number and other coordinated information.

In product stewardship negotiations, few companies argue with the need to provide information to the public. The debate, however, centers on how to provide that information, its cost, and who pays. Ultimately, success in reducing lifecycle product impacts will translate into progress toward developing a sustainable culture. To achieve this goal, each of us needs to understand that waste is a resource that has a value in the creation of future products.

Convenient Actions

While a lack of knowledge can be a barrier to action, knowledge in and of itself is not enough to motivate behavior. Once residents are provided with information about how to manage HHW and how to avoid future hazardous products, they need an easy way to take action. A product becomes a stewardship issue because of the lack of infrastructure for its collection, transportation, and processing. Multiple collection options add convenience for residents. However, convenience has a price.

Studies from the United Kingdom and France indicate that the separate collection of products increases transportation emissions and can be counter-productive to reducing greenhouse gases. Each region will need to optimize collection strategies with the involvement of municipal, retail, and other collection entities. Consumer convenience should also be balanced by the responsibility of the consumer to take action. While it might be most convenient for all residents to have their HHW picked up door-to-door by appointment, this would also negate most environmental benefits.

Product stewardship negotiations focus on how many collection options are needed based on the size of the population or the geographical extent. For urban dwellers, a municipal or retail option might suffice, while rural residents might require a mail-back program or an extensive system based on mobile collections or “milk-run” operations to reduce costs through consolidation. Some urban areas are even experimenting with curbside col-

lection of motor oil and leftover paint to provide added convenience and lower costs by attaching collection equipment to trucks already on the road collecting other recyclable materials.

Incentives and Disincentives

Education and convenient opportunities are part of the foundation needed to get residents to act. But, if people are not self-motivated to protect health, safety, and the environment and manage their HHW, we need to do more than educate them about the problem and provide them with a convenient way to manage the product. Often, residents need incentives and disincentives to motivate them to participate, such as a reward for taking the desired action or a penalty for *not* taking action. Like most policies, a mixture of approaches may be needed, even if the incentives are targeted for one set of actors and penalties toward another. For example, Maine's thermostat program requires wholesalers and contractors to collect mercury thermostats, with penalties for non-compliance, while also providing a \$5 per thermostat incentive for each mercury thermostat returned by a homeowner or contractor.

Financial Incentives

Financial incentives are perhaps one of the best methods for changing consumer behavior, although the cost of these measures must be considered. One example is a deposit on beverage containers, which doubles the rate of recycling containers with a deposit as compared to other containers without a deposit. In Massachusetts, when enacted in 1981,³¹ the 5-cent deposit initially resulted in recycling rates for deposit containers of over 80 percent. However, as the value of a nickel in present-day dollars decreased, the recycling rate dropped to under 70 percent. Another incentive program, called "Pay as You Throw," requires residents to pay for garbage disposal (paying a per bag or barrel fee) but allowing them to recycle for "free" (*i.e.*, where recycling costs are built into the price of the bag or barrel fee). These incentive programs yield some of the highest recycling rates in the country.

Many product stewardship financial incentives include a cash "bounty" or a store coupon paid to a resident or business if they return an item. The 2006 national voluntary agreement on auto switches includes a cash bounty for those returning mercury auto switches. Maine's 2006 thermostat law requires manufacturers to pay homeowners and contractors a \$5 incentive payment for returning a mercury thermostat. In addition, some states have retail automobile battery return programs, in which retailers charge a \$5 or \$10 "core charge" upon purchase of a new automobile battery, but rebate that money if the consumer brings in a used automobile battery at the time of purchase or within 30 days of the purchase. Finally, some retailers and manufacturers offer a coupon good toward a future purchase if an item is returned for recycling. For example, HP offers a coupon off the purchase of a new hardware product on the HP Home & Home Office Store for consumers that recycle their computer hardware through HP's recycling service.³² These programs all provide incentives for consumers to return end-of-life products.

A healthy recycling market can remove the need for a financial incentive and motivate action that benefits the environment. In Europe, scrap metal dealers experienced a

revival in 2007 owing to a sharp increase in scrap metal prices. This phenomenon created a high demand for metallic waste products such as washing machines and dishwashers collected under the WEEE Directive. In the United States, consistently high demand for scrap lead has contributed to the high rate of lead-acid automobile battery recycling. If a waste product has value, there will be great interest in recovering the product. If a financial subsidy can stimulate recycling markets so that value can be maintained in the long term, we will have moved another step closer to sustainability in that product sector. This value can also be designed into the product so that end markets are planned for the recycled material prior to it being manufactured. However, if no value can be derived for the end product, financial incentives may be needed over a much longer period of time to motivate consumer action.

Financial Disincentives

While not nearly as popular politically, waste bans and other disincentives can prod residents to take action. Bans on the disposal of electronic scrap are a key component of product stewardship legislation, but should only be implemented if a robust recycling infrastructure is first in place. Banning disposal but offering no available alternative will only frustrate residents and create political problems. Disposal bans send a clear signal to the public that a product should be handled in a special manner. Owing to the difficulty in enforcing against households and small businesses, these measures mostly play an educational role.

The Origin of Product Stewardship and EPR Systems

Early Efforts

Companies have long sought ways to reduce the costs of production, which in turn have sometimes reduced environmental impacts. For example, once single-use soda bottles replaced refillable bottles, they were made lighter and with fewer materials. While this reduced production costs, it also reduced energy and material use, transportation burdens, and other environmental impacts. As product manufacturers sought new ways to save money through product design innovations, environmental groups and government agencies stepped up to force additional changes to alleviate growing environmental and litter problems.

Pollution prevention, toxics use reduction, and similar programs placed their emphasis on decreasing the amount of toxics (*i.e.*, hazardous materials) used in the manufacture of products. These programs sought to change company practices by showing that up-front investments in new technologies could save money over time while also reducing pollution. For example, 3M Company's employee-based Pollution Prevention Pays (3P) program, initiated in 1975, is widely recognized as one of the earliest successful attempts at preventing pollution while saving the company money.³³

Product stewardship, by contrast, focuses on toxics used in the products themselves. Consumer products deliver toxic materials into our homes through effective product distri-

bution networks. These products are presumed to be safe to use, but if improperly handled, stored, or disposed, there is the potential for risk. While pollution prevention managers met with company engineers to reduce toxics at the plant, solid waste managers met with company facility managers and citizens to recycle non-hazardous wastes. It would take public outrage over litter to force manufacturers to manage their products at the end-of-life.

U.S. Beverage Container Laws

The first product stewardship laws in the United States pertained to the collection of beverage containers. In 1971, Oregon became the first state in the nation to pass a “bottle bill.” Today, there are 11 states with beverage container laws,³⁴ with Hawaii’s law passing in 2002. These laws grew out of concern over roadside litter. Later bottle bills introduced in other states promoted resource conservation and recycling goals. However, with the exception of Hawaii, none of these bills gained legislative traction and were ultimately defeated by strong industry lobbyists. Before the passage of Hawaii’s law, the last new bottle redemption law enacted was in California in 1986.

Beverage container laws typically require bottlers to pay a handling fee for the collection of the container, and require retailers to take back containers of the type they sell. In some states, this requirement spawned the creation of redemption centers to provide the collection service. Thus, the bottle bill became one of the earliest experiments in shared responsibility. It provided consumers with an incentive to recycle, funded through a deposit derived from consumers themselves. It required manufacturers to pay a handling fee to those collecting their product at the end-of-life. It required retailers to take back products they sold. And government was required to monitor the program, enforce against non-compliant retailers and manufacturers, and combat fraud from bottles purchased in non-bottle bill states.

Since their introduction, bottle bills and subsequent beverage container laws have been contentious. There is no doubt that these programs produce greater results than any other program that collects and recycles beverage containers. In states with these laws, the recycling rate of containers on which the deposit is paid is over double the rate for containers that carry no deposit. According to a report by the Sound Resource Management Group of Washington, 191 containers per capita are recycled in states without bottle bills, while states with bottle bills recycle 490 containers per capita.³⁵ However, bottlers and retailers claim that program costs do not justify their results. This stalemate accounts for the passage of only one state law in the past 20 years.

Beverage container laws were followed by state and national legislative and voluntary initiatives aimed at requiring, or encouraging, manufacturers to meet recycling targets, develop markets for collected materials, or use a specified percentage of recycled content in their products. The major targets of these efforts were traditional non-hazardous products and materials, such as newsprint, plastic, glass, and telephone directories.³⁶ These efforts attempted to make manufacturers take greater responsibility for the environmental impacts of their products, even though many times these actions would not be financially advantageous to the companies. These initiatives did not, however, take a comprehensive approach to the life cycle impacts created by these products. Instead, they focused on a part of the problem and often included an array of industry sectors in one piece of legislation. This strategy, no doubt, contributed to industry’s success in blocking much of these efforts.

Recent comprehensive voluntary initiatives also have not been successful in developing solutions to the declining recycling rate of beverage containers.

Product Stewardship and Hazardous Products in the U.S.—Tires, Motor Oil, and Automobile Batteries

In the early 1990s, there was a profound shift in focus toward “special wastes” (*i.e.*, products that presented a management problem for local public works officials). Tire piles in some locations burned out of control for days, precipitating public alarm that led to laws creating funds for the cleanup of old piles and ensuring that new ones did not form. Used motor oil recycling laws sprouted from public concern over oil slicks in the ocean and inland waterways, and laws on automobile batteries were enacted to ensure that these lead-acid products would not be abandoned in vacant lots or in the woods. These laws fostered the creation of companies to collect and process the scrap products. They also spurred the creation of end markets that would use processed materials in the construction of roads, playgrounds, and other products from scrap tires, re-refined oil from used motor oil, and smelted lead and recycled plastic products from automobile battery casings.

The laws that addressed environmental problems resulting from these products were initiated by the manufacturers of tires, motor oil, and automobile batteries. These companies, through their associations, developed, promoted, and encouraged government to pass legislation that required consumers to pay visible “advanced recycling fees” that were collected at retail and deposited into a state-managed fund. These government grant programs provided funds for public and private collection centers, and covered the cost of handling, transporting, and recycling the products.

While these laws reduced much of the immediate environmental risk from HHW products, they relied heavily on government staff, retailers, and consumers, but not on manufacturers. According to the Product Policy Institute,

the American Petroleum Institute (API) promoted model legislation for used oil that utilizes state monies or consumer fees to finance state funds that are used to operate used oil collection facilities. Seventeen states have laws based on the API model. Similarly, the Rubber Manufacturers Association was instrumental in getting 35 states to pass scrap tire legislation in which fees, collected from consumers by tire dealers in most cases, fund government managed tire management programs.^[37] Finally, the Battery Council International (BCI) successfully promoted legislation for collecting lead-acid batteries used in cars and trucks. Unlike regulations for used oil and scrap tires, lead-acid battery laws, which have been passed in 37 states, require retailers to take back used batteries and require consumers to pay a “core charge,” which is a deposit paid by any person who purchases a new battery without returning a used battery at the same time.^[38] A common feature of the take-back programs for all three products is the absence of significant producer responsibility, either physical or financial, assigned to brand-owners.^[39]

German/European Packaging Ordinance⁴⁰

The 1991 “German Packaging Ordinance”⁴¹ laid the groundwork for the worldwide EPR revolution. By all measures, this initiative unleashed a tidal wave of opinion, one side sup-

porting its waste reduction incentive for producers, and the other side opposing its strong regulatory approach and complex implementation.

With its enactment, the concept of producer responsibility took hold in Europe. The German government passed legislation that required a deposit on certain non-refillable containers and also required retailers to take back the packaging from consumers. The legislation places direct responsibility for meeting specific waste reduction targets for product packaging on those who place a packaged product onto the market (manufacturers or importers, who are called “producers”). However, the ordinance provided an exemption if producers could meet collection and recycling targets through an alternative privately financed plan. Producers could either develop and implement take-back schemes for their product packaging or join a certified national waste management scheme.

The industry-proposed system that allowed for its exemption was called the Green Dot program, and to originally operate this program, industry created the Duales System Deutschland GmbH (DSD) company. DSD subcontracted the collection service to waste management companies and municipalities. At the start of the program in Germany, DSD was the only certified compliance scheme.

The role of a compliance scheme such as DSD is to oversee the collection, sorting, and recycling of packaging waste with the support of municipal waste management partners and waste management/recycling companies. Until 1996, DSD owned the Green Dot trademark, the licensing of which finances the waste management system. In order to rule out packaging-political trade barriers in Europe from the start, DSD founded the Packaging Recovery Organization Europe (PRO EUROPE) in 1995. The primary task of PRO EUROPE is to award the Green Dot trademark to national collection and recovery systems within the European Union (EU), the European Economic Area, and the candidate countries in accordance with uniform rules and regulations.

In the late 1990s, many producers, municipalities, and waste management companies in Germany became dissatisfied with the service and attitude of DSD because it was perceived to be acting as a monopoly. Following lawsuits against DSD, Europe and Germany forced open the packaging take-back market to competition resulting in at least three compliance schemes entering the German packaging market. With the acquisition of DSD by the financial investor KKR in 2003, DSD lost the license for the Green Dot, which is now used in all of Europe as a symbol that stands for the take-back of packaging material.

Since 1999, when the monopoly was cracked, packaging take-back costs have lowered as a result of competition among packaging compliance schemes. DSD is no longer the preferred supplier owing to its pricing structure. Companies that have a contract with DSD to collect packaging waste pay a fee for the service based on each unit sold. Other compliance schemes, such as VfW and Interseroh, instead calculate their packaging take-back service fee based on the volume of material returned.

A key lesson learned from the development of the German packaging scheme is that competition among compliance schemes optimizes efficiency and improves service better than any other management practice. This result was also achieved in the United Kingdom where over 27 packaging compliance schemes compete with each other for customers, service, and price. Producers often initiate these compliance schemes, but so do other companies including those involved in logistics and waste management. The United Kingdom has one of the lowest packaging take-back costs. However, many other European Member

States still use single packaging schemes, although the trend in more countries is to copy the German and British experiences.

European Electronics Waste Management – WEEE and RoHS⁴²

A decade later, in 2003 after a long consultation process, the European Community enacted the Waste Electrical and Electronic Equipment Directive (WEEE Directive), which requires electronics manufacturers selling in Europe to be responsible for recycling all electronics that depend on electricity (*i.e.*, those with a plug, battery, or switch). There are 10 WEEE categories, including large household appliances, refrigerating appliances, small domestic appliances, consumer electronics, information technology and telecommunications, toys, tools, sports equipment, medical devices, monitoring and control instruments, and automatic dispensers.⁴³ The WEEE Directive, and its accompanying Restriction on Hazardous Substances (RoHS) Directive, which bans certain hazardous materials from the production of electronics, swept EPR into the United States.

These laws significantly affected how electronic products worldwide were designed and managed at the end-of-life. Any manufacturer that wishes to sell in the 27 member states of the European Union must comply with these directives. The WEEE and RoHS Directives operate under the principle of shared producer responsibility whereby producers are responsible for product design including the elimination of certain hazardous substances. Producers are also responsible for setting up take-back schemes, which are contracted out for the pickup and transport of materials from designated collection points to recycling facilities.

The WEEE Directive requires each individual producer (manufacturer or importer) to meet its obligation by joining a collective scheme or by establishing an individual scheme. The Directive requires that producers share responsibility for the cost of managing “historic”⁴⁴ end-of-life electronic waste from private households⁴⁵ prior to August 13, 2005, according to the actual market share of each producer per type of equipment. To do so, all Member States have implemented National WEEE Registries to which each producer must report on the amount of appliances sold (by weight). The Registry calculates each producer’s market share per type of equipment, which becomes that producer’s take-back obligation. The producer is required to report its collection volume to assess compliance. In some countries, individual producers conduct the registration and reporting tasks, while compliance organizations provide these services for the producers in other countries.

Besides the responsibility for managing historic waste, the WEEE Directive also imposes individual producer responsibility that requires a company to takeback its own products sold after August 13, 2005, and to provide a financial guarantee for this responsibility. The WEEE Directive provides flexibility in complying with this responsibility either by joining a collective scheme or through a company-specific scheme. By September 2006, only 12 of the 25 Member States had adequately transposed the Directive to distinguish between collective and individual systems. “Of these 12, only Germany, Italy, and Sweden have mandated an individual financial guarantee for new electrical and electronic equipment placed on the market (regardless of the compliance scheme they have joined).”⁴⁶ All Member States have adopted national legislation to implement the WEEE Directive. In Austria and Ireland, for example, execution started on August 13, 2005. Italy will be the

last country to begin enforcement by January 1, 2008. To inform consumers not to discard appliances into the trash, products since August 2005 must be labeled with a crossed-out-dustbin.

Until 2011, producers are allowed to charge their customers (retailers or wholesalers) a visible fee to recover end-of-life management costs, and retailers are allowed to pass this visible fee onto consumers. However, in most countries the visible fees have disappeared, as the administration has been more costly than the benefits. As of August 2007, only four countries maintained a mandatory visible fee, while in all other countries the producer's take-back costs are internalized into the product price.

Retailers and municipalities must provide collection sites for the return of WEEE at their own expense and with no cost to the consumer. They must also provide educational information for the consumer provided by the producer. However, in most countries the producer compliance schemes contribute to the retailer and municipal efforts. For example, in Germany, producers provide free collection containers to retailers and municipalities, and pick them up from the collection points.

The implementation of the WEEE Directive has sparked the setup of multiple take-back compliance schemes. In almost all countries, several schemes compete with each other, which has significantly reduced the take-back cost, as seen particularly in Austria. These compliance schemes are either established by producers or by companies involved in logistics or waste management. In Europe, a new market for take-back compliance services has recently been developed, spurred by the creation of the European Recycling Platform that stimulated competition and opposed single monopoly stewardship organizations.

The companion RoHS Directive restricts the use of six hazardous substances in electrical and electronic products that are covered by the WEEE Directive. The RoHS Directive was adopted in February 2003, and took effect on July 1, 2006. As of that date, new electrical and electronic products that contain more than the agreed levels of lead, cadmium, mercury, hexavalent chromium (or chromium VI), and polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants are banned from sale in the European Union.⁴⁷ Similar directives have been introduced in other parts of the world. In the U.S. for example, the California Electronic Waste Recycling Act (enacted in 2003) references the RoHS Directive, as does China's equivalent electronics waste management law.⁴⁸

Canadian Product Stewardship

As European producer responsibility systems were evolving, similar waste management dynamics began to unfold in Canada. Faced with dwindling funding and an increase in waste generation, the provinces began to place responsibility on producers to find end-of-life solutions for their products. In 1994, British Columbia, Canada's furthest western province, enacted the country's first producer responsibility legislation, which addressed paint. The province continues to have some of the most progressive product stewardship systems in Canada. Other provinces eventually adapted these systems to develop their own provincial brand of product stewardship.

Canada now has four national stewardship programs—for used cell phones/rechargeable batteries, domestic beer-related packaging, ozone-depleting substances, and obsolete,

unusable, or banned pesticides and pesticide containers. It also has numerous provincial programs on the following items: medications; tires; motor oil, containers, and filters; electronics; paint, stains, and varnishes; lead acid batteries; solvents/flammable liquids, gasoline, and pesticides; and beverage containers. By 2007, there were nearly 50 product stewardship programs throughout Canada.

Canadian product stewardship systems include a wide range of programs that Duncan Bury, Environment Canada, divides into five categories based on the degree of producer responsibility: (1) Government, (2) Quasi-Government—delegated agency, (3) Shared Responsibility—industry and municipalities, (4) Industry “Light,” and (5) Industry “Premium.”⁴⁹

The Government model involves a tax collected from the consumer at the point of purchase. The tax may go into the general fund and be subject to government budgeting pressures with no guarantee that it will all be appropriated to the recycling and management of those products.

The Quasi-Government model involves delegating the program to a quasi-government agency that manages the program through inclusion of a variety of stakeholders. Industry (including manufacturers, importers, and retailers) will play an advisory role only and have no direct responsibility for program funding or operation. ARFs are either set by government regulation or by the quasi-government agency and are dedicated to end-of-life management, although changing and setting fees can be difficult. Commonly, there is no municipal role even though municipalities can offer their collection systems for a fee paid by the agency. There is also no connection between producers and end-of-life management of their products. Therefore, this model is considered as a weak or non-existent producer responsibility system. An example is the Alberta Recycling Management Authority (AMRA) Alberta electronics recycling program.

Under Canada’s Shared Responsibility model, industry and municipalities share operational and funding responsibilities. Industry can be apportioned part of the total system cost of a stewardship/recycling program or part of the operational system. For example, taxpayer dollars might pay for half the system costs, while industry funds the remaining portion. A second example is where municipalities pay for collection, while producers cover transportation and end-of-life management. An example of this model is the Ontario “Blue Box” multi-material recycling program that is operated by municipalities but with 50 percent of its funding provided by Stewardship Ontario, the stewardship organization representing the packaging and printed paper industry. A similar multi-material recycling program model has recently been launched in Quebec with Eco-Enterprise, the industry stewardship organization for that program.

The Shared Responsibility model is often used to share and offset costs of existing programs and avoids replacing one system with another. Since municipalities commonly fund and operate collection facilities under this model, public perception is that municipalities are still 100 percent responsible. In reality, system responsibility is proportionate to the degree of influence for that entity. The large data requirements to establish legitimate costs make this model burdensome, along with the need for trust to be established between partners that must divide responsibilities and costs.

In the Industry Light model, industry is given a legal mandate to operate a producer responsibility program and has control over the funding mechanism, recycling, and promotion. Industry’s ability to negotiate program costs and efficiencies may be limited by man-

dated sole source contracts and other government interventions. These prescriptive elements might delay start-up of the program and compromise producer flexibility. Government retains control over some key issues, such as goal setting, planning, and enforcement. Unless constrained by a government directive, municipalities are able to negotiate industry access to municipal collection systems. An example of this model is the Saskatchewan Waste Electronic Equipment Program (SWEEP) that was directed by the province to negotiate exclusively with SARCAN for the operation of the collection system. This directive reduced competition among end-of-life service providers and did not allow industry the flexibility that likely would have resulted in lower costs.

In the Industry Premium model (or full producer responsibility), industry has full responsibility to fund and operate the program from collection through end-of-life management. Industry sets fees, determines the collection mechanism, promotes the program, and contracts for recycling and other services. Government's role is to provide high-level policy direction, set objectives, and enforce against non-compliance. Under this model, industry decides whether it wants to negotiate with municipalities for their collection services. This model requires performance goals and reporting to ensure that government objectives are being met. Examples of this model are the British Columbia product stewardship programs for paint, pesticides, oil, flammable liquids, solvents, beverage containers, pharmaceuticals, tires, and electronics. The British Columbia electronics program sought bids from multiple collection and recycling service providers, and such competition should lead to reduced service costs.

Both the Industry Light and Industry Premium models could include systems that contain a fee, whether visible or invisible, as long as there is significant industry responsibility. However, Canadian systems are striving to move toward product stewardship systems that include the costs of end-of-life management in the product price in the same way as manufacture, distribution, and advertising. Canadian systems are also striving to enhance the premium model by supplemental legislative and regulatory approaches that drive design, much like the WEEE and RoHS directives work together to achieve end-of-life management and design changes. Canadian approaches seek the use of several system tools to develop a full product stewardship program.

Importing EPR to the U.S.

The WEEE and RoHS directives became standards for the type of producer responsibility systems that were sought in the United States many years before their actual enactment dates. While the WEEE Directive addressed the end-of-life management of products, RoHS focused on product design and the elimination of hazardous materials. While these directives changed the way manufacturers designed their products worldwide, they did not automatically result in the transfer and acceptance of producer responsibility in the United States. Product stewardship was a new concept for all stakeholders, requiring a steep learning curve, along with a translation into the U.S. cultural and economic context. In addition, manufacturer executives from the United States often did not have the in-depth knowledge of producer responsibility systems that their European counterparts possessed, even if the same companies were operating under the European systems.

For a market-based U.S. economy that is home to Milton Friedman and is the birthplace of capitalism, the European systems appeared to put too much power in the hands of government at the expense of corporations. In Europe, the EU and its member countries have strong political support from citizens. The governments led with a matured view of waste management fueled by restrictions on disposal space, and disposal costs that soared sooner than rates in other countries. By contrast, in the United States, the federal government has traditionally left waste management decisions to state and local government, many of which have large land masses available for landfills, with correspondingly lower disposal costs. The wide-open American frontier mindset, coupled with a reluctance to interfere with corporate operations and profits, delayed the acceptance of a system that put unprecedented responsibility for waste management on product manufacturers and retailers. Time was needed for these concepts to be embraced by the U.S. public.

The Center for Clean Products and Clean Technologies at the University of Tennessee hosted the country's first academic symposium on EPR in November 1994. In cooperation with U.S. EPA, this initiative sought to extract from the European context EPR policies for implementation in the U.S.⁵⁰ In 1995, the President's Council on Sustainable Development adopted "extended product responsibility" as "a voluntary system that ensures responsibility for the environmental effects throughout a product's life cycle by all those involved in the life cycle."⁵¹

In 1994, the Organization for Economic Cooperation and Development (OECD) started a multi-year research program on Extended Producer Responsibility that culminated in a Guidance Manual for governments (OECD 2001) that acknowledged that responsibilities under EPR are inherently shared by retailers, distributors, and consumers. However, the first guiding principle of EPR policies and programs was "to provide producers with incentives to incorporate changes upstream at the design phase in order to be more environmentally sound."⁵²

While federal officials and academics from the United States debated EPR concepts, state and local solid waste officials in the United States were forging their own paths toward product stewardship. In the late 1990s, faced with decreasing waste management budgets, increasing waste, reduced recycling, and an increase in toxic products, state and local officials unknowingly began to trace the steps of their Canadian and European colleagues. They targeted hazardous products, and at the top of the list were heavy metals such as mercury and cadmium. As states began to initiate legislation that would place product end-of-life responsibility on producers, industry began to respond.

Voluntary Industry EPR Program – Rechargeable Batteries

In 1995, the Portable Rechargeable Battery Association established the Rechargeable Battery Recycling Corporation (RBRC) to manage a program for the recovery and recycling of nickel-cadmium (Ni-Cd) batteries. RBRC is a non-profit corporation composed solely of battery manufacturers. Its voluntary take-back program, which began in 1996 under the name *Charge Up to Recycle!*[®], was the first national, industry-wide producer responsibility program to be implemented in the United States. Around this time, the U.S. EPA estimated that Ni-Cd batteries comprised less than 0.1% of municipal solid waste in the U.S. by weight but accounted for 75% of its cadmium content.⁵³

RBRC's effort was prompted by eight state laws with take-back requirements for rechargeable batteries, growing interest in Europe to ban cadmium from rechargeable batteries, and the passage of comprehensive legislation in Minnesota and New Jersey. "Both states require that rechargeable batteries be easily removable from products, be labeled as to content and proper disposal, and be banned from the municipal waste stream. In addition, they require manufacturers to take rechargeable batteries back at their own expense for recycling or proper disposal."⁵⁴

The RBRC program was expanded to include Canada in 1997, and further broadened in scope to include all small rechargeable batteries in 2001, including Ni-Cd, Nickel Metal Hydride (Ni-MH), Lithium Ion (Li-ion), and Small Sealed Lead-Acid (SSLA). In 2004, RBRC enlarged the collection program to include used cell phones, thereby changing the program name to *Call2Recycle*TM.

RBRC funds the program by licensing the right to use the organization's chasing arrows recycling logo on products and packaging. Manufacturers contribute funds to RBRC based on their market share. These funds are used to conduct an education campaign and to establish collection sites at retail outlets, municipal locations, and commercial establishments.⁵⁵ The program is free for the consumer and for collection sites, which use special prepaid shipping containers provided by RBRC.

To ensure that the RBRC recycling program became the national model, the battery industry sought federal legislation that facilitated its national rollout. The Mercury-Containing and Rechargeable Battery Management Act ("The Battery Act") became law on May 13, 1996. "This legislation reduce[d] barriers to the battery collection and recycling system and avoid[ed] the need to deal with inconsistent legislation in different states."⁵⁶ Although the federal Universal Waste Rule (UWR)⁵⁷ was in effect at this time, each state needed to adopt the UWR, making implementation of the RBRC cumbersome. The Battery Act established national, uniform labeling requirements for Ni-Cd and certain SSLA rechargeable batteries, and mandates that they be "easily removable" from consumer products. The Act also made the UWR immediately effective in all states, rather than having to wait for them to adopt it one by one. While the RBRC program is voluntary for retailers, both California and New York City passed laws requiring retailers to collect and recycle rechargeable batteries. The batteries are recycled at a metals recovery facility in Pennsylvania. The metals, such as nickel and cadmium, are recovered; the nickel is used to make stainless steel and the cadmium is used to make new batteries.

The RBRC program was an important step for industry in the U.S. since battery manufacturers took full responsibility for their products at end-of-life. The program has also illustrated serious shortcomings of voluntary programs that have no mandated performance goals or reporting requirements and therefore lack accountability.⁵⁸ The RBRC system provides an extensive network of collection opportunities for residents to bring spent rechargeable batteries for recycling. At the same time, RBRC provides public education and brands the program with the face of "Al the Tool Man" from the television show, *Home Improvement*. However, a 2004 survey conducted by INFORM, Inc. on the RBRC program found that many stores listed as drop-off sites did not know about the program. Others did not exist at the address given, and few consumers were aware of the program.⁵⁹

While the number of batteries collected each year increases, there is no evidence that the program in North America has succeeded in capturing anywhere near a majority of batteries that need to be collected. In fact, a 2007 Canadian study⁶⁰ reported that the recycling

rate in the RBRC-run collection program for all secondary (rechargeable) batteries generated in Canada in 2005 was 5.6 percent.

Making Mercury Products a Priority

In the early 1990s, when the public became more aware of the hazardous products in stores and in their homes, HHW managers had not yet begun to differentiate risks posed by the multitude of toxic products on the market, which became a critical distinction as budgets for HHW programs began to shrink. At the outset, programs typically encouraged residents to collect all products. Since most collections were one-day events, funding decisions were made based on the number of cars and not on the contents of products brought by residents. If a car was turned away, there was no way of knowing if it contained a jar of elemental mercury, latex paint, or an empty bottle of hydrogen peroxide.

One of the first states to prioritize waste streams was California, which set up “ABOPs,” which were collection sites that focused on antifreeze, batteries (lead acid), oil, and paint. Another early advocate for HHW product prioritization was Massachusetts. In the state’s first comprehensive plan for managing hazardous household products in 1996,⁶¹ Massachusetts set a policy of phasing in the collection of priority waste streams into three categories: high volume materials, universal waste materials, and low volume materials. High volume materials included automotive products (used oil, oil filters, antifreeze, auto batteries, and gasoline), leftover paint products, and household batteries (Ni-Cds and button cells). Universal waste materials included certain mercury batteries, thermostats, and pesticides,⁶² and low volume materials included solvent-based glues, metal cleaners, toxic art supplies, chemistry sets, photographic chemicals, and other HHW that pose environmental and health risks in relatively small quantities.

With the release of a seminal document in 1996 by state officials, *Mercury in Massachusetts: An Evaluation of Sources, Emissions, Impacts, and Controls*,⁶³ mercury products became a top priority for the state, including thermometers, thermostats, fluorescent lamps, and household batteries (which, at the time, was the leading source of mercury from products). In-state mercury releases were estimated to contribute 41 percent of total mercury releases from the air to land and water in the state. Mercury-containing products burned in municipal waste combustors were estimated to contribute the largest share of the in-state mercury releases. These mercury emissions entered already stressed water bodies. With over 70 percent of its solid waste being combusted,⁶⁴ and with fish advisories issued on a significant number of state water bodies owing to mercury pollution, Massachusetts set out to remove mercury from the waste stream.

NEWMOA Mercury Products Legislation

Massachusetts was not alone in its focus on mercury products. States in the Northeast and Midwest (Great Lakes Region), supported by the Mercury Policy Project, Clean Water Action, and other environmental groups, began to lead a national effort to remove mercury products from the waste stream. In 1998, the Conference of New England Governors and Eastern Canadian Premiers (the “Conference”) developed a Mercury Action Plan to reduce

mercury pollution in the region. To assist the New England states and the Eastern Canadian provinces in implementing the Action Plan, the conference asked the Northeast Waste Management Officials Association (NEWMOA) to develop model legislation that would synthesize approaches and provide a comprehensive and consistent framework for managing mercury-containing wastes.

Starting in 1999, the states in the Northeast and other parts of the country actively began to use NEWMOA Mercury Education and Reduction Model Legislation to pursue enactment of legislation focused on reducing mercury in products and wastes. The legislation is based on producer responsibility and includes restrictions on the sale of certain mercury-added products, phase-outs and exemptions, labeling, a disposal ban, and a manufacturer collection requirement that reads (in part): “The cost for the collection system must be borne by the manufacturer or manufacturers of mercury-added products. Manufacturers may include the cost of the collection system in the price of the product and may not assess a separate fee for the use of the collection system.”^{65, 66}

In 1998, Massachusetts went one step further by limiting the amount of mercury emissions from solid waste combustion facilities and imposing a requirement that all solid waste combustion facilities remove mercury-containing products prior to combustion. This regulation,⁶⁷ one of the first in the nation, forced companies to set up product take-back systems for the collection and recycling of mercury-containing HHW that, for years, went into the household garbage. As a result of this regulation, the state’s subsequent mercury products law (modeled after the NEWMOA model bill), and the closing of several solid waste incinerators, the state was able to show a significant reduction in mercury pollution in 2007 in its water bodies, particularly in the northeastern part of the state.⁶⁸

Voluntary Industry EPR Program—Thermostats

In response to rising concerns over mercury and the threat of legislation in multiple states, a second voluntary industry-wide take-back program was launched. To increase the collection and recycling of retired mercury thermostats, the three largest mercury thermostat manufacturers—Honeywell, General Electric, and White-Rodgers—established a non-profit entity in 1998 called the Thermostat Recycling Corporation (TRC). A typical mercury thermostat contains 3 grams of mercury that can be released into the environment if the thermostat is broken or improperly disposed.⁶⁹ The program began in nine states at its inception and became a national program (excluding Alaska and Hawaii) in 2001. The number of thermostats and the amount of mercury collected and recycled annually has increased over time as the program has expanded and taken root.⁷⁰

The TRC program was preceded by a take-back system that Honeywell had established in Minnesota after the state legislature enacted a law in 1992 prohibiting the disposal of mercury thermostats, assigning responsibility for compliance to contractors removing thermostats from households, and requiring manufacturers to provide education and incentives to encourage recycling. Honeywell established several take-back programs to serve a variety of customers. A wholesaler-based, reverse distribution system for heating and cooling contractors was initiated in 1993; a homeowner mail-back program began in 1994; and collections from HHW centers began in 1995. The Honeywell mail-back program was

never expanded nationally and was subsequently terminated by the company in 1999 based on cost.⁷¹

TRC used Honeywell's experience, along with market research, to design a program to serve the heating and cooling wholesaler/contractor distribution chain, which distributes and installs 75 percent of all thermostats.⁷² TRC believed that this supply chain could retrieve the greatest number of thermostats. Homeowners, who replace thermostats with units purchased at retail stores, account for approximately 25 percent of thermostats installed. TRC did not provide options for homeowner collection until later in the program, and discontinued all Honeywell-initiated programs except the wholesaler-based reverse distribution system.

In 2004, following concerns about the TRC program performance expressed by state and local governments and a critical report published by NEWMOA,⁷³ the Product Stewardship Institute began a national dialogue to increase the recycling of mercury thermostats and explore ways to reduce the continued production of mercury thermostats.⁷⁴ After conducting extensive interviews with TRC, thermostat manufacturers, and other key stakeholders, PSI developed a Background Summary Report that highlighted the problems, key issues, and potential solutions to managing mercury thermostats. PSI convened two stakeholder meetings in July and October 2004, after which the multi-stakeholder group reached agreement on seven priority initiatives.

Dialogue participants, including Honeywell and TRC, agreed to expand the TRC program to wholesaler chain stores; begin collecting thermostats at contractor locations; begin collecting at HHW facilities nationwide (following a pilot project); and test a financial incentive on contractor recycling behavior in two states. In conjunction with PSI, they also created a comprehensive model thermostat program to provide states with a menu of legislative options from which to choose. As of 2007, 10 states restricted the sale of mercury thermostats,⁷⁵ and several followed Maine's lead and introduced legislation in 2007 to maximize the recovery of mercury thermostats following replacement. The two biggest legislative issues that remain to be resolved include performance goals and financial incentives for households and contractors.

National Carpet Recycling Agreement

As states in the Northeast and Midwest targeted mercury products, another Midwest initiative sought to capitalize on existing product stewardship efforts by several carpet manufacturers. In 1999, the Midwestern Workgroup on Carpet Recycling, spearheaded by the states of Minnesota, Iowa, and Wisconsin, with involvement from the U.S. EPA, began a multi-stakeholder dialogue. The regional effort grew into a national initiative over the two-year dialogue. The resulting National Carpet Recycling Agreement was signed on January 8, 2002, by a consortium of industry representatives, including carpet and fiber manufacturers, the Carpet and Rug Institute, state and local government agencies, nongovernmental organizations, and the U.S. EPA.⁷⁶

The agreement set a nationwide goal of 40 percent diversion of carpet from landfills by 2012, including a 15 percent increase in recycling. The agreement outlines the roles and responsibilities for the Carpet America Recovery Effort (CARE), an industry-led, third party organization that assists in the development of a carpet collection and recycling

infrastructure, and identifies viable markets for post-consumer carpet. CARE publishes an annual report outlining the results of its efforts. By helping to promote markets for secondary carpet fiber, CARE is seeking to divert carpet from landfills and incinerators into value-added products and to build the collection infrastructure to eventually support carpet-to-carpet recycling.⁷⁷

National Electronics Product Stewardship Initiative (NEPSI)

In 2000, the Product Stewardship Institute identified electronics as the nation's top product in need of an end-of-life management strategy following its survey of state officials. State and local government agencies were concerned about the hazardous components of computers and televisions, the rapid obsolescence of these products, and the significant volume they represent in the waste stream. PSI coined the term National Electronics Product Stewardship Initiative (NEPSI) and began to coordinate state and local agency interests in a product stewardship solution.

The creation of NEPSI caught the attention of electronics manufacturers and others, and in early 2001, the U.S. EPA spearheaded the country's first national dialogue on electronics management. The dialogue included 45 representatives, with about a third each from government, industry, and other stakeholder interests. During the three years of meetings, the Electronic Industries Alliance (EIA) represented manufacturers, while PSI coordinated participation and comment from over 20 state agencies and numerous local governments. The Silicon Valley Toxics Coalition played a significant role representing environmental interests. The meetings were facilitated by the Center for Clean Products and Clean Technologies at the University of Tennessee.

Although the NEPSI dialogue did not result in a national agreement, it was a significant turning point in the United States. Since it was the first large multi-stakeholder product dialogue, it attracted national attention and a large commitment of resources. NEPSI also became the first dialogue, along with the national carpet discussions, in which industry consciously committed to take a product stewardship approach. This transformation took several years to evolve and was heightened in response to state legislative pressure that started to increase as the bid for a national negotiated solution started to wane.

As a result of the increased national attention, companies began to compete on voluntary take-back initiatives. These systems became significant transitional solutions offered by companies to meet the growing expectation for producer responsibility. HP, Dell, and a coalition of ARF supporters led by Panasonic, Sony, Sharp, and Philips were the first to offer free periodic collections of scrap electronics. By 2006, a number of electronics companies offered some type of end-of-life collection program for their products, with some providing money-back coupons on the sale of new equipment. In that year, Dell became the first company in the United States to collect its own end-of-life equipment for free from consumers. In August 2007, Sony followed with a collection program in conjunction with Waste Management to collect Sony products for free at specific locations, while other companies still charged the consumer for take-back service.

In 2004, stakeholders negotiated a formal resolution facilitated by EIA, PSI, and the University of Tennessee. The resolution outlined a scope of products to be covered by federal legislation and a hybrid financing system that would start with an ARF to cover

historic and orphan products but transition to producer responsibility at a later date based on a series of criteria to be determined. The resolution put a halt on further discussions until manufacturers could come back with a viable system to which they all agreed.

The next time that a national proposal was floated by a coalition of manufacturers was 2007. By then, NEPSI had disbanded and states focused on passing their own legislation. The manufacturer ARF coalition that was formed during the NEPSI discussions successfully passed the first electronics end-of-life management law in the country, the CA ARF. Following this development, multi-stakeholder coalitions formed in each state to challenge ARFs and push for producer responsibility. HP developed model state legislation and worked with influential environmental groups, including the Silicon Valley Toxics Coalition, Computer TakeBack Campaign, Washington Citizens for Resource Conservation, and the Natural Resources Council of Maine, as well as charities, retailers, and governments, to pass electronics legislation.

In 2005, Maine became the first state to pass a law based on producer responsibility. Since local governments assumed the collection responsibility, it was called “partial producer responsibility” in the U.S. Maryland passed the third electronics law, which was partly funded by a manufacturer registration fee. When Washington became the fourth state with an electronics recycling law, it signaled a clear national trend toward full producer responsibility. By 2007, nine states passed electronics recycling laws, with only the first one being an ARF, while the rest are some version of producer responsibility. Two, however, only cover computers and not televisions.⁷⁸

The NEPSI process laid the foundation for each of these state laws, as most of the participants learned about the positions and interests of manufacturers, retailers, recyclers, and other stakeholders through the many NEPSI meetings. Every aspect of the electronics end-of-life management issue was discussed during these meetings, including the scope of products to be covered, reuse and recycling infrastructure, financial payments to provide incentives for collection, financing system options, environmentally sound processing standards, performance goals, creation of a stewardship organization, and federal preemption of state laws.

As a result of the numerous NEPSI interactions, strong relationships formed among stakeholders that led to important spin-off projects and initiatives outside the process. For example, NEPSI inspired the development of EPEAT and other procurement related initiatives. In addition, Northwest Product Stewardship Council member agencies that participated in the NEPSI process launched the Take it Back Network, composed of small retailers and other businesses that provided collection service and demonstrated the convenience and practicality of retail take-back.

To help fill a void by an absence of retailer participation in NEPSI, U.S. EPA initiated a series of key retail pilot projects with Staples, Office Depot, and Good Guys that lay the foundation for retail participation in electronics collections.⁷⁹ These projects were part of EPA’s wider Plug-In To eCycling program, which is a partnership between EPA and consumer electronics manufacturers and retailers to offer consumers more opportunities to donate or recycle their used electronics.⁸⁰ In 2007, Staples became the first retailer to provide significant electronic recycling services at all of its stores nationwide after having worked with PSI and the Take it Back Network to pilot the program. Finally, the National Center for Electronics Recycling was formed to help fulfill information needs identified by

NEPSI participants. These examples are only a sample of the many activities that built on the knowledge and relationships developed through NEPSI.

This first national product stewardship dialogue has become a reference point for new initiatives on other product categories, as well as a background for continued work on national electronics legislation. While states without electronics legislation continue to push for their own state laws, many groups continue to seek federal legislation that will bring electronics end-of-life management systems to all states in the country. In addition, many that participated in NEPSI have provided key leadership and experience to other emerging stewardship initiatives.

The Growth of U.S. Product Stewardship Organizations

Northwest Product Stewardship Council

Following a decade of striking out on their own, and in the footsteps of the regional mercury products efforts, states began to mobilize for the specific purpose of establishing multi-state product stewardship agreements. “In 1998, aware of a growing international interest in and implementation of EPR, a small committed group of solid waste professionals from government agencies in the greater Seattle area began meeting to learn more about this policy tool, and how it might be used domestically.” This group of professionals chose to call themselves the Northwest Product Stewardship Council (NWPSC) because “product stewardship” encompassed both product and producer responsibility, and was easier for the public to understand.⁸¹ The U.S. EPA provided key support for the council.

The group got a significant early boost when the Seattle City Council adopted a new solid waste plan called “On the Path to Sustainability,” “... which adopt[ed] zero waste as a guiding principle, and product stewardship as one of the programs for achieving future goals.” Such visible policy support in conjunction with growing participation from other local governments in Washington and Oregon justified staff and funding for product stewardship, which was critical to the growth and coordination of the regional effort.⁸² The NWPSC’s initial focus was on the purchase of computer (and related) equipment with environmental attributes, and the development of purchasing guidelines for procurement officials. These efforts pushed for design changes through market dynamics.

In April 2000, the council held the country’s first regional product stewardship conference, which attracted nearly 200 attendees from government, business, and non-profit organizations. The goal of the conference was to “... expand awareness of product stewardship and develop a structure in which ongoing dialogue and action could continue.”⁸³ In addition to computers, the council targeted televisions, tires, medical industry waste, apparel, and retail grocers as other priority products and sectors. By 2007, the NWPSC refocused its priorities on the following projects: electronics, pharmaceuticals, beverage containers, mercury products, paint, and tires.⁸⁴ The council maintains a loose-knit structure that allows it the flexibility to pool resources to fund product-focused projects. It is also increasingly involved in policy development, and was a critical player in developing and passing Washington state’s product stewardship-based electronics recycling law. The council has become a model for other state and regional councils around the United States. One of its core strengths is its ability to conduct important pilot projects and initiatives with

broad-based regional support that can be replicated in other U.S. regions. The council also coordinates the regional input from multiple agencies in national dialogues, which allows state and local officials to participate in numerous activities without over-burdening any single entity.

North American Hazardous Materials Management Association

As the Northwest regional effort was blossoming, a 1999 conference of the North American Hazardous Materials Management Association (NAHMMA) hosted several speakers from the U.S., Canada, and Europe on the topic of EPR. Founded in 1993, NAHMMA grew to 500 members in 2007, and is dedicated to pollution prevention and reducing the toxicity of municipal waste streams. The conference highlighted the efforts of British Columbia's impressive product stewardship programs.

The introduction of these product stewardship ideas to NAHMMA conference participants caught hold of a large group of U.S. state and local HHW managers who were struggling with collection rates of an estimated 3 to 5% on even highly hazardous products. These officials were ripe for a new solution that would solve their dilemma of limited government funds while faced with increasing public demand for HHW services.

One state official from Massachusetts responsible for HHW management realized that state and local officials around the country, acting independently, could not command the attention of industry. However, a group of government officials acting together would have greater leverage in convincing manufacturers and retailers to take greater responsibility for the lifecycle impacts of their products. State and regional efforts were essential, but so was a national network that would link not only government officials across the nation but all those working toward the goal of sustainability and better product management—from industry, environmental groups, academia, and other sectors.

Product Stewardship Institute, Inc.

In December 2000, the Product Stewardship Institute (PSI), a national non-profit membership-based organization, was founded to serve as the collective voice of state and local governments across the country on product stewardship issues. As a kick-off to its creation, PSI coordinated the country's first national forum for government officials to discuss product stewardship policies and programs. Over 100 government officials from 20 states attended the two-day national Product Stewardship Forum. Prior to the forum, PSI surveyed state officials across the country to determine their five top waste management priorities for which a product stewardship approach was recommended. These five products—electronics, paint, mercury-containing products, pesticides, and tires—became the focus of the forum agenda. PSI has since worked on the following additional product sectors: mercury thermostats, fluorescent lighting, paint, pharmaceuticals, radioactive devices, gas cylinders, pesticides, tires, beverage containers, and phone books.⁸⁵

PSI's mission is to "... pursue initiatives to ensure that all those involved in the lifecycle of a product share responsibility for reducing its health and environmental impacts."⁸⁶ PSI has a Board of Directors composed of state and local government officials and an Adjunct Council composed of businesses, environmental groups, and other organizations.

PSI's five-point *Principles of Product Stewardship* serves as a guiding compass for the organization and its members. These *Principles* were developed in 2001 by a consensus of government officials and were synthesized from policy efforts of the NWPSC, Minnesota, Oregon, U.S. EPA, and international EPR agencies and organizations. The five principles include: (1) shared responsibility, (2) internalizing a product's lifecycle cost into the purchase price, (3) providing incentives for manufacturers to make cleaner products and follow sustainable management practices, (4) flexibility to achieve goal-oriented results, and (5) specific roles for industry, government, and consumers. PSI's *Principles of Product Stewardship* became a simple but effective way to spread the concept of product stewardship, as many influential organizations and agencies adopted these *Principles* in whole or in part and, in turn, spread the word further to their members.⁸⁷

PSI brings priority waste management issues to the attention of manufacturers and retailers, and seeks collaborative solutions through a mediated series of meetings. PSI has developed a four-phased model for engaging stakeholders, involving research, dialogue, implementing agreements, and evaluating outcomes.⁸⁸ Through the PSI dialogue process, stakeholders agree on the basic problem before determining the dialogue focus and goals. PSI facilitates discussions on issues that lead to prioritized strategies on which agreements are based. Stakeholders jointly implement and evaluate most dialogue projects.

By August 2007, PSI membership included 40 states and 46 local governments, representing over 80 percent of the U.S. population.⁸⁹ This broad-based support ensures that product stewardship and its message of fiscal and environmental relief are well understood by those who establish our nation's environmental laws and policies. PSI has developed a multi-stakeholder network of government, industry, and environmental representatives, and fosters communication with these groups through an annual forum, conference calls on a myriad of timely issues, and other means.

State and Regional Councils

As product stewardship spread throughout the country, manufacturers and retailers began to engage with other stakeholders, seeking the elusive balance between their responsibility to shareholders and their societal responsibility to eliminate the lifecycle impacts caused by their products. For most, it was a quick lesson in options to reduce waste, reduce the use of hazardous materials in product manufacture, take back their products, and change the way that recycling programs were financed. The time became ripe for state and local governments to push for a stronger EPR model, one that directly involved manufacturers and provided them with financial incentives to change the design of their products.

In 2003, the Product Policy Institute (PPI) was founded to "advance sustainable production and consumption and good governance." PPI is a not-for-profit research and communication organization that believes that government should set and enforce sustainable industry performance standards that are based on producer responsibility, a polluter pays approach, and precaution.⁹⁰ Working with local governments in California, PPI assisted in the formation of the California Product Stewardship Council (CPSC) in 2006, which was modeled after the NWPSC and the British Columbia Product Stewardship Council. CPSC galvanized local government support for producer responsibility, and prepared these agencies to influence state, regional, and national policy, at times in conjunction with PSI and

other organizations. By 2007, other regions of the country began to mobilize support for their own regional product stewardship councils, including the Midwest and Northeast.

Topics in Product Stewardship and HHW

Framework Legislation

Initial product stewardship efforts involved a product-by-product approach. Stakeholder groups were formed for each product topic (*i.e.*, mercury thermostats, paint, or electronics), and focused on developing a system for managing each product separately. Some of the program elements developed to manage these products are similar for most products, although other elements are unique to a product and its particular set of stakeholders. The next generation of product stewardship systems will seek ways to take advantage of similarities among products to create efficiencies, and to identify those elements that require a product-specific approach.

British Columbia passed a framework Recycling Regulation in 2004 that includes nine product categories, including HHW.⁹¹ The Recycling Regulation was enacted under the authority of the Environmental Management Act and provides a framework for EPR, including core requirements applying to all programs and schedules for the implementation of each product category covered by the regulation. The governing political party (cabinet) can add product categories without new legislation. The new regulation unifies and coordinates key elements (*i.e.*, funding, level of producer accountability, performance measures, etc.) that were previously included in separate regulations for each product category. Having a framework regulation makes it easier to add new product categories, and it creates a level playing field between programs as all producers are operating under the same rules.

The Canadian province of Manitoba also drafted a series of stewardship regulations in January 2006 that identified the need for a common strategy for managing all HHW, along with electronics, tires, and packaging/printed paper.⁹² Green Manitoba, an agency of the provincial government, is scheduled to finalize the regulations by September 2007. Manitoba's authority comes from its Waste Reduction and Prevention (WRAP) Act that enables the Minister of Conservation to enact regulations by Order in Council. It requires the development of an annual WRAP Strategy Report and provides for the designation of products or materials for waste reduction responsibilities. A variety of economic instruments and producer responsibility requirements can be established under the Act, including product levies, dedicated funds, deposits, and return-to-retail requirements.⁹³

State and local agencies in the U.S. have also recognized the need to develop framework legislation, with the Northwest Product Stewardship Council governments and the state of California taking a lead. The advantage of a broad framework is that a state legislature can approve an overall approach to product stewardship that will not require repeated trips to the legislature. Instead, adding product categories and program details could be left to administrative agencies. Such an approach will save time for all parties, which will translate into greater environmental protection at lower cost.

Mercury Stockpiling – Eliminating the Toxic Product Loop

As scientists and engineers find substitutes for toxic materials in products, our society will begin to reduce the mining and generation of these materials, use up what we have, and stockpile the remainder. However, hazardous materials removed from end-of-life products may still become ingredients in new products. It is ineffective to spend large sums of money to divert hazardous products from the waste stream if the toxic material is being used in a new product and sent back into commerce. To reverse this trend, congressional legislation has been introduced to develop a permanent repository in the U.S. for the stockpiling of mercury and to ban the export of mercury from the U.S., including mercury-containing products collected in HHW programs.⁹⁴ Mercury is mined worldwide, increasing the amounts entering the market. Mercury is also reintroduced into the market through municipal programs that collect mercury thermostats, fluorescent lamps, auto switches, dental amalgam, and other products. Companies that recycle these products distill the mercury and sell it on the global market. Other hazardous household products might also require a similar stockpiling approach, including rechargeable batteries (nickel, cadmium, other metals) and automobile batteries (lead).

Institutionalizing Change in Agencies and Corporations

Product stewardship is a new concept. It requires all of us to think differently. Instead of government agencies issuing unilateral legislation or regulations for response and comment, product stewardship is best implemented as a collaborative strategy. It is a new way of doing business, and it requires that stakeholders have faith in a process that will result in the best policies, regulations, laws, or programs. Any break in communication can undermine the initiative.

For product stewardship to be fully integrated throughout a company or agency, it needs support from those at the top, as well as from those who will implement the initiatives, and everyone in between. Sudden changes in staffing, especially those in high-level decision-making positions, can prove to be detrimental to product stewardship efforts. Since collaborative approaches are based on relationships, it is important that, when people change positions or leave a company or agency, new staff pick up where others leave off. These sudden changes in company or agency positions have been a significant barrier to multi-stakeholder negotiations, which often involve incremental progress over several years. These changes have, at times, led to distrust, reversing years of progress. The situation can often be avoided by a policy or declaration from a company's board of directors or CEO, a Memorandum of Understanding (MOU) by a multi-stakeholder dialogue group, or from an agency's top environmental official.

The states of Minnesota and Oregon were the first to develop agency-wide policies in the U.S. that defined product stewardship and set out a plan for managing waste streams in a new way. Minnesota attempted to codify this approach in legislation, which was eventually defeated, although it remains as a guiding principle for agency staff. In 2007, the California Integrated Waste Management Board (CIWMB) became the first state agency to take a strong producer responsibility approach by issuing a policy (Strategic Directive 5) that directs staff to pursue strategies that will require manufacturers to develop systems

for the take-back of their products at the end of their life. The directive reads, in part, “It is a core value of the CIWMB that producers assume the responsibility for the safe stewardship of their materials in order to promote environmental sustainability... The CIWMB will seek legislation to foster ‘cradle-to-cradle’ producer responsibility.”⁹⁵

On the corporate side, the National Paint and Coatings Association officially passed a Resolution of its Board of Directors in March 2007 that stated the intention of paint manufacturers to take responsibility for leftover paint management, with certain limitations to be further negotiated. The NPCA resolution was industry-wide and gave government officials the assurance they needed to continue negotiating instead of moving toward legislative initiatives. The resolution followed four years of multi-stakeholder negotiations that included two MOUs signed or endorsed by over 60 entities engaged in the Paint Product Stewardship Initiative.

Product Stewardship, HHW, and Global Warming

In 2007, public attention finally turned toward the potential impacts of global warming, and residents began seeking ways to take personal action to reduce their own impacts. This dynamic creates the opportunity for residents to understand the wider impacts that their consumption habits have on the environment. A much-needed “tipping point” has occurred in public consciousness.⁹⁶

Awareness of the issue presents an opportunity for policies to be developed for products that impact global warming. One of the first actions that consumers can take is to change their light bulbs from incandescent to fluorescent. Stepping into the fray, Wal-Mart announced plans to sell millions of compact fluorescent lamps (CFLs) as a gesture to do its part to reduce global environmental impacts. The use of fluorescents will aid in reducing greenhouse gases and mercury emissions since less mercury-containing coal will need to be burned to produce the energy needed to use the new light bulbs.⁹⁷ The problem is that the fluorescent bulbs contain mercury, and neither Wal-Mart nor other retailers promoting their sale initially informed the public of the need to collect these products when they became waste.

Within a few months of Wal-Mart’s sales blitz, numerous initiatives started to address the need to remove CFLs and other fluorescent lamps from the waste stream. EPA held meetings with retailers and manufacturers; the Vermont Department of Environmental Conservation completed a successful pilot project with Ace Hardware and other retailers; the Maine Department of Environmental Protection started statewide retail collections; the Product Policy Institute, in conjunction with the Northwest Product Stewardship Council, the British Columbia Product Stewardship Council, and the California Product Stewardship Council, wrote a letter to Wal-Mart seeking a manufacturer take-back program; Wal-Mart conducted a five-state collection pilot project; and the Product Stewardship Institute began a national multi-stakeholder dialogue to address a product stewardship solution for all fluorescent lighting. HHW program managers might do well to incorporate global warming messages when the connection can be made between hazardous household products and energy use, conservation, or global impacts. Fluorescent lamps provide the perfect opportunity to engage stakeholders working on global warming with those working on HHW and product stewardship.

Product Stewardship, HHW, and Environmental Groups

Surprisingly, government officials, and not the environmental community, educated the public about HHW impacts. For years, HHW program managers struggled within their own professional community about how to fund and manage programs. Early attempts to engage environmental groups on product stewardship issues were also difficult, as these groups were working on global warming, international environmental issues, and/or large-scale problems, and staff members were stretched thin. Few could be enlisted for national product stewardship dialogues, including NEPSI, which was represented for most of the dialogue by a single but influential organization, the Silicon Valley Toxics Coalition. This group has long been a leader on electronics management issues.

The dynamic is changing, as environmental groups have become major proponents of producer responsibility and have been vocal on both statewide and national initiatives. The growth in the ability of these groups to engage on the issues has created opportunities for other organizations and government agencies to develop strong coalitions in support of product stewardship policies. In addition, as attention has shifted to the role that consumers can play in reducing greenhouse gases, such as buying CFLs, the environmental community is expected to create more partnerships with government and industry stakeholders.

Often though, environmental groups are hesitant to participate in stakeholder dialogues since much of their power is derived through legislative initiatives or high-visibility unilateral tactics. The engagement methods these groups choose will continue to be diverse, at times collaborative and at other times combative, depending on the issue and the stakeholder group.

Corporate Change – By Company and Industry Sector

As mentioned previously, changing corporate America is akin to turning a ship in the harbor: it must be done slowly and carefully, or great collateral damage can occur. But if done right, it can be a smooth experience for all. The barriers that must be overcome are significant, and negotiations require an ongoing positive attitude that change can occur in a way that does not wreak havoc in the marketplace. Government regulations that are barriers must be changed. Long-standing ways of doing business must slowly be undone, and remade.

Corporate change will often take place in two ways. First, it requires one or more industry leaders that understand the business opportunities and innovations needed to service a new market, a new trend, or new consumer demand. Second, it very often requires industry-wide communication through trade associations. These two elements often need to be present for the successful integration of product stewardship in an entire industry sector. In some cases, an industry leader will step out to develop a pilot project to show that a particular program can be accomplished. This was the case when Staples successfully implemented and documented its pilot computer take-back program in 24 retail stores and with 14 commercial customers in the northeast in 2004. Other change occurs through association leadership, such as the National Paint and Coatings Association, which led the industry to develop two MOUs. However, strongest change occurs when companies

within a sector take leadership roles but remain a part of the association and the overall initiative.

Corporate change becomes fully integrated when a company's product end-of-life management program becomes a core business interest. Once companies understand this business aspect not as a burden but as a way to meet consumer demand and take a step toward sustainability, they will manage their responsibility with the same efficiencies and best management practices as they manage their core business.

Green Chemistry

Product stewardship began as a means to address the lack of funding for end-of-life management of wastes. The first steps were like putting a finger in a dike to stop the gush of wasted water. A next big step for this movement is to change product chemistries and design better products. There will be no more after-the-fact-scramble to figure out how to collect, transport, recycle, or dispose of a hazardous product. We need to move from reaction to planning. Green chemistry offers a systematic approach to designing products that are environmentally superior. This approach consists of a deliberate consideration of impacts for each material, and can include a multi-stakeholder process to establish criteria for materials use and product development. The movement in green chemistry has been particularly motivated by the "precautionary principle," which is an approach that advocates for the avoidance of potential hazards to save resources in the long term. (See the Appendix B for further discussion of Green Chemistry.)

Three-Legged Stool – Economic, Environmental, and Social Considerations

In his 2007 book, *Blessed Unrest*,⁹⁸ Paul Hawken writes that environmentalists are waiting for those in the social movement who fight for workers' rights, child labor, better wages, and related issues to hop on the environmental bandwagon, but that it has to be the other way around. Both movements have a great deal to gain from one another, and over time, their methods and interests are likely to blur. There is little doubt that the two movements have to begin to work more closely together.

In the context of HHW, those involved in the manufacture of toxic products have similar interests to those who manage them at the end-of-life. In both cases, their jobs would be safer and less complicated if those products were made without hazardous materials. Since economic factors are always a consideration in environmental and social policies, that element comprises the third leg of the proverbial stool. For example, the Basel Action Network⁹⁹ highlighted the problems that arise when electronic scrap sent to third world countries for recycling is mismanaged in rudimentary recycling operations. While the companies sending this scrap abroad from the U.S. and other nations found a lively reuse and upgrade market for some of these materials and an economical way to recycle, there is no doubt that poorly managed recycling practices in some countries contribute to significant impacts on the health of local workers, the public, and the environment. Envi-

ronmental groups and those working on social issues will need to jointly address similar issues in the future.

Global Harmonization of Environmental Policies

While product stewardship often encourages local production and consumption, it cannot ignore the market dynamics of international trade. The RoHS Directive not only affected products sold in Europe, but also in the United States and worldwide. It did not make economic sense to manufacture different products for different markets. Now that RoHS is the international standard for restrictions on hazardous materials in electronic products, it should become a legal standard also in the US. Furthermore, any additional changes to RoHS should be considered on a global basis so that implementation of RoHS becomes global practice. This harmonization of environmental policies will begin to occur on an international scale as governments, non-profit organizations, and companies begin to collaborate across borders. Global consistency will result in greater certainty for business, cost savings, and leveling the playing field regarding environmental and social criteria. A coalition of American, Canadian, and European standards might provide the leverage needed to increase the environmental and social standards related to product manufacture in countries such as China, where many products that flood the American market are manufactured under substandard conditions.

Connecting People to Products

In his 1955 classic, *The Sane Society*, social psychologist Eric Fromm unwittingly forecast the future of the product stewardship movement when he said: “The process of consumption is as alienated as the process of production....The act of consumption should be a ... meaningful, human, productive, experience. In our culture, there is little of that. Consuming is essentially the satisfaction of artificially stimulated phantasies ... alienated from our concrete, real selves....We are surrounded by things of whose nature and origin we know nothing....We do not know how bread is made, how cloth is woven, how a table is manufactured, how glass is made. We consume, as we produce, without any concrete relatedness to the objects with which we deal; we live in a world of things, and our only connection with them is that we know how to manipulate or to consume them.”¹⁰⁰

People around the world are disconnected from the products they use, including who made them, how they were made, and how they got to the store where they were bought. Would we buy a television if we knew that a child produced it for fifteen cents a day? Would we buy a toy if we knew the batteries inside contained mercury? Would we want our computer to go to a recycler if we knew that company sent it to locations where metals were extracted using acids that pollute local waterways?

Many products today are manufactured with little thought to the social and environmental impacts they have all along their lifecycle. Government has subsidized the end-of-life management systems needed to reduce these impacts. Product stewardship has enlightened the public about the end-of-life management costs of everyday products. That is only the beginning. We now need to understand and communicate the social and environmental

impacts of manufacturing these products, as well as other aspects of a product's lifecycle. We need manufacturers to make superior products that perform as well or better than the current product, are comparable in cost, and readily available. We also need to create a level playing field in product manufacture so that the true costs of making, using, and disposing of a product are evident to the consumer. Only then can sustainable products compete fairly.

Once environmentally and socially superior products are available as alternatives, a major challenge will be to educate the public in a manner that allows people to make informed choices about the products they buy. Consumers will need to differentiate products. Through simplified lifecycle analyses, company and product environmental footprints, and other technical tools, consumers might soon be able to compare companies and their products ... quickly and easily. Ecological labels and product certifications show promise as a means to communicate important information to the consumer about the relative strengths of comparable products. Misleading claims, however, make it necessary for government, business, and environmental groups to work together to ensure that only real claims are allowed and false claims are punished.

Product stewardship has cracked open the old way of thinking about waste management, but we are still a long way from consumer-driven markets based on information about the environmental and social implications of product decisions. But that day will come.

About the Author

Scott Cassel is the Executive Director and Founder of the Product Stewardship Institute, Inc. His professional experiences have focused on product and waste stream management issues at the local, state, and national levels, and the development of product stewardship systems to ensure the environmental sustainability of consumer products throughout their lifecycles.

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Notes

1. The term “producer” is used in Europe to identify those who place a product for the first time on the market, which can be a manufacturer, an importer, or even a retailer that imports products directly.

2. According to Wikipedia, John Elkington, co-founder of the business consultancy Sustainability, coined the phrase “the triple bottom line” in 1994, and expanded and articulated the concept in his 1998 book, *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. TBL is a business principle that measures corporate performance along three lines: profits, environmental sustainability, and social responsibility, and that a company’s responsibility be to stakeholders rather than shareholders.

3. See Basel Action Network video, *Exporting Harm*, available at: <http://www.ban.org/main/film.html>.

4. Alexis Cain *et al.*, “Substance Flow Analysis of Mercury Intentionally Used in Products in the United States,” *Journal of Industrial Ecology*, Volume 11, No. 3, 2007, pp. 61–75.

5. Hans Korfmacher, July 30, 2007, email communication.

6. Beverly Thorpe, Iza Kruszewska, and Alexandra McPherson of Clean Production Action, “Extended Producer Responsibility: A Waste Management Strategy that cuts waste, creates a cleaner environment, and saves taxpayers money,” 2004, p.13.

7. Margaret Walls, *Extended Producer Responsibility Policies and Product Design: Economic Theory and Selected Case Studies*, OECD Environment Directorate Report ENV/EPOC/WGWPR(2005)9/FINAL (Paris, France: February 2006).

8. Cradle-to-cradle product management is a concept made accessible to the public by William McDonough and Michael Braungart and in their book, *Cradle-to-Cradle, Remaking the Way We Make Things*, North Point Press, 2002. Available at: http://www.mcdonough.com/cradle_to_cradle.htm.

9. Hans Korfmacher, July 30, 2007, email communication.

10. According to the Battery Council International, more than 98 percent of all battery lead and plastic is recycled. BCI webpage: <http://www.batterycouncil.org/environment.html>. August 9, 2007.

11. See Maryland’s electronics recycling law: Environment Article, Title 9, Water, Ice and Sanitary Facilities, Subtitle 17 Office of Recycling, Part IV Statewide Computer Recycling Pilot Program). The law became effective on July 1, 2005. See Maryland Department of Environment website, at: <http://www.mde.state.md.us/Programs/LandPrograms/Recycling/SpecialProjects/ecycling.asp>.

12. See Minnesota Session Laws, Chapter 48, available on Minnesota Pollution Control website, at: <http://www.pca.state.mn.us/oea/stewardship/electronics-law.cfm>, August 9, 2007.

13. The Maine Department of Environmental Protection recycling goals for mercury thermostats in its 2006 law are equivalent to at least 125 pounds of mercury per year from mercury-added thermostats by January 1, 2009, and 160 pounds by January 1, 2010. The rate recycled is a percentage of the number of mercury thermostats estimated to be removed from the wall and replaced with another thermostat.

14. Hans Korfmacher: “Some Learnings from the Establishment of the First Pan-European WEEE Compliance Scheme: The European Recycling Platform,” presentation at Product Stewardship Institute Forum, San Francisco, May 2007, <http://www.erp-recycling.org>.

15. When incorporated in 1998, TRC included three companies. A fourth company, Nordyne, joined in 2007.

16. The European Recycling Platform was established by Hewlett Packard, Sony, Electrolux, and Braun in 2002. By 2007, it represented more than 900 manufacturers with a market share of about 25% in Europe.

17. Historic products are those that have already been sold prior to the date of any newly implemented system.

18. Hans Korfmacher, August 15, 2007, email communication.

19. Hans Korfmacher, "Some Learnings from the Establishment of the First Pan-European WEEE Compliance Scheme: The European Recycling Platform," presentation at Product Stewardship Institute Forum, San Francisco, May 2007, <http://www.erp-recycling.org>.
20. For information on the Staples project, see www.productstewardship.us.
21. The national paint dialogue was initially funded by state and local governments, and the U.S. EPA. The collaborative projects included in the MOU were also funded by these entities, but also included funding from the National Paint and Coatings Association and paint recyclers.
22. The 1st MOU included the following projects: the development of a recycled paint standard with Green Seal to increase markets for recycled paint; a lifecycle assessment and cost-benefit analysis that compares drying and disposal of leftover latex paint to reuse and recycling; a study to determine the infrastructure needed (and the cost) to collect, transport, and recycle leftover paint; and several projects to reduce and reuse leftover paint. For more information, see: www.productstewardship.us/PaintProjectsandInitiatives.
23. Fishbein, "Industry Program to Collect Nickel-Cadmium (Ni-Cd) Batteries," Section 7.4. Available at: <http://informinc.org/recyclenicd.php>
24. Hans Korfmacher, August 15, 2007, email communication.
25. Ceres website: <http://www.ceres.org/coalitionandcompanies/>. 6 July 2007.
26. EPEAT website: <http://www.epeat.net/>. 6 July 2007.
27. Wal-Mart website, August 15, 2007. <http://www.walmartstores.com/GlobalWMStoresWeb/navigate.do?catg=677>.
28. Home Depot website: <http://www6.homedepot.com/ecoptions/>. August 15, 2007.
29. Amy Stodghill, "Whole Foods Unveils Their Own Fair Trade Label," Green Options, March 30, 2007, at: http://greenoptions.com/2007/03/30/whole_foods_unveils_their_own_fair_trade_label.
30. Hans Korfmacher, August 15, 2007, email communication.
31. The Massachusetts beverage return law was enacted in 1981 but implemented in 1983.
32. HP website, August 15, 2007, at: <http://www.hp.com/hpinfo/globalcitizenship/environment/recycle/ecoupon.html>.
33. Samuel Perkins, "Pollution Prevention and Profitability: A Primer for Lenders," Northeast Waste Management Officials' Association, 1996. For full text see: <http://cleanerproduction.com/Training/Banks/Refs/NEWMOA%20P2%20Primer%20for%20Lenders.doc>
34. California, Connecticut, Delaware, Hawaii, Iowa, Maine, Massachusetts, Michigan, New York, Oregon, Vermont. www.bottlebill.org.
35. Dr. Jeffery Morris, Bill Smith, Rick Hlavka, "Economic and Environmental Benefits of a Deposit System for Beverage Containers in the State of Washington," 5. (Prepared for the City of Tacoma Solid Waste Management, 2005) Available at: <http://www.bottlebill.org/assets/pdfs/legislation/WABottleBillFinalReport.pdf>
36. Bill Sheehan and Helen Spiegelman, "Extended Producer Responsibility Policies in the United States and Canada: History and Status" (For publication in *Governance and Sustainability: The Case of Integrated Product Policy*, Heidelberg, Germany, 2005)
37. For current information on state scrap tire laws in the U.S., see: http://www.rma.org/scrap_tires/state_issues/.
38. For current information on lead-acid battery laws in the U.S., see: <http://www.batterycouncil.org/states.html>.
39. Sheehan and Spiegelman, "Extended Producer Responsibility Policies in the United States and Canada," 14
40. The section on the German/European Packaging Ordinance was partially written by Hans Korfmacher, with assistance from Bette Fishbein. It was edited by Scott Cassel.
41. The Ordinance on the Avoidance and Recovery of Packaging Waste came into force in Germany on June 12, 1991.

42. Hans Korfmacher contributed to the writing of this section on the WEEE and RoHS Directives.

43. Directive 2002/96/EC of the European Parliament and of the EU Council of 27 January 2003. For entire text see: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0096:EN:HTML>.

44. “Historic” products are those that have already been sold prior to the date of any newly implemented system. Under WEEE, manufacturers also share collective responsibility for “orphan” and “abandoned” products. “Orphan” products are those manufactured by companies that are no longer in business and have not been purchased by another company. “Abandoned” products are those whose brand name cannot be identified.

45. The costs associated with the management of historical WEEE from sources other than private households are borne by producers. “By 13 August 2005, financing is to be covered by producers in the case of waste from holders other than private households and placed on the market after that date. In the case of waste from products placed on the market before 13 August 2005, management costs are to be borne by producers. However, Member States may provide that users be made responsible, partly or totally, for this financing.” http://www.weee-forum.org/legislation_eu.htm

46. Press release issued by Greenpeace International, the European Environmental Bureau and Friends of the Earth Europe, September 28, 2006, at: http://www.eeb.org/press/280906_pr_EU_missing_opportunity_innovation_electronics.htm

47. Directive 2002/95/EC of the European Parliament and of the EU Council of 27 January 2003. For entire text see: <http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML>.

48. For the status of electronics laws in China and other nations, see: <http://www.productstewardship.net/policiesElectronicsIntl.html>.

49. Duncan Bury, Environment Canada, Presentation to the Association of Municipal Recycling Coordinators, Extended Producer Responsibility (EPR) Funding and The Future, Hockley Valley, February 14, 2007.

50. Gary A. Davis, Patricia S. Dillon, Bette K. Fishbein, and Catherine A. Wilt, “Extended Producer Responsibility: A New Principle for Product-Oriented Pollution Prevention,” (prepared for the U.S. EPA Office of Solid Waste, 1997)

51. Sheehan and Spiegelman, “Extended Producer Responsibility Policies in the United States and Canada,” 15.

52. Sheehan and Spiegelman, “Extended Producer Responsibility Policies in the United States and Canada,” 16.

53. Fishbein, “Industry Program to Collect Nickel-Cadmium (Ni-Cd) Batteries,” Section 4.1. Available at: <http://informinc.org/recyclenicid.php>.

54. Fishbein, “Industry Program to Collect Nickel-Cadmium (Ni-Cd) Batteries.” Available at: <http://informinc.org/recyclenicid.php>.

55. For an updated list of collection sites, go to: www.rbrc.org.

56. Fishbein, “Industry Program to Collect Nickel-Cadmium (Ni-Cd) Batteries,” Section 4.1. Available at: <http://informinc.org/recyclenicid.php>.

57. The Federal Universal Waste Rule was developed by U.S. EPA to reduce regulatory barriers to collecting particular waste streams, such as batteries, thermostats, and pesticides, which increased recycling and reduced environmental impact. The Universal Waste Rule was amended in 1999 to include some lamps (*i.e.*, fluorescent, high intensity discharge [HID], mercury vapor).

58. Bette Fishbein, telephone communication, August 15, 2007.

59. Aarthi Rayapura, *Wireless Waste: The Challenge of Cell Phone and Battery Collection* INFORM, Inc., 2005, available at: http://informinc.org/reports_waste.php.

60. RIS International, “Canadian Consumer Battery Baseline Study Final Report,” (Submitted to Environment Canada, February 2007.)

61. "Massachusetts Plan for Managing Hazardous Materials from Household and Small Businesses," Executive Office of Environmental Affairs, 5 July 1996. Massachusetts used the term hazardous household products (HHP) to denote that the goal was to reuse and recycle materials and not have them become a waste.

62. Other materials projected to be added were fluorescent lamps, thermometers, mercury switches, and electronic products with cathode ray tubes.

63. "Mercury in Massachusetts: An Evaluation of Sources, Emissions, Impacts, and Controls," Massachusetts Department of Environmental Protection, 1996, available at: <http://www.mass.gov/dep/toxics/stypes/hgexsum.htm>.

64. At the time, three solid waste combustion facilities in northeast Massachusetts contributed to a high concentration of mercury and other pollution, prompting particular concern in that part of the state.

65. Northeast Waste Management Officials' Association, "Revised Discussion Document: Mercury Education and Reduction Model Act," http://newmoa.org/prevention/mercury/final_model_legislation.doc (5 July 2007) Section 10 (F).

66. For information on the NEWMOA Mercury Reduction Program, including updates on laws, see: <http://www.newmoa.org/prevention/mercury/>.

67. Municipal Waste Combustor Regulation (M.G.L. c. 111, Sections 142A through 142M and 150A, M.G.L. c. 21A, Section 18), April 1998.

68. Presentation by Mark Smith, Massachusetts Department of Environmental Protection, PSI Networking Conference Call, "The Fate of Excess Mercury in the United States," 13 June 2007.

69. Mercury thermostats contain three grams of mercury per ampoule. Some thermostats contain more than one ampoule. The average thermostat, therefore, contains about four grams of mercury.

70. For up-to-date information, see TRC's website, at: <http://www.nema.org/gov/ehs/trc/>.

71. Product Stewardship Institute, "Thermostat Stewardship Initiative: Background Research Summary—Final," November 18, 2004.

72. After an initial payment for the collection bin, TRC pays for the replacement collection bins, shipping costs, and the cost of recycling the mercury thermostats.

73. "Review of the Thermostat Recycling Corporation Activities in the Northeast," prepared by the Northeast Waste Management Officials Association, November 2001, available at: <http://www.newmoa.org/prevention/mercury/TRCreport.pdf>.

74. The national thermostat dialogue was initially funded by state and local governments, and the U.S. EPA. Several of the collaborative projects were also funded by EPA.

75. States that restrict the sale of mercury thermostats did so independent of the national dialogue. These states include California (effective January 2006), Connecticut (effective July 2003, unless the manufacturer submits a plan enabling collection), Louisiana (effective 2008), Maine (effective January 2006), Maryland (effective October 2007), Michigan (effective January 2010), New York (effective 2008), Oregon (effective January 2006, prohibits installation of thermostats containing mercury in commercial and residential buildings), Rhode Island (effective January 2006, labeling requirements, phase-out depending upon mercury content levels, and collection plan requirements), Vermont (effective July 2006), and Washington (unless the manufacturer participates in recycling).

76. Minnesota Pollution Control Agency, "A National Agreement on Carpet Recycling," <http://www.pca.state.mn.us/oea/carpet/index.cfm> (5 July 2007).

77. Minnesota Pollution Control Agency, "A National Agreement on Carpet Recycling," <http://www.pca.state.mn.us/oea/carpet/index.cfm> (5 July 2007).

78. The nine states with electronics end-of-life management laws in the United States as of August 2007 are: California, Maine, Maryland, Washington, Minnesota, Texas, Oregon, Connecticut, and North Carolina. The laws in Texas and North Carolina only cover computer equipment.

79. For information on PSI's Staples Pilot Project, go to: <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=72>. For information on the Take-it-Back Network and the Office Depot and Good Guys pilot projects, see: <http://www.metrokc.gov/dnrp/swd/takeitback/index.asp>

80. For information on EPA's Plug-In To eCycling project, go to: <http://www.epa.gov/epaoswer/hazwaste/recycle/ecycling/index.htm>.

81. David Stitzhal, "Northwest Product Stewardship Council: A Level Long Enough," *Pollution Prevention Review* (Autumn 2000): 68.

82. Stitzhal, "Northwest Product Stewardship Council: A Lever Long Enough," 69.

83. Stitzhal, "Northwest Product Stewardship Council: A Lever Long Enough," 73.

84. For up-to-date information on the NWPSC, see: <http://www.productstewardship.net/index.html>.

85. For up-to-date information on PSI, see: <http://www.productstewardship.us/index.cfm>.

86. PSI mission statement, available at: www.productstewardship.us.

87. For a full list of organizations endorsing PSI's Principles of Product Stewardship, see: <http://www.productstewardship.us/displaycommon.cfm?an=1&subarticlenbr=14>. These organizations include the Environmental Council of the States, Solid Waste Association of North America, Northeast Recycling Council, Northwest Product Stewardship Council, and North American Hazardous Materials Management Association.

88. PSI research results in a Product Stewardship Action Plan for each product, which forms the basis for a series of face-to-face meetings. This phase includes interviews with key stakeholders, whose perspective is sought on the project problem, focus, goals, issues, and potential strategies. The interviews serve to engage stakeholders and provide them with a level of comfort on the issue and the dialogue process.

89. For a map of the Product Stewardship Institute membership coverage, see: www.productstewardship.us/membershipmap.

90. For up-to-date information on the Product Policy Institute, see <http://www.productpolicy.org/>

91. The British Columbia Recycling Regulation is at http://www.qp.gov.bc.ca/statreg/reg/E/EnvMgmt/449_2004.htm.

92. For current information on the Manitoba regulations, go to: http://greenmanitoba.ca/cim/1001C1_1T376T3T377.dhtm.

93. Jim Ferguson, Green Manitoba, email communication, August 22, 2007.

94. Senator Barak Obama (D-IL) introduced two bills in 2007 to address this issue. The Mercury Market Minimization Act (M3) would end U.S. exports of elemental mercury by 2010, prohibit Department of Energy and Department of Defense sales of stockpiled mercury, and provide for permanent storage of excess mercury. The M3 bill, coupled with a similar ban in the European Union by 2011, would take substantial amounts of mercury off the world market. The companion Missing Mercury in Manufacturing Monitoring and Mitigation Act (M5) would prohibit the use of mercury in the chlor-alkali process by 2012.

95. For the full text of the CIWMB Strategic Directive, see: <http://caproductstewardship.org/state/ciwmb.htm>

96. The concept of the tipping point is the focus of a book by Malcolm Gladwell called the *Tipping Point*, published in 2003.

97. Incandescent lamps also contain small amounts of lead. As of August 2007, policymakers were still debating the relative impacts of lead in incandescent lighting.

98. Paul Hawken, *Blessed Unrest*, Penguin Books, 2007.

99. For more information on the work of the Basel Action Network, see: www.ban.org.

100. Erich Fromm, *The Sane Society* (NY, NY: Henry Holt and Company, 1955), pages 131, 133–134.