

PLANNING THE FUNERAL AT THE BIRTH: EXTENDED PRODUCER RESPONSIBILITY IN THE EUROPEAN UNION AND THE UNITED STATES

Noah Sachs*

This Article examines how governments in the world's two largest economies are diverging in their approaches to regulating hazardous products and packaging, with major ramifications for manufacturing, waste management, and trade. The European Union is implementing product-oriented environmental regulation based on the principle of Extended Producer Responsibility ("EPR"), which assigns responsibility to manufacturers to take back their products after consumers discard them. In theory, EPR could dramatically alter production practices by internalizing externalities from products and providing incentives for environmentally friendly design. However, practical problems of implementation raise questions about the effectiveness of EPR as a policy tool.

This Article explores the European experience with EPR, the reasons for apparent resistance to EPR in the United States, and the implications of a move toward product-oriented environmental law. It critiques EPR on the grounds that the transaction costs of EPR may outweigh its environmental benefits and that practical problems of implementation may preclude the achievement of expected product design incentives. Given the substantial cost and technical hurdles to establishing the legal underpinnings of EPR programs, this Article recommends that the United States consider alternative policy instruments to address environmental externalities from products.

I. INTRODUCTION

The United States and the European Union are rapidly diverging in their approaches to environmental regulation. In the United States, environmental law remains focused on mitigating externalities from production—the effluent limits, emissions controls, and technology mandates that are the backbone of a command-and-control regulatory system. In the last decade, the European Union has supplemented this traditional focus on the *processes* of production with policies to address externalities from *products* themselves.

Product externalities are generally less noticeable than the archetypal production externality of factory emissions,¹ but aggregated across millions

* Climenko/Thayer Lecturer on Law, Harvard Law School. The author wishes to thank William Alford, Ken Mack, Doug Kysar, Jim Salzman, Michael Vandenberg, and Bette Fishbein for helpful comments on a draft of this Article, and Sameer Doshi for invaluable research assistance. Many thanks to the editors of the Harvard Environmental Law Review for their assistance and insightful suggestions on revisions.

¹ Most analyses of environmental externalities, including law review articles on the subject, use factory emissions as the illustration. *See, e.g.*, Guido Calabresi & A. Douglas Malamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1121 (1972) (discussing a factory that uses cheap coal and pollutes a wealthy neighborhood); Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 1 (1960) (using the “standard example” of a “factory the smoke from which has harmful effects on those occupying neighboring properties.”); Henry E. Smith, *Ambiguous Quality Changes from Taxes and Legal Rules*, 67 U. CHI. L. REV. 647 (2000) (comparing the efficiency of

of items, the environmental impacts of products can be substantial.² Lawn-mowers and household paints, for instance, are significant sources of smog-causing nitrogen oxides and volatile organic compounds in the United States.³ At the post-consumer stage, products such as computers, batteries, and cell phones can leach heavy metals and other hazardous materials into landfills and can release carcinogens upon incineration. The wave of product-oriented environmental regulation in the European Union looks beyond the walls of the factory and attempts to address the full life-cycle impacts of products, from materials extraction to product distribution, consumer use, and disposal. Beyond merely encouraging recycling, product-oriented regulation attempts to shape how products are designed, marketed, used, and disposed of, with the goal of reducing the environmental “footprint” of products as they move through industrialized economies.

A robust product policy was a key element of the EU’s Sixth Environmental Action Programme,⁴ approved in 2002. After several years of preparation, the European Union issued a new Integrated Product Policy in 2003, which advocates a suite of policies to address product externalities, including product standard-setting, ecolabeling, environmental performance indicators, greener public procurement, and information disclosure to facilitate life-cycle analysis of product impacts.⁵ The goal of the Integrated Product Policy is ambitious: establishing a “new growth paradigm and a higher quality of life through wealth creation and competitiveness on the basis of greener products.”⁶

The European Union and its Member States have already implemented product-oriented legislation for a staggering array of products and product packaging, from plastic bottles to laptop computers to Fiat and Ford automobiles. The legislation is based on the principle of Extended Pro-

using a price or quantity policy tool to regulate factory emissions rather than a direct “quality” tool such as abatement technology).

² For an article that discusses pollutant emissions from individuals compared to industrial sources, see Michael P. Vandenberg, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 VAND. L. REV. 515 (2004) [hereinafter Vandenberg, *From Smokestack to SUV*].

³ In 2003, lawn and garden equipment was responsible for 16% of hydrocarbon emissions and 21% of carbon monoxide emissions from mobile sources of pollution nationwide. OFFICE OF AIR AND RADIATION, EPA, REDUCING AIR POLLUTION FROM NONROAD ENGINES 3–4 (2000), available at <http://www.epa.gov/otaq/regs/nonroad/f00048.pdf>. Paints and other architectural coatings accounted for 491 tons, or 2.7% of all national emissions of volatile organic compounds in 1998. OFFICE OF AIR AND RADIATION, EPA, NATIONAL AIR POLLUTANT EMISSION TRENDS 1900–1998 (2000), tbl. A-3, available at <http://www.epa.gov/ttn/chieftrends/trends98/trends98.pdf>.

⁴ See Dec. No. 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme, Art. 3, 2002 O.J. (L 242) 1, 4.

⁵ *Communication from the Commission to the Council and the European Parliament, Integrated Product Policy—Building on Environmental Life-Cycle Thinking*, COM (2003) 302 final (June 18, 2003).

⁶ *Commission of the European Communities, Green Paper on Integrated Product Policy*, at 3, COM (2001) 68 final (Feb. 7, 2001).

ducer Responsibility (“EPR”), which assigns long-term environmental responsibility for products to producers in an attempt to internalize costs and convert the linear “cradle-to-grave” production and distribution chain into a “cradle-to-cradle” system that encourages recycling, reuse, and improved product design. In practice, EPR has been implemented through product take-back legislation, which requires manufacturers to take back their products after consumer use or pay a fee to an organization that will collect and recycle the products. In 2003, for example, the European Union enacted sweeping legislation requiring all twenty-five Member States to implement take-back by 2006 for a wide variety of electronic equipment, from computers and printers to toys, shavers, and microwaves.⁷

EPR can be viewed as an ecological extension of product liability law, making producers responsible for long-term environmental management of their products, and its goals are similar in many respects to product liability law, such as reducing “injury” and spurring improved product design. Just as the concept of tradeable emissions permits leapt from universities and think-tanks to legislation in the 1980s and 1990s, EPR theory is now being operationalized in directives and national legislation throughout the European Union.

In contrast, EPR has not taken root in the United States, and sporadic interest in EPR at the federal level, including a series of EPA-sponsored talks on EPR, has not yielded legislation. U.S. environmental law remains overwhelmingly focused on regulating industrial sources of pollution and often neglects the externalities from products themselves.

EPR has received only sparse attention in legal literature.⁸ Commentators on EPR have generally praised it as a promising “next generation” environmental policy that relies on market incentives rather than command-and-control mandates.⁹ Because the prospect of taking back products at their end-of-life may provide market incentives for bringing environmental considerations into the design process, advocates claim that EPR might reorient large sectors of industrialized economies toward more sus-

⁷ Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on Waste Electrical and Electronic Equipment, 2003 O.J. (L 37) 24 [hereinafter WEEE Directive].

⁸ Only a handful of law review articles have addressed EPR to any extent. See Knut F. Kroepelien, *Extended Producer Responsibility—New Legal Structures for Improved Ecological Self-Organization in Europe?*, 9 REV. EUR. COMMUNITY & INT’L ENVTL. L. 165 (2000); Catherine K. Lin et al., *Globalization, Extended Producer Responsibility and the Problem of Discarded Computers in China: An Exploratory Proposal for Environmental Protection*, 14 GEO. INT’L ENVTL. L. REV. 525 (2002); James Salzman, *Sustainable Consumption and the Law*, 27 ENVTL. L. 1243 (1997) [hereinafter Salzman, *Sustainable Consumption*]; Megan Short, Note, *Taking Back the Trash: Comparing European Extended Producer Responsibility to U.S. Environmental Policy and Attitudes*, 37 VAND. J. TRANSNAT’L L. 1217 (2004).

⁹ See generally, GARY A. DAVIS ET AL., *EXTENDED PRODUCT RESPONSIBILITY: A NEW PRINCIPLE FOR PRODUCT-ORIENTED POLLUTION PREVENTION* (1997); NEIL GUNNINGHAM & DARREN SINCLAIR, *LEADERS AND LAGGARDS: NEXT-GENERATION ENVIRONMENTAL REGULATION* (2002).

tainable production and consumption.¹⁰ EPR has also been lauded as one foundation of a “materials efficiency revolution,” through which countries can achieve continued GDP growth while radically reducing raw materials and energy inputs.¹¹

EPR is one of the most significant developments in global environmental policy in the last decade, and it is time for a critical examination of EPR theory and implementation. Are the claims of EPR advocates accurate? Should the United States follow Europe’s lead and adopt a comprehensive product policy that includes EPR? How has EPR worked in practice? What are its costs and benefits? What are the alternatives to EPR that the United States should consider?

In this Article, I critique EPR as a tool for waste management and environmental sustainability. My review of the EU legislation suggests that the ambitious claims of EPR proponents may be overstated, at least for some product classes. EPR should be viewed as one of many ways to fund increased recycling, but only in some cases does it succeed in forcing the cost-internalization that would provide incentives for manufacturers to “design for the environment.” The transaction costs of implementing EPR on a national or supranational scale, such as sorting particular product classes, or even particular brands, out of the general waste stream, are substantial and may outweigh the environmental benefits for many product classes.

While EPR seems to be a market-oriented environmental policy, it can be difficult to establish the proper incentives and provide a legal foundation for the market to operate. Therefore, implementing producer responsibility for waste can actually be less efficient than other options for addressing environmental externalities from products. While EPR is often touted for its reliance on market mechanisms, EPR legislation in the European Union has also involved substantial government mandates regarding labeling, reporting, recycling, recovery, materials selection, and product design. These government mandates are likely to be more effective in the long run in reducing hazards from products than the more novel product take-back requirement. In sum, implementation of EPR “on the

¹⁰ Gus Speth, co-founder of the Natural Resources Defense Council, former CEO of the UN Development Programme, and now Dean of the Yale School of Forestry and Environmental Studies, has argued that EPR is one of the key transitions that needs to occur in industrial economies to achieve a more “sustainable world.” JAMES G. SPETH, *RED SKY AT MORNING* 152, 167–68 (2004).

¹¹ See, e.g., John E. Young, *The Coming Materials Efficiency Revolution*, in BETTE K. FISHBEIN ET AL., *EXTENDED PRODUCER LIABILITY: A MATERIALS POLICY FOR THE 21ST CENTURY* 1, 33 (2000) (“Eliminating waste . . . potentially offers a huge pot of cash that could be devoted to other purposes. The sums involved are quite large in proportion to the national budget.”); See generally Angela Canas et al., *A New Environmental Kuznets Curve? Relationship Between Direct Material Input and Income per Capita: Evidence from Industrialized Countries*, 46 *ECOLOGICAL ECON.* 217 (2003).

ground” in Europe appears to be falling short of EPR’s theoretical ideals, and similar problems would likely arise in the United States.

To be sure, the lack of regulation of product externalities is a glaring gap in U.S. environmental law. Many products have substantial adverse environmental impacts, especially upon disposal, that are never taken into account in design, production, and consumption decisions. However, to address these externalities, policy-makers should examine alternatives to EPR, such as fees for recycling paid at the point of purchase, materials taxes, and content specifications, which could approximate many of the benefits of EPR at a potentially lower cost. At the same time, product-oriented policies should provide incentives for firms that choose to pursue a closed-loop, reverse supply chain for their own products. Existing voluntary product take-back efforts in the United States, organized by some manufacturers and retailers, should be expanded and should be supported by any future product legislation.

Part II of this Article explores the problem of product externalities, explains the theory of EPR, and critiques some of its underlying claims. This Part uses the problem of discarded electronics as a case study in product externalities, both because of the overall scale of the problem and because discarded electronics have been an active area of interest for EPR proponents. Part III reviews the rapid adoption of EPR in the European Union and discusses how new take-back obligations will be unlikely to lead to substantial changes in product design. Part IV reviews discussions of EPR in the United States, focusing on discarded electronics, and suggests reasons for the divergence of the United States and European Union on product policy. Finally, Part V contains recommendations for a more comprehensive approach in the United States, including alternatives to EPR, to address environmental externalities from products.

II. THE THEORY OF EXTENDED PRODUCER RESPONSIBILITY

A. *The Problem of Product Externalities*

Product externalities¹² are inherent in industrial economies, which are based on a linear production, distribution, and disposal chain that moves trillions of dollars of products annually from factories to consumers to landfills and incinerators.¹³ When viewed from the perspective of mate-

¹² An externality is a social cost of production or consumption not captured in the price system, and the textbook remedy is to internalize these social costs through tradeable permits, Pigovian taxes, or other instruments. See generally Sharon Beder, *Charging the Earth: The Promotion of Price-Based Measures for Pollution Control*, 16 *ECOLOGICAL ECON.* 51 (1996); Donald N. Dewees, *Instrument Choice in Environmental Policy*, 21 *ECON. INQUIRY* 53 (1983); Kenneth R. Richards, *Framing Environmental Policy Instrument Choice*, 10 *DUKE ENVTL. L. & POL’Y F.* 221 (2000); Robert N. Stavins, *Correlated Uncertainty and Policy Instrument Choice*, 30 *J. ENVTL. ECON. & MGMT.* 218 (1996).

¹³ In 2004, for example, U.S. personal consumption of durable and nondurable goods

rial flows, consumers actually “consume” very little.¹⁴ The vast majority of products that are manufactured are used only temporarily by consumers, in a short time-span on their way toward final disposal. Within this linear product chain,¹⁵ manufacturers benefit from a waste regulatory regime that externalizes disposal costs and environmental impacts from disposal to municipalities and taxpayers.¹⁶

Think of product externalities as a second price tag on every product we consume, representing the real costs of disposing of the product and the environmental impacts directly flowing from the existence of that product. The price tag may be less than a cent for some products, and several dollars for others, but because this price is never actually “paid” by consumers or producers, the price becomes externalized as a social cost.

One major product externality is the cost of waste disposal. In 2003, for example, Americans produced almost 236 million tons of Municipal Solid Waste (“MSW”), or about 4.5 pounds of waste per person per day, up from 2.7 pounds per person per day in 1960.¹⁷ Of this waste, 30.6% was recycled or composted; 15% was incinerated; and about 55% was buried in landfills.¹⁸ In the United States and the European Union, MSW disposal is largely funded out of general tax revenues, rather than by per-unit or per-bag charges.¹⁹ In this zero-price disposal market, neither manu-

totalled almost \$3.4 trillion. News Release, Bureau of Economic Analysis, U.S. Dep’t of Commerce, Gross Domestic Product and Corporate Profits: Fourth Quarter 2004 (Mar. 30, 2005), available at <http://www.bea.doc.gov/bea/newsrelarchive/2005/gdp404f.htm>.

¹⁴ See WILLIAM McDONOUGH & MICHAEL BRAUNGART, CRADLE TO CRADLE: REMAKING THE WAY WE MAKE THINGS 27 (2002).

¹⁵ Some analysts describe the current production and consumption patterns of products as a product “life-cycle.” See, e.g., Enrique Tufet-Opi, *Life after End of Life: The Replacement of End of Life Product Legislation by an European Integrated Product Policy in the EC*, 14 J. ENVTL. L. 33, 52 (2002). Others, however, refer to these patterns as a product “chain,” reflecting the linear movement of products from manufacturer to retailer to consumer to disposal. The OECD uses the product chain terminology. See, e.g., ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, EXTENDED PRODUCER RESPONSIBILITY: A GUIDANCE MANUAL FOR GOVERNMENTS 48 (2001), available at <http://www1.oecd.org/publications/e-book/9701041e.pdf> [hereinafter OECD Manual].

¹⁶ For a discussion of externalities related to the product chain, see John Rousakis & Bernard A. Weintraub, *Packaging, Environmentally Protective Municipal Solid Waste Management, and the Limits to the Economic Premise*, 21 ECOLOGY L.Q. 947, 953–63 (1994).

¹⁷ EPA, Basic Facts: Municipal Solid Waste, <http://www.epa.gov/epaoswer/non-hw/muncpl/facts.htm> (last visited Sept. 29, 2005) (on file with the Harvard Environmental Law Review).

¹⁸ *Id.* These figures are only for municipal waste and do not include industrial wastes or construction and demolition debris.

¹⁹ In the past decade, municipalities in OECD countries have implemented “pay as you throw” programs in which households are charged on a per-bag basis for trash pickup, or for trash drop-off at a municipal disposal facility. These programs can provide incentives to minimize disposal. However, they have not achieved widespread acceptance in large cities, and their fees are scaled to weight or bulk of trash, which is only a rough approximation of environmental impacts from disposal. See Terry M. Dinan, *Economic Efficiency Effects of Alternative Policies for Reducing Waste Disposal*, 25 J. ENVTL. ECON. & MGMT. 242, 254 (1993); Marie Lynn Miranda & Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, 52 J. ENVTL. MGMT. 79

facturers nor consumers have any incentive to reduce waste generation or packaging or to consider the costs of disposal in production or consumption decisions.

A second type of product externality stems from the environmental impacts of landfilling and incineration of products, especially products containing hazardous substances. Disposal of products such as paints, electronics, batteries, cleaning supplies, and household pesticides can lead to leaching of toxic constituents in landfills or release of hazardous air pollutants upon incineration.²⁰ Electronics are responsible for 40% of the lead²¹ and for about 70% of other heavy metals (including mercury) found in U.S. landfills.²² Vinyl siding, made of polyvinyl chloride (“PVC”), releases chlorine gas and dioxin upon incineration, and about 500 to 600 million pounds of PVC are incinerated each year in the United States.²³ With few exceptions,²⁴ manufacturers have no legal requirement, or any economic incentive, to consider the environmental impacts of disposal of their products.

Environmental regulation in the United States tends to miss these environmental externalities from products themselves because they are focused principally on externalities from manufacturing. Consider, for example, regulation of a U.S. facility that uses solvents and pigments to manufacture paints. The release of Volatile Organic Compounds (“VOCs”) in the solvents to the air would be stringently regulated under the Hazardous Air Pollutant provisions of the Clean Air Act,²⁵ and any discharge of manufacturing byproducts to water would be controlled under the Clean Water Act.²⁶ But the same VOCs, when incorporated into the finished paint products and sold to consumers, are entirely unregulated and can later be released to the environment when the paint is applied, or when unused

(1998).

²⁰ See generally Rousakis & Weintraub, *supra* note 16, at 954 (discussing the environmental impacts of landfilling and incineration).

²¹ BETTE FISHBEIN, WASTE IN THE WIRELESS WORLD: THE CHALLENGE OF CELL PHONES 31 (2002) [hereinafter FISHBEIN, WASTE].

²² GLOBAL FUTURES FOUNDATION, COMPUTERS, E-WASTE, AND PRODUCT STEWARDSHIP: IS CALIFORNIA READY FOR THE CHALLENGE—REPORT FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX (2001), available at <http://future500.org/documents/e-waste.pdf> [hereinafter GLOBAL FUTURES FOUNDATION, COMPUTERS].

²³ MICHAEL BELLIVEAU AND STEPHEN LESTER, BAD NEWS COMES IN 3S: THE POISON PLASTIC, HEALTH HAZARDS, AND THE LOOMING WASTE CRISIS 2 (Dec. 2004), available at http://www.besafenet.com/PVCDisposalReport_2-Column_R6.pdf.

²⁴ In theory, manufacturers may have an incentive to control the end-of-life impacts of their products because of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601–9675 (2000). CERCLA imposes strict, retroactive, and joint and several liability on certain parties for releases of hazardous substances. See 42 U.S.C. § 9607(a). CERCLA liability can arise for releases not only of industrial wastes, but also for *any* hazardous substances, including those contained in discarded products. However, CERCLA does not apply to “federally permitted releases” such as toxic emissions from trash incineration. See 42 U.S.C. § 9607(j) and 42 U.S.C. § 9601(10)(H).

²⁵ Clean Air Act § 112, 42 U.S.C. § 7412 (2000).

²⁶ See Clean Water Act §§ 301 and 311, 33 U.S.C. §§ 1311 and 1321 (2000).

paint is disposed. In other words, traditional facility-based environmental regulation targets only a portion of the overall environmental impacts of the product and leaves many of the product externalities unaddressed.

In the United States, the Resource Conservation and Recovery Act (“RCRA”),²⁷ the federal statute that governs hazardous waste generation and disposal, contributes to the migration of hazardous substances through products and into landfills and incinerators. RCRA exempts hazardous wastes disposed by households and many small companies from the full range of regulations imposed on larger hazardous waste generators. These household and “Conditionally Exempt Small Quantity Generator” exclusions²⁸ allow trashcan disposal of products containing hazardous materials, such as electronics, computers, paints, and cleansers, facilitating the passage of hazardous materials down the product chain from manufacturer to retailer to consumer and, ultimately, to landfilling or incineration. In contrast, hazardous wastes from manufacturing, such as used solvents, lubricants, or acids, are stringently regulated under RCRA Subtitle C and are subject to extensive storage, transport, record-keeping, and disposal regulations designed to keep such material out of the waste stream. This bifurcation in regulation reflects the focus of U.S. environmental law on the processes of production, while U.S. law regulates loosely, or not at all, environmental hazards from products themselves. Americans generate a total of 1.6 million tons of household hazardous waste every year,²⁹ and this waste stream is largely exempt from RCRA regulation, regardless of its toxicity.³⁰ Of course, it is not feasible to subject every U.S. household to

²⁷ 42 U.S.C. §§ 6901–6992k (2000). RCRA contains a host of regulatory requirements for hazardous byproducts of industrial processes, from their point of generation to their disposal in licensed solid waste or hazardous waste disposal facilities. A waste stream can be deemed hazardous under RCRA if it exhibits one or more of the hazardous characteristics of toxicity, ignitability, corrosivity, and reactivity, *see* 40 C.F.R. §§ 261.21–261.24 (2004), or if it is a “listed” waste within the regulations. *See* 40 C.F.R. pt. 261, subpt. D (2004).

²⁸ *See* 40 C.F.R. § 261.4(b)(1) (2004) (household exclusion) and 40 C.F.R. § 261.5(f)(3) (2004) (conditional exemption for companies generating less than 220 pounds of hazardous waste per month). According to EPA, the household waste exclusion is based on a sentence in the Senate Report for RCRA which stated that the new hazardous waste program “is not to be used to control the disposal of substances used in households or to extend control over general municipal wastes based on the presence of such substances.” S.Rep. No. 94-988, at 16 (1976), *quoted in* 45 Fed. Reg. 33099 (May 19, 1980).

²⁹ EPA, HOUSEHOLD HAZARDOUS WASTE: STEPS TO SAFE MANAGEMENT, *available at* <http://www.epa.gov/epaoswer/non-hw/househd/hhw-broc.pdf> [hereinafter EPA, HOUSEHOLD HAZARDOUS WASTE].

³⁰ As EPA explained in a 1984 Federal Register Notice, the household waste exclusion was a matter of administrative practicality. 49 Fed. Reg. 44,978 (Nov. 13, 1984). According to EPA, about 3000 municipalities have established household hazardous waste collection programs. *See* EPA, HOUSEHOLD HAZARDOUS WASTE, *supra* note 29. However, these limited local efforts do not begin to approach the scale of the problem, and state regulation of household hazardous waste disposal is spotty. In Massachusetts, local hazardous waste collection removes only a small percentage of household hazardous waste from the waste stream. *See* JOHN McNABB, MASSACHUSETTS COALITION TO REDUCE WASTE, EXTENDED PRODUCER RESPONSIBILITY: PUTTING RESPONSIBILITY WHERE IT BELONGS 5 (1999), *avail-*

RCRA hazardous waste regulations given the attendant administrative and enforcement challenges. But with mounting hazards from products, a more comprehensive approach is needed in the middle ground between no regulation and full-scale regulation under RCRA.

Beginning in the mid-1990s, discarded electronics became the flash-point for concern over the environmental impacts of products in the European Union and in the United States. Because many of the EPR laws in Europe, and EPR discussions in the United States, target discarded electronics, the problem of discarded electronics is discussed in some detail in this Article as a case study in product externalities.

Environmental externalities from discarded electronics flow from their bulk, quantity, and toxicity. The rapid obsolescence of consumer electronics raises an environmental corollary to Moore's law³¹—today's state-of-the-art desktop computer becomes, within two or three years, a nearly worthless box full of lead, chromium, cadmium, copper, and plastics, destined for a landfill or incineration.³² Lead is the most common solder material in electronics,³³ and the Cathode Ray Tubes ("CRTs") in televisions and computer monitors contain between four and eight pounds of lead as a radiation shield.³⁴ About twenty-two percent of the yearly world consumption of mercury is for electronic equipment.³⁵ Other toxic components of common consumer electronics include cadmium, hexavalent chromium, brominated flame retardants, and beryllium.³⁶ Other than pesticides and paints, electronics are likely the most hazardous products discarded by households in the industrialized world.

The problem of discarded electronics is especially acute in the European Union, given limited landfill capacity and a high population density (almost four times higher than the United States).³⁷ In 1998, six million tons of electronics waste were generated in the European Union, and the

able at <http://www.lexingtonma.org/swat/epr.pdf>.

³¹ In 1965, Gordon Moore, co-founder of Intel, predicted that data density on integrated circuits (and computer processing speed) will double every year or so. The prediction has been accurate and has been one of the driving forces behind the information technology revolution. See *Moore's Law at 40: Happy Birthday*, *ECONOMIST*, Mar. 26, 2005, at 65.

³² COMPUTER TAKEBACK CAMPAIGN, POISON PCs AND TOXIC TVs 9 (2004), available at <http://www.svtc.org/cleancc/pubs/ppcttv2004.pdf> [hereinafter COMPUTER TAKEBACK CAMPAIGN, POISON PCs].

³³ PER HEDEMALM ET AL., NORDIC COUNCIL OF MINISTERS, WASTE FROM ELECTRICAL AND ELECTRONIC PRODUCTS: A SURVEY OF THE CONTENTS OF MATERIALS AND HAZARDOUS SUBSTANCES IN ELECTRIC AND ELECTRONIC PRODUCTS 25 (1995).

³⁴ COMPUTER TAKEBACK CAMPAIGN, POISON PCs, *supra* note 32.

³⁵ BASEL ACTION NETWORK & SILICON VALLEY TOXICS COALITION, EXPORTING HARM: THE HIGH-TECH TRASHING OF ASIA 9 (2002), available at <http://www.ban.org/E-waste/technotrashfinalcomp.pdf> [hereinafter EXPORTING HARM].

³⁶ See FISHBEIN, WASTE, *supra* note 21, at 36–37, 63; EXPORTING HARM, *supra* note 35, at 9.

³⁷ The population density of the twenty-five Member States of the European Union is about 115 people per km², compared to about 31 people per km² in the United States. See CENTRAL INTELLIGENCE AGENCY, THE WORLD FACTBOOK 575–76, 614 (2005) (numbers derived by dividing population statistics by land area statistics).

European Commission projects that this amount will double by 2010.³⁸ The growth rate of discarded electronics in the European Union remains about three times higher than the overall growth rate of the MSW stream.³⁹

The United States also faces a growing toxic burden from electronics. In 2004, about 47 million personal computers and about 25 million televisions were sold in the United States,⁴⁰ and, by 2006, over 160,000 computers and televisions, weighing approximately 3500 tons, will become obsolete *each day*.⁴¹ The average U.S. consumer now retires cell phones every one and a half to two years⁴² and computers every two to three years.⁴³ The free cell phone, discarded after a year or two, has become the prime emblem of a throwaway society in the digital age.

In the next decade, a wave of discarded electronics will hit municipalities as consumers finally start emptying their closets, attics, and garages of long-obsolete equipment. The pollutants contained in discarded electronics rival, in many cases, emissions from traditional pollutant sources such as factories and power plants. For example, the 500 million computers estimated by the National Safety Council to be discarded in the United States between 1997 and 2007 likely contain over 632,000 pounds of mercury.⁴⁴ In comparison, all the power plants in the United States emit about 96,000 pounds of mercury per year, according to EPA.⁴⁵

As the European Commission has noted, even modern landfills are not completely watertight, and “a certain leaching of metals and chemical substances cannot be excluded. It goes without saying that environmental impacts are considerably higher when [electronics are] put on uncontrolled landfills, which still takes place to a significant extent in certain Member States and in most candidate countries for accession to the European Union.”⁴⁶

³⁸ *Proposal for a Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment*, at 4 (COM 2000) 347 final (June 13, 2000) [hereinafter Explanatory Memorandum], available at http://europa.eu.int/eur-lex/en/com/pdf/2000/en_500PC0347_02.pdf.

³⁹ *Id.*

⁴⁰ COMPUTER TAKEBACK CAMPAIGN, POISON PCs, *supra* note 32, at 9.

⁴¹ *Id.* at 2.

⁴² See Fishbein, WASTE, *supra* note 21, at 21.

⁴³ NATIONAL SAFETY COUNCIL, ELECTRONIC PRODUCT RECOVERY AND RECYCLING BASELINE REPORT 14 (1999). Many discarded electronics are not really obsolete. Cell phones and computers manufactured four years ago, for instance, can still perform the vast majority of functions that most consumers actually use. Consumers upgrade for the latest features, not because their existing products have become, in some sense, unusable. While computers as a whole are designed for a five-year useful life, many of the subsystems (drives, memory, keyboards) are designed to last even longer. See H. SCOTT MATTHEWS ET AL., DISPOSITION AND END-OF-LIFE OPTIONS FOR PERSONAL COMPUTERS 8 (Green Design Initiative Technical Report #97-10 1997).

⁴⁴ EXPORTING HARM, *supra* note 35, at 6.

⁴⁵ See EPA, Emissions of Mercury by State (1999), <http://www.epa.gov/ttn/atw/combust/utiltox/stxstate2.pdf> (last visited Sept. 29, 2005) (on file with the Harvard Environmental Law Review).

⁴⁶ Explanatory Memorandum, *supra* note 38, at 9 (footnote omitted).

Electronics disposal is propelled primarily by market forces, as consumers upgrade to new products, but law also plays a significant role, at least in the United States. For example, disposal of analog television CRTs is about to increase dramatically due to the FCC-mandated change to digital broadcasting.⁴⁷

The public is largely ignorant of the fate or environmental impacts of the electronics waste stream. As a report prepared for EPA concluded, “[t]he awareness among most computer and electronics buyers as to the scope of the e-waste problem is low to none. Even most sophisticated technology users do not understand the nature of the waste problem, or the fact that many of the materials used in computer/CRT manufacturing are considered hazardous.”⁴⁸ As for municipalities, “they have been saddled with the responsibility for a problem that is not of their own making and about which they can do little on their own to prevent.”⁴⁹

Many U.S. states, overwhelmed by the flood of discarded electronics, have focused on changes in waste management practices, but have not imposed any particular responsibility on electronics manufacturers to manage the waste stream. Several states have implemented landfill bans for CRTs⁵⁰ and rechargeable batteries,⁵¹ and some have reclassified electronics waste as so-called “universal waste” to streamline disposal and recycling.⁵² In 2003, California enacted a first-in-the-nation Advance Recov-

⁴⁷ See 47 U.S.C. § 309(j)(14)(A) (2000). Under an FCC Order issued in 2001, broadcasters can cease parallel analog and digital broadcasts at the end of 2006 in any market in which 85% of television households are able to receive the digital TV signal. See FCC Order 01-330 (2001), available at www.fcc.gov/Bureaus/Mass_Media/Orders/2001/fcc01330.pdf. At that point, owners of analog televisions will be forced either to upgrade to digital TV and discard their obsolete analog TV (the most likely outcome), or purchase a set-top box that can convert the digital signal to analog.

⁴⁸ GLOBAL FUTURES FOUNDATION, *COMPUTERS*, *supra* note 22.

⁴⁹ See DAVIS ET AL., *supra* note 9, at 1–2.

⁵⁰ In April 2000, the Massachusetts Department of Environmental Protection banned the disposal of CRTs at municipal landfills, see 310 MASS. CODE REGS. 19.017 (2005), the first such ban to apply to individuals as well as businesses. In April 2001, the California Department of Toxic Substances Control declared that CRTs are hazardous waste and cannot be disposed in landfills. See Letter from Peggy Harris, Chief, State Regulatory Programs Division, Hazardous Waste Management Program, Cal. EPA, to Sheila D. Davis, Materials for the Future Foundation (April 3, 2001) (on file with the Harvard Environmental Law Review) (“[W]hen discarded, CRTs are identified as a hazardous waste under both federal and State law . . .”). Maine and Minnesota adopted landfill bans for CRTs in 2003, see 38 ME. REV. STAT. ANN. tit. 38, § 1610 (2004) and MINN. STAT. ANN. § 115A.9565 (West 2003), which was amended by 2005 MINN. SESS. LAW SERV. 1st Sp. Sess. Ch. 1 (SF 96) (West), which delays implementation of the ban until 2006. In February 2001, Rhode Island became the first state to establish a permanent statewide recycling collection facility for computers. See EPA, *Electronics: State and Local Initiatives*, <http://permanent.access.gpo.gov/websites/epagov/www.epa.gov/epa.oswer/non-hw/reduce/epr/products/estate.html> (last visited Jan. 3, 2006) (on file with the Harvard Environmental Law Review).

⁵¹ For a summary of state battery disposal regulations enacted in the 1990s, see EPA, *Batteries: Legislation*, <http://www.epa.gov/epr/products/bat-legislation.htm> (last visited Oct. 19, 2005) (on file with the Harvard Environmental Law Review).

⁵² See, e.g., N.J. ADMIN. CODE § 7:26A-7.4 (2005) (New Jersey Department of Environmental Protection regulations on universal wastes).

ery Fee (“ARF”) on sales of electronics that contain video displays larger than four inches. The ARF is a “visible” fee of between six and ten dollars that will appear separately on price tags and receipts, and the proceeds will be used to fund free electronic waste collection and an improved electronics recycling infrastructure in California.⁵³ The California ARF is a sensible component of a legal response to problem of electronics disposal, and it could be expanded nationally as the problem grows in the United States. ARFs are discussed in more detail in Part V.

In comparison to the United States, the European Union has taken a far more aggressive approach to discarded electronics and to other products that pose substantial environmental impacts. Under the principle of Extended Producer Responsibility, the European Union has looked to manufacturers to fund, and in some cases directly undertake, waste management responsibilities. As discussed below, the implementation of EPR is plagued by high transaction costs, and these costs are creating an increasing gap between the predictions of the economic theory behind EPR and the actual results of EPR programs in Europe.

B. EPR Theory—Internalizing Product Externalities

The theory behind EPR, and take-back laws in particular, is that manufacturers should be forced to internalize disposal costs and environmental externalities associated with their products. As the Organization for Economic Cooperation and Development (“OECD”) put it, EPR involves “(1) the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities, (2) to provide incentives to producers to incorporate environmental considerations in the design of their products.”⁵⁴ In other words, EPR extends the Polluter Pays Principle⁵⁵—which is most often discussed in the context of factory emissions, effluents, and hazardous waste clean-ups—to products themselves.

EPR can impose four distinct types of legal responsibility on producers for their products.⁵⁶ Economic responsibility, which involves requir-

⁵³ See Electronics Waste Recycling Act of 2003, codified at CAL. PUB. RES. CODE §§ 42460–42486 (West 2004).

⁵⁴ OECD Manual, *supra* note 15, at 9.

⁵⁵ The Polluter Pays Principle is enshrined in the Treaty Establishing the European Community, art. 174, ¶ 2, 2002 O.J. (C 325) 108 [hereinafter Treaty Establishing the European Community] and in numerous international environmental agreements. As phrased in Principle 16 of the 1992 Rio Declaration, the principle means that governments should “promote the internalization of environmental costs and the use of economic instruments,” by mandating that “the polluter should, in principle, bear the cost of pollution.” The U.N. Conference on Environment and Development, June 3–14, 1992, *Annex I, Rio Declaration on Environment and Development*, Princ. 16, U.N. Doc A/CONF.151/26 (Aug. 12, 1992) [hereinafter, Rio Declaration].

⁵⁶ See Michael W. Toffel, *End-of-life Product Recovery: Drivers, Prior Research, and Future Directions* 4 (Oct. 17–18, 2002) (unpublished paper presented at Conference on Euro-

ing manufacturers to pay all or a portion of end-of-life management costs, is by far the most common type of EPR program.⁵⁷ Physical responsibility requires manufacturers to take physical possession of their products after consumer discard, dramatically increasing logistical challenges through a reverse supply chain and embedding economic responsibility.⁵⁸ Information responsibility involves mandates for product labeling, such as component or material lists, to reduce the cost of third-party involvement in post-consumer recycling.⁵⁹ Finally, liability rules impose financial liability for environmental damage and clean-up costs from disposal of hazardous products.⁶⁰

EPR theory predicts dramatic impacts on industrial economies and the environment through changing the default rule for how waste is managed. The linear product chain is a creature of law. Law determines which externalities within the chain will be internalized, and which will remain social costs. In most jurisdictions, law provides the default rule that municipal governments will collect, manage, and dispose of products within the municipal waste stream at no direct cost to manufacturers. Under a Hohfeldian analysis, a duty on municipalities to manage wastes correlates with a right of manufactures to design and produce their products without regard to end-of-life environmental impacts.⁶¹ Reversing the underlying rights and duties in the linear product chain could arguably shift manufacturer incentives and bring environmental considerations to the forefront of manufacturers' business decisions. As Jim Salzman, a Duke University law professor, has written, "there is no obvious reason why government rather than industry *should* manage waste disposal. The ultimate decision would require empirical analysis of the infrastructure and transaction costs but, at a theoretical level, getting government out of the waste business could be beneficial."⁶²

C. Downstream and Upstream Impacts of EPR

One obvious impact of EPR is that it will reduce environmental impacts "downstream" from the consumer by avoiding landfilling and incineration. A manufacturer take-back requirement would be expected to reduce the volume of waste headed for disposal in landfills and incinerators and

pean Electronics Take-Back Legislation: Impacts on Business Strategy and Global Trade, Fontainebleau, Oct. 17–18, 2002, available at http://faculty.haas.berkeley.edu/toffel/papers/EOL_Takeback_LitReview.pdf (listing economic, physical, information, and liability responsibilities).

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ See WESLEY NEWCOMB HOHFELD, FUNDAMENTAL LEGAL CONCEPTION AS APPLIED IN JUDICIAL REASONING 12–14 (David Campbell & Philip Thomas eds., Ashgate 2001).

⁶² Salzman, *Sustainable Consumption*, *supra* note 8, at 1279.

would also divert toxic constituents from the waste stream, such as the lead, chromium, and mercury found in consumer electronics. I call these “downstream impacts” of EPR.

A closed loop system of take-back, recycling, and reuse should also reduce pressure on firms to find and exploit virgin raw materials. For example, recovering scrap metal from a discarded computer or microwave could reduce the demand for processing newly mined bauxite into aluminum, or newly mined iron ore into steel. The intense energy inputs in mining, processing, and finishing virgin metals could also be avoided under a closed-loop take-back regime.⁶³ I call this avoided virgin material and energy use “resource benefits” of EPR.

Finally, according to EPR advocates, if manufacturers know they will bear the burden of difficult to recycle or toxic products at the end of a product’s life, they will have an incentive to redesign products, to the extent feasible, to avoid adverse environmental impacts. Producers might design products for longer life-spans, enabling reuse, or they might design for recyclability and easier disassembly to facilitate the reverse supply chain that would be spurred by EPR. In theory, EPR would make environmental considerations a core element of businesses’ bottom line, introducing competitive pressures to minimize end-of-life waste management costs through better design, just as firms seek to reduce other costs of doing business. I will refer to these incentives as “design impacts” of EPR.

Bette Fishbein, an EPR analyst at INFORM, Inc., an environmental research group in New York, has described EPR’s resource benefits and design impacts, both of which occur “upstream” from the consumer, as follows:

A producer that responds to EPR by making a less wasteful and more recyclable product will reduce the huge environmental impacts of raw materials extraction . . . , as well as the impacts of materials and energy use associated with materials processing and the manufacture of new products By extending producer responsibility to the post-consumer stage, EPR forges a critical link between the end of life of products and product design. It puts end-of-life management on the radar screen of product designers, which is essential to developing sustainable products.⁶⁴

⁶³ Resource benefits are achieved even if EPR is applied to so-called “historic waste,” or products already on the market when take-back legislation is enacted. Requiring manufacturers to take back and recycle historic waste could avoid some near-term raw material extraction for new products. However, there can be no design incentives for such historic wastes.

⁶⁴ BETTE FISHBEIN ET AL., *EXTENDED PRODUCER RESPONSIBILITY: A MATERIALS POLICY FOR THE 21ST CENTURY* 62 (2000) [hereinafter FISHBEIN ET AL., *EXTENDED PRODUCER RE-*

These two potential upstream impacts of EPR are at the root of claims that EPR can reorient industries toward sustainability by using the take-back obligation as a policy “hook” to change design and production practices. The theory depends on price signals and feedback from the end of the product chain to the beginning. It also depends on each firm bearing the waste management costs of its design and production decisions. As discussed below, such individualized cost internalization is difficult to advance in practice and is plagued by substantial transaction costs, undermining the ambitious potential of EPR.

D. Who Is the Polluter?

A key question that needs to be answered in assessing the costs and benefits of EPR is whether it makes sense to involve producers in waste management at all. Industry groups have frequently argued that EPR distorts the Polluter Pays Principle because it is consumers, not producers, that are the “polluters” in the context of product externalities.⁶⁵ Consumers actually introduce products into the environment by discarding them, whereas producers are making a useful product, not a waste. In this view, product externalities such as waste disposal costs or environmental impacts of disposal are caused by the consumer’s decision to consume, not the producer’s decision to produce.

Coasians might argue that the initial assignment of obligations for waste management is immaterial because obligations can be shifted, through bargaining among the parties, to the most economically efficient state. However, the initial assignment of liability does make a difference in the context of waste disposal, given the high transaction costs of bargaining among various actors, including product manufactures, retailers, municipalities, individual consumers, and people harmed by environmental externalities.⁶⁶

SPONSIBILITY].

⁶⁵ See, e.g., EUROPEAN ORGANIZATION FOR PACKAGING AND ENVIRONMENT, PRODUCER RESPONSIBILITY DEFINED: A BRIEFING PAPER (1998) available at <http://www.europen.be/issues/prodrep.html> (noting that “it is to the producer of the environmental impact that responsibility must be assigned, and not to the producer of the product.”). See also Tufet-Opi, *supra* note 15, at 43–44; Bette K. Fishbein, *EPR: What Does It Mean? Where Is It Headed?*, POLLUTION PREVENTION REV., Autumn 1998, at 45 [hereinafter Fishbein, *EPR: What Does It Mean?*] (noting the opposition of European industry groups to EPR for packaging).

⁶⁶ While consumer mandates would likely have only a weak effect on production practices, it is possible that new responsibilities on retailers could influence manufacturer practices. See James Salzman, *Beyond the Smokestack: Environmental Protection in the Service Economy*, 47 UCLA L. REV. 411, 479–80 (1999–2000) [hereinafter Salzman, *Beyond the Smokestack*]. The German Packaging Ordinance, discussed *infra* in Parts III.A–B.1, is one of the few EPR programs to target retailers rather than manufacturers. After enactment of that Ordinance, retailers pressured manufactures to establish a nationwide packaging take back system. When liability is imposed on a retailer, the retailer may be in a position of Best Briber—the party best placed to pass responsibility within the product chain until it reaches the cheapest cost avoider. Salzman, *Beyond the Smokestack*, *supra* at 479–80.

If the consumer is viewed as the polluter, a different range of policy options becomes more attractive for internalizing externalities, such as consumer-oriented taxes on disposal of certain products, or “pay as you throw” per-bag disposal charges for household waste. Such consumer-oriented fees could still have desired “upstream” impacts if manufacturers respond to the new consumer mandates by producing products that will incur lower fees for consumers upon disposal.

Yet there are several strong arguments for assigning liability to producers, at least in theory. Principles of industrial ecology⁶⁷ provide the basis for one such argument. One of the core principles of industrial ecology is that the ecological web provides essential “natural capital” for industrial production, such as raw materials (chemicals, coal, cotton, etc.); materials for construction of manufacturing facilities (steel, concrete, lumber, etc.); “assimilative capacity,” such as airsheds and watersheds for depositing waste; and biological services (air, water, food) to sustain employees.⁶⁸ The implication of industrial ecology is that the interface between industry and the environment is not just at the point where the smoke leaves the smokestack, but rather, environmental externalities have their origin in the design decisions for the products produced in the factory, and indeed, in the decision to produce a certain product in the first place. Under this perspective, it makes no sense to argue that a consumer “introduces” a product into the environment upon disposal, because the full life-cycle impacts of products, from virgin materials extraction to energy use to disposal impacts, are all determined by the design decisions of producers.

On a more practical level, direct Pigovian taxes on consumers for waste disposal, or per-bag disposal charges, are either infeasible or have been shown to have little impact on the waste stream.⁶⁹ Some economists have concluded that such direct fees on consumers create incentives for moon-

⁶⁷ Industrial ecology is “the study of the flows of materials and energy in industrial and consumer activities, of the effects of these flows on the environment, and of the influences of economic, political, regulatory, and social factors on the flow, use, and transformation of resources.” Charles W. Powers & Marian R. Chertow, *Industrial Ecology: Overcoming Policy Fragmentation*, in THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY 19, 27 (Marian R. Chertow & Daniel C. Esty eds., 1997) (internal citation omitted).

⁶⁸ See *id.* See also Robert Costanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 NATURE 253 (1997); Michelle Swenarchuk, *Stomping on the Earth: Trade, Trade Law, and Canada's Ecological Footprints*, 5 BUFF. ENVTL. L.J. 197 (1997-98); INVESTING IN NATURAL CAPITAL: THE ECOLOGICAL ECONOMICS APPROACH TO SUSTAINABILITY (A. Jansson et al. eds., 1994); NATURE'S NUMBERS: EXPANDING THE NATIONAL ECONOMIC ACCOUNTS TO INCLUDE THE ENVIRONMENT (William D. Nordhaus & Edward C. Kokkelenberg eds., 1999).

⁶⁹ See, e.g., Karen Palmer & Margaret Walls, *Extended Producer Responsibility: An Economic Assessment of Alternative Policies 2* (Resources for the Future Discussion Paper 99-12, 1999). See also Don Fullerton & Wenbo Wu, *Policies for Green Design*, 36 J. ENVTL. ECON. & MGMT. 131, 145 (1998) (noting that a single fee per bag cannot capture all the externalities from discarded products).

light dumping and that consumers are often poorly informed and do not adjust their consumption demand or disposal practices in response to waste taxes.⁷⁰ Moreover, per-bag disposal fees are a blunt policy instrument because they address only waste volume, not the environmental characteristics of discarded products or their degree of recyclability.⁷¹

The question of “who is the polluter?” should be answered under traditional liability principles by assigning liability to the entity in the product chain that is the cheapest cost avoider.⁷² At first glance, the producer would seem to be the cheapest avoider of social costs from products because producers’ design decisions related to materials selection, toxic constituents, and degree of recyclability are the major determinants of the environmental externalities from products.⁷³ Producers are in a position to conduct a cost-benefit analysis of whether design changes are warranted given the prospect of taking back a product at the end of its useful life, and they have the best information about potential re-use possibilities for their scrapped products. Whether increased costs for producers can be passed along to consumers will depend on producers’ market power and consumer demand elasticities. Municipalities, which bear most of the responsibility for waste management at present, have no influence over the environmental profile of the products that they manage in the waste stream.

The cheapest cost avoider cannot be determined in the abstract, however. The result depends on the product in question, the externalities that flow from the product, and the transaction costs of managing the product under different assignments of responsibility. For low-value products with small environmental impacts (such as toys, clothing, or furniture), overall social costs may be minimized, as a practical matter, through assignment of responsibility to municipalities. The transaction costs of EPR, including separate collection, tracking and management of waste, and assessment of fees on producers, will likely outweigh the environmental benefits of EPR for such products. For these kinds of products, enacting regulations to assign responsibility to producers, then undertaking the logistical challenge of carrying them out, is probably not worth the effort.

The merits of EPR need to be assessed for diverse product types and national circumstances. The full range of transaction costs under conditions of producer responsibility must be examined and should be compared against the costs and benefits of municipal responsibility or retailer or consumer responsibility. Even if there are strong theoretical arguments for assigning responsibility to producers, problems of implementation may lead policy-makers toward second-best alternatives. The costs and benefits of EPR also need to be compared against alternative policy instruments that

⁷⁰ See Marco Runkel, *Product Durability and Extended Producer Responsibility in Solid Waste Management*, 24 ENV'T & RESOURCE ECON. 161, 161 (2003).

⁷¹ Palmer & Walls, *supra* note 69, at 8.

⁷² See Calabresi & Malamed, *supra* note 1, at 1096–97.

⁷³ See Salzman, *Sustainable Consumption*, *supra* note 8, at 1279.

could approximate the upstream and downstream benefits of EPR at lower transaction costs. Such instruments, such as Advance Recovery Fees, content standards, and recycling subsidies, are discussed in more detail in Part V.

The goal of this Article is not to conduct a comprehensive cost-benefit analysis of EPR for every possible product type. Rather, the Article illustrates the problem of transaction costs and lack of design incentives in EPR programs in the European Union, and it suggests that many of the ambitious claims of EPR proponents are overstated.

III. EPR IN EUROPE: ANALYSIS AND IMPLICATIONS

A. European EPR Legislation

The European experience with EPR suggests, on the one hand, that EPR programs can be implemented at national and supranational scales. The European Union and individual European nations have supplemented traditional, facility-based environmental regulation with product-oriented legislation targeting products that were difficult to manage with the EU's limited landfill and incineration capacity. EPR legislation has been adopted, or is about to be adopted, in all twenty-five EU Member States, and for the most part, the objectives of European EPR programs to reduce landfill impacts and stimulate a closed-loop recycling system are being met.

On the other hand, European EPR programs have involved large logistical hurdles and transaction costs and, for many types of products, the legislation is not providing the expected ecological design incentives that are at the core of EPR theory. Indeed, the European Union has frequently coupled its product take-back programs with direct design mandates, such as materials standards or bans on certain chemicals in products, and it appears that these command-and-control mandates may be more important in the long run in improving the environmental profile of products than the "next generation" product take-back legislation.

Germany's 1991 Packaging Ordinance—the first practical application of EPR in Europe—serves as the leading example of how product take-back works in practice. The Ordinance was remarkably simple. It assigned sole responsibility to retailers to take back product packaging from consumers and established refundable deposits on some types of packaging as a consumer incentive to return the packaging.⁷⁴ The Ordinance envisioned that manufacturers would ultimately assume responsibility for their packaging though a provision that exempted retailers from the take-back requirement if

⁷⁴ BETTE FISHBEIN, GERMANY, GARBAGE, AND THE GREEN DOT: CHALLENGING THE THROWAWAY SOCIETY 21 (1994) [hereinafter FISHBEIN, GERMANY].

their product suppliers established a privately financed system that would collect packaging and meet material-specific targets for collection and recycling.⁷⁵ This feature led retailers to pressure their suppliers, and as a result, over six hundred German companies joined a Producer Responsibility Organization (“PRO”), a nonprofit entity that manages packaging drop-off bins and contracts with packaging recyclers.⁷⁶ The PRO, rather than retailers or the government, now manages the packaging take-back system in Germany.

The German PRO charges manufacturers a license fee to use a “green dot” logo on packages, indicating that the package is recyclable,⁷⁷ and the license fee is scaled to the degree of recyclability of the packaging. For example, manufacturers that package products in difficult-to-recycle plastics pay a fee for the green dot logo that is about seven times higher than for products packaged in cardboard, internalizing, to an approximate extent, the increased waste management cost of plastic packaging.⁷⁸ The program has provided incentives for reduced packaging and substitution of packaging materials. For instance, the Ordinance has provided incentives to “lightweight,” or shift to lighter and less packaging.⁷⁹ Toothpaste is now sold in Germany without the cardboard box around the tube⁸⁰—useless packaging that ends up in the trash in the United States and other countries.

Following the German Packaging Ordinance, other European countries enacted product take-back laws for a wide array of products in the mid- to late 1990s, including used automobiles (France), batteries (France and Norway), major appliances (Austria, Netherlands, Denmark, and Italy), consumer electronics (Belgium, Sweden, Norway, Denmark, Italy, Switzerland, and the Netherlands), and packaging (France).⁸¹ At the supranational level, the European Union has incorporated EPR principles into

⁷⁵ *Id.* at 21–24.

⁷⁶ *Id.* at 50.

⁷⁷ *See id.* at 51–53. In practice, retailers have refused to accept products that do not carry the green dot logo, because the retailers do not want the responsibility of sending packaging back to suppliers. *Id.*

⁷⁸ *See* Duales System Deutschland, List of License Fees and Bases of Assessment, available at <http://www.gruener-punkt.de/uploads/media/20E4.pdf>.

⁷⁹ *See* Rousakis & Weintraub, *supra* note 16, at 967–68.

⁸⁰ *See generally* FISHBEIN, GERMANY, *supra* note 74, at 42–46. The major responses of manufacturers to the Green Dot price incentives have been reducing packaging weight or avoiding multi-part packaging and secondary packaging, substituting different kinds of packaging, and using more refill packs and concentrates, such as for cleaning detergents. *See* Duales System Deutschland, Putting Packaging on a Diet, available at http://www.gruener-punkt.de/Packaging_optimisation.95+B6Jkw9MQ_.O.html.

⁸¹ Michael W. Toffel, *Closing the Loop: Product Take-Back Regulations and Their Strategic Implications*, J. CORP. SUSTAINABILITY, Oct. 2003, at 2-162 to -63 [hereinafter Toffel, *Closing the Loop*]; Explanatory Memorandum, *supra* note 38, at 15–16; HANS VEDDER, COMPETITION LAW, ENVIRONMENTAL POLICY, AND PRODUCER RESPONSIBILITY: EXPERIENCES IN THE NETHERLANDS FROM A EUROPEAN PERSPECTIVE 167–75 (2002); OECD Manual, *supra* note 15, at 55.

numerous pieces of waste legislation, including legislation on packaging (1994),⁸² used autos (so-called “End-of-Life Vehicles”) (2000),⁸³ and electronics (2003).⁸⁴ As noted above, the waste legislation is just one component of a larger Integrated Product Policy that is likely to be implemented throughout the European Union over the next decade.

The European Union’s new waste directives are an ambitious program of action that has consolidated waste policy-making in Brussels and, in particular, in the Environment Directorate-General of the European Commission. Although the principle of subsidiarity⁸⁵ would seem to limit centralized action in the environmental arena in favor of diverse measures by the Member States, centralized environmental law-making in the European Union has been common. It has usually been justified on the grounds of trade harmonization, preventing transboundary pollution, and avoiding an inter-jurisdictional “race to the bottom” that may result if individual Member States lower environmental standards to attract investment.⁸⁶ The result, as one British scholar has noted, is that the EU’s environmental program over the past three decades has “been transformed from its origins as a restricted body of technical standards designed primarily to eliminate trade restrictions into an expansive programme committed to the vision of sustainable development and the wholesale integration of environmental, social and economic policies.”⁸⁷

⁸² European Parliament and Council Directive 94/62/EC, 1994 OJ (L 365) 10. The Packaging Directive set collection targets of between 50 and 65% of packaging waste and a recycling target of between 25 and 45% of total packaging material. *Id.* It did not itself require that producers take responsibility for packaging throughout the EU, but it did state, in Article 15, that Member States may implement the Directive in accordance with the Polluter Pays Principle. Member States have implemented the Directive through a variety of mechanisms and degrees of producer responsibility. See IAN BAILEY, *NEW ENVIRONMENTAL POLICY INSTRUMENTS IN THE EUROPEAN UNION: POLITICS, ECONOMICS, AND THE IMPLEMENTATION OF THE PACKAGING WASTE DIRECTIVE* 67–68, 78–79, 82 (2003).

⁸³ EU Parliament and Council Directive 2000/53/EC, 2000 OJ (L 269) 34 [hereinafter ELV Directive]. The ELV Directive requires automakers to reuse or recycle 85% of the auto’s weight by 2006, a target that increases to 95% by 2015. See *id.* at 38.

⁸⁴ WEEE Directive, *supra* note 7.

⁸⁵ The subsidiarity principle, contained in Article 5 of the EC Treaty, permits EU institutions to act “only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community.” Treaty Establishing the European Community, *supra* note 55, art. 5

⁸⁶ See Richard Revesz, *Federalism and Environmental Regulation: An Overview*, in *ENVIRONMENTAL LAW, THE ECONOMY, AND SUSTAINABLE DEVELOPMENT* 69–72 (Revesz, Sands, & Stewart eds., 2000) [hereinafter *ENVIRONMENTAL LAW, THE ECONOMY, AND SUSTAINABLE DEVELOPMENT*]. For the WEEE Directive and the Directive on the Restriction of the Use of Hazardous Substances (“RoHS Directive”), the Commission justified EU-level action on the grounds that pollution from landfilling or incinerating WEEE is of a transboundary nature, economies of scale are necessary to justify the cost of electronics recycling centers, and differing national approaches could disrupt the Internal Market. See Explanatory Memorandum, *supra* note 38, at 19.

⁸⁷ BAILEY, *supra* note 82, at 17.

The EU EPR legislation has been enacted in the form of Directives, which are required to be transposed into national legislation in each Member State under Article 249 of the Treaty Establishing the European Community (“EC Treaty”).⁸⁸ However, given the political complexities of the transposition process and the divisions of jurisdiction and responsibility within the European Union, issuance of a Directive does not necessarily lead to perfect harmonization of national policies. Rather, Member States have considerable latitude to determine the mechanisms and policies for implementing the broad EU Directives.⁸⁹ As a consequence, European nations have adopted a wide variety of approaches for product take-back, reflecting national priorities, relative political power of industry, and the state of recycling markets. Most of the EPR legislation in Europe relies on municipalities and consumers to sort and collect products or packaging, reflecting the impracticality and enormous costs of requiring producers to retrieve goods from individual households. How responsibility is allocated among municipalities, consumers, and producers varies widely.⁹⁰ For example, under the EU’s Packaging Directive, Member States have established different collection mechanisms, ranging from curb-side pick-up by municipalities to consumer drop-off at retailers or municipal collection centers.⁹¹ As the European Commission noted, the degree of producer responsibility ranges from “covering the costs for recovery of glass and paper-cardboard only, to systems where industry is bearing the complete costs of collection, sorting, [and] recycling/recovery for municipal packaging waste.”⁹² In other words, EPR as practiced in Europe has not meant that responsibility for products rests solely with producers, but European EPR does retain the core concept that producers’ environmental responsibility for products extends beyond the factory door to the post-consumer stage.⁹³

⁸⁸ See *id.* at 6; Treaty Establishing the European Community, *supra* note 55, art. 249.

⁸⁹ See BAILEY, *supra* note 82, at 7, 35–36.

⁹⁰ See EUROPEAN COMMISSION, EUROPEAN PACKAGING WASTE MANAGEMENT SYSTEMS iii (Feb. 2001).

⁹¹ See RDC ENVIRONMENT & PIRA INTERNATIONAL, EVALUATION OF COSTS AND BENEFITS FOR THE ACHIEVEMENT OF REUSE AND RECYCLING TARGETS FOR THE DIFFERENT PACKAGING MATERIALS IN THE FRAME OF THE PACKAGING AND PACKAGING WASTE DIRECTIVE, Mar. 2003, at IX–XI.

⁹² EUROPEAN COMMISSION, EUROPEAN PACKAGING WASTE MANAGEMENT SYSTEMS, *supra* note 90, at iv. The Commission explained that “[t]he coverage of costs between private actors . . . and public sector . . . is mainly a result of the balance of power between these actors.” *Id.* at iv. There is also substantial variation in the charges levied on packaging in the Member States under the Packaging Directive. For instance, the fee structure for packaging in Germany provides incentives to shift from plastic to glass beverage containers, while the fee structure in the UK provides the opposite incentive. See BAILEY, *supra* note 82, at 133–34.

⁹³ As the OECD has noted, EPR assigns ultimate responsibility to the producer, but assigning such responsibility “does not change the need for others to participate to ensure that the programme is carried out.” OECD Manual, *supra* note 15, at 55.

*B. Analysis of European EPR Legislation**1. Success in Spurring Recycling of Products*

European EPR legislation has generally succeeded in achieving expected downstream impacts and resource benefits—reducing the volume of waste headed for landfills and incinerators and reducing virgin materials use. For example, in Germany, between 1991 and 1998, annual packaging consumption per capita dropped from 94.7 kilograms to 82 kilograms, a 13.4% decrease.⁹⁴ Since the introduction of the Packaging Ordinance in 1991, about 61 million tons of packaging has been recycled,⁹⁵ and according to one study, 18% less packaging was used in Germany in 2000 compared with a hypothetical trend line in the absence of the Packaging Ordinance.⁹⁶

These gains have come at substantial cost, however. The Green Dot system in Germany costs about €1.8 billion per year,⁹⁷ or around \$2.27 billion at the May 2005 exchange rates. A Regulatory Impact Analysis by the UK on the EU's new Directive on Waste Electrical and Electronic Equipment ("WEEE") concluded that it would avoid 133,000 to 339,300 tons of landfilling in the UK per year, with an estimated cost savings of £2 million to £13 million per year.⁹⁸ However, the same analysis concluded that the Directive would cost between £217 and £455 million per year for the UK, depending on how it is implemented.⁹⁹ The Commission's cost estimates are lower, in the range of €500–900 million per year for collecting and recycling WEEE from fifteen Member States, with an estimated price increase of 1% for most electronic products.¹⁰⁰ The full costs and benefits of the WEEE Directive will not be known for several years, but these estimates suggest that some caution is warranted, and they should prompt more consideration of alternative mechanisms for addressing product externalities in the United States.

To be comprehensive, any cost-benefit analysis of EPR should include resource benefits (avoided energy inputs and avoided virgin material use),

⁹⁴ *Id.* at 11.

⁹⁵ Duales System Deutschland, Trendsetter Green Dot—prices cut by half in 15 years (Sept. 27, 2005), <http://www.gruener-punkt.de/index.php?id=1371&L=1&noFlash=1> (on file with the Harvard Environmental Law Review).

⁹⁶ See Joachim Quoden, *Effects of the Introduction of an EPR Management System on the Economy*, in ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, ECONOMIC ASPECTS OF EXTENDED PRODUCER RESPONSIBILITY 120 (2004) [hereinafter OECD, ECONOMIC ASPECTS OF EPR].

⁹⁷ Duales System Deutschland, What Does the Green Dot Cost? 1 (Jan. 2004) available at http://www.dual-system.com/uploads/media/0404_whatdoesitcost.pdf.

⁹⁸ U.K. DEP'T OF TRADE AND INDUSTRY, PARTIAL REGULATORY IMPACT ASSESSMENT (RIA) ON DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON WASTE FROM ELECTRICAL AND ELECTRONIC EQUIPMENT 21 (2003), available at <http://www.dti.gov.uk/sustainability/weee/weeeriamarch.pdf>.

⁹⁹ *Id.*

¹⁰⁰ Explanatory Memorandum, *supra* note 38, at 22.

but doing so is enormously complex. If EPR programs avoid deforestation, mining, petroleum refining, air pollution, or greenhouse gas emissions that would have otherwise preceded production of new products, how should those benefits be quantified?

Even if such benefits could be quantified, it should also be recognized that *any* policy instrument that stimulates recycling or subsidizes use of secondary materials could accomplish many of the same results. In other words, the issue of whether the European Union or the United States should do more to encourage recycling is quite distinct from the issue of who should pay. Curbside collection of beverage containers and newspapers, funded by municipalities, is a leading example of a policy that spurs recycling and avoids virgin material extraction without a producer take-back requirement. Like EPR, existing municipal recycling programs in the United States have the benefit of reducing the extraction of raw materials and helping to reduce the absolute levels of materials flowing through industrial economies.¹⁰¹ Given that existing environmental regulations leave product externalities unaddressed, the United States should promote increased recycling and reuse of products that contain hazardous substances, such as electronics, but producers need not be the funding source in order for these programs to be effective.

Some scholars have critiqued EPR and other instruments to spur recycling for not going far enough. In this view, such programs are inadequate, and possibly counterproductive, because they do nothing to address the *level* of consumption in the developed world, which is the primary driver of raw materials and energy use, waste disposal, and environmental impacts across the globe.¹⁰² Focusing attention on producer responsibility

¹⁰¹ Policies promoting recycling and reuse are one potential means of reducing “throughput” in industrial economies—the total amount of materials processed through the economy into finished goods and services and resulting wastes. A remarkable study by the World Resources Institute concluded that one half to three quarters of all raw material inputs in five OECD economies studied are returned to the environment as wastes within a year. WORLD RESOURCES INSTITUTE, *THE WEIGHT OF NATIONS 6* (2000) (examining trends in Austria, Germany, Japan, Netherlands, and the United States). The study also found that while pollution per unit of GDP has been declining in the five countries since 1975, primarily because of improved technological efficiency and a shift toward service-based economies, pollution has increased dramatically on an absolute basis between 1975 and 1996 (up twenty-eight percent in the United States). *Id.* at 19. The authors attribute the absolute rise to “[c]ultural factors and consumption choices [that] have helped to offset the real efficiency gains that have been made in industry In the absence of further policy incentives, structural economic change and technological efficiency gains alone appear unlikely to bring about a real reduction in resource use and waste output.” *Id.* at 20.

¹⁰² See Bradley A. Harsch, *Consumerism and Environmental Policy: Moving Past Consumer Culture*, 26 *ECOLOGY L.Q.* 543, 545 (1999) (noting that “environmental policy has accepted consumers’ desires as being immutable even though the destructive consequences of fulfilling them have been undeniable.”); Salzman, *Sustainable Consumption*, *supra* note 8, at 1280. Agenda 21, adopted by consensus at the Earth Summit in Rio de Janeiro in 1992, declared that “the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries” See Report of the U.N. Conference on Environment and Development, June 3–

or increasing recycling may constitute a license for consumers to continue their unsustainable, high-consumption lifestyles. As several scholars argued in a recent book called *Confronting Consumption*, technological or policy fixes for reducing the environmental impacts of consumption are insufficient without efforts to reduce consumption itself:

[E]veryone has become adept at talking about sustainability without having to wade into the treacherous waters of consumption Consumption occasionally enters the discussion, but only in nonthreatening ways, and most often in the form of calls for “green consumption” or in support of some moral imperative to consume recycled or recyclable products. Much of this sustainable development talk steers clear of escalating consumption levels and, especially, the roots of such escalation.¹⁰³

As another scholar put it, “consumers ought to consume less, not just consume differently”¹⁰⁴ and “government should encourage consumers to question whether the desire they seek to satisfy is best satisfied through economic exchange, or if it is indeed appropriate at all.”¹⁰⁵

These critiques are too rigid, however. To be sure, rising consumption in affluent countries is a major driver of global environmental degradation and, notably, does not even seem to correlate with measures of human satisfaction.¹⁰⁶ But given expanding economies and increasing consumption, reducing landfill impacts and avoiding energy inputs and virgin material impacts through recycling is an important agenda.¹⁰⁷ Environmentalists should be encouraging countries to move toward this agenda, and it is a recipe for stasis to critique this agenda for not pursuing more dramatic goals of reducing how much consumers consume.

14, 1992, *Annex II, Agenda 21*, ¶ 4.3., U.N. Doc A/CONF.151/26 (Aug. 12, 1992).

¹⁰³ Thomas Princen et al., *Confronting Consumption*, in *CONFRONTING CONSUMPTION* 1, 1–2 (Princen et al. eds., MIT Press 2002). The authors are critical of the focus of mainstream environmental groups on technological improvements in production, and they are especially critical of academic economists, who, they claim, ignore questions of “whether and how consumption patterns contribute to or solve social and environmental problems.” *Id.* at 9, 11.

¹⁰⁴ Harsch, *supra* note 102, at 573.

¹⁰⁵ *Id.* at 578.

¹⁰⁶ See generally GREGG EASTERBROOK, *THE PROGRESS PARADOX* 163–87 (2003) (summarizing studies that show steady or declining evaluations of subjective well-being since World War II amidst unprecedented gains in material living standards); Harsch, *supra* note 102, at 582–85.

¹⁰⁷ As the European Commission has noted, overall use of products is increasing because of greater disposable income and because decreasing household size means that there is a greater duplication of household products. *Communication from the Commission to the Council and the European Parliament—Integrated Product Policy: Building on Life-Cycle Thinking*, at 3, COM (2003) 302 Final (June 18, 2003), available at http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0302en01.pdf. The EU’s new Integrated Product Policy does not address the level of consumption in Europe, but it is designed to “reduce the environmental impacts of increased quantities of products.” *Id.*

2. *Difficulty of Achieving Product Redesign Goals*

If EPR is similar to other recycling programs in achieving downstream impacts and resource benefits, then what is the added value of producer responsibility? What are the advantages of the EU's product-oriented legislation, which assigns responsibility for product environmental impacts to producers, compared to the regime in the United States, which leaves waste management responsibility with municipalities but includes various recycling programs and incentives?

One possible answer is that it is only through producer responsibility that manufacturers will have an incentive, through the take-back obligation, to change the design of their products to have reduced impacts on the environment. In economic terms, a substitution incentive for producers (shifting to less toxic or more recyclable materials) could arguably lower the overall costs of recycling compared to funding recycling without producer involvement.

Providing incentives for ecological design of products is a kind of holy grail for EPR proponents, and advocates argue that the design incentives are the primary rationale for involving product manufacturers in end-of-life waste management.¹⁰⁸ However, Europe has had only limited success in implementing product-oriented environmental policies to provide such design incentives, reflecting the difficulties of shaping the design of millions of products in countries with advanced economies.

Firms will have design incentives under an EPR program only if there is true cost-internalization [hereinafter "individual responsibility"], where firms both bear the end-of-life costs of their product design decisions and can capture cost-savings under a take-back mandate through redesigning products to be more ecologically friendly. Individual responsibility can occur, for example, if firms physically take back and dismantle or recycle their own products. This form of responsibility is akin to a product lease (imposed by legislation rather than by contract), where the manufacturer retains a reversionary right in the product that is triggered upon the consumer's decision to discard.¹⁰⁹ Individual responsibility can also be

¹⁰⁸ See OECD Manual, *supra* note 15, at 19.

¹⁰⁹ Leasing is widely seen as a model for larger-scale implementation of EPR. Many large American companies, including Xerox, IBM, and Dell, already lease a substantial proportion of the products they manufacture. See Bette K. Fishbein et al., INFORM Inc., LEASING: A STEP TOWARD PRODUCER RESPONSIBILITY 5–6 (2000). While the impetus for leasing is not usually environmental, lease arrangements do provide incentives for manufacturers to design products for durability and recyclability, and to use repair and remanufacturing to extend the life of products. See *id.* (noting that "[c]ompanies that get back large amounts of products through their leasing systems have an increased awareness of the costs of managing these products as waste, of the potential for enhancing and recapturing end-of-life value, and of the manufacturing processes that can facilitate remanufacturing and recycling"). Xerox, for example, has instituted an Asset Recycle Management program aimed at reusing copiers and other products returned at the end of leases, rather than discarding them. The program avoids disposal costs, and Xerox asset recovery engineers work

achieved if firms are assigned economic responsibility for waste management of their own products, such as through paying a fee that approximates the disposal costs and environmental externalities of each of the firm's products, as under the German Packaging Ordinance.

It is difficult to see how true cost-internalization can be achieved for more complex products, such as electronics, which contain a chemical stew of metals, plastics, liquids, glass, and housings. Fees on manufacturers, to provide incentives for improved design, would have to reflect a wide array of product characteristics, such as weight, bulk, chemical constituents of the product, and degree of recyclability. True cost internalization would require some estimate, by a government regulator or potentially by an industry coalition such as a PRO, of the present value of future waste management costs and environmental externalities. In other words, fees would need to be tailored not just to a product class made by several manufacturers, such as a microwave, air conditioner, or computer, but to a firm's *individual* products and models, such as the GE Spacemaker XL1800 microwave, the Kenmore 72056 air conditioner, or the Dell Dimension 4700 desktop computer.

If EPR were implemented through a physical take-back system rather than up-front fees, products would have to be tracked and sorted out of the waste stream by brand name—a daunting bureaucratic challenge with very high transaction costs.¹¹⁰ Even under a system funded by front-end fees paid by producers to put a product on the market, the targeted products still need to be separately collected at the back end, after consumer use, to keep them out of the waste stream.

EPR programs will fail to provide a strong ecological design incentive if firms are assigned economic responsibility for their products based on factors such as market-share, product type, or the mere fact of being a producer of a targeted product [hereinafter “collective responsibility”]. Collective responsibility may internalize some waste management costs by shifting them from municipalities to industry, and it may lead to some design changes merely by making manufacturers more aware of the waste implications of their products. But any design incentives will be weak. Firms have no particular incentive to improve the environmental profile of their own products if they know that they will be charged for end-of-life waste management in conjunction with their industry group as a whole and that the fee will not be scaled for environmental impacts.

directly with product design engineers to improve recyclability, ease of disassembly, and other design issues that will lower the cost of end-of-life management of Xerox's products. *Id.* at 6–8.

¹¹⁰ See NAKO TOJO, INTERNATIONAL INSTITUTE FOR INDUSTRIAL ENVIRONMENTAL ECONOMICS, EPR PROGRAMMES: INDIVIDUAL VERSUS COLLECTIVE RESPONSIBILITY: EXPLORING VARIOUS FORMS OF IMPLEMENTATION AND THEIR IMPLICATION TO DESIGN CHANGE 53 (2003), available at http://www.cleanproduction.org/CD/EPR_IndivVersusCollective2003.pdf (reporting on interviews with European recyclers who noted problems with sorting various products by brand, including the space needed to separate the goods and the labor costs).

Of course, the exact effects of collective responsibility would depend on the structure of the market. If one or two companies are dominant in a particular product category and have substantial market-share, then a collective mandate could force design changes, depending on the marginal costs and benefits of doing so. This is one reason why the effectiveness of EPR must be assessed on a product-by-product basis.

Environmental policy makers are confronted with a clear trade-off between individual and collective responsibility. Individual responsibility shapes the design of products through cost-internalization, yet it involves large transaction costs of tracking and sorting millions of products, or assessing fees calibrated to approximate the environmental impacts and disposal costs for each product. Collective responsibility provides weak incentives for product redesign, yet it is far more economical to implement on a national scale.¹¹¹

Many EU EPR programs have defaulted to collective responsibility as a matter of practical necessity, despite the theoretical advantages of individual responsibility. Take, for example, the EU's recent electronics directive on WEEE which establishes a product take-back requirement and mandatory recycling targets for discarded electronics within the EU Member States.¹¹² The Directive covers a broad array of products such as large and small household appliances; information technology and telecommunications equipment; electric tools; consumer equipment; lighting; electronic tools; toys and sports equipment; medical devices; and automatic dispensers.¹¹³ The WEEE Directive requires that Member States provide "convenient facilities" for consumers to return WEEE at no charge by August 2005.¹¹⁴ The collection function will most likely be performed by municipalities, and retailers are also required to take back a product free-of-charge when a customer buys a new, similar product. Once collected, responsibility for managing the WEEE shifts to producers, who must set up treatment and recycling systems.¹¹⁵

While the WEEE Directive squarely involves electronics manufacturers in end-of-life waste management, it is unlikely to provide significant incentives for improved ecological design of products. The WEEE Directive imposes collective responsibility on producers, for instance, for manag-

¹¹¹ Margaret Walls, a leading economist who has studied EPR programs, describes the trade-off as "simplicity and flexibility coupled with minimal incentives for DfE [Design for the Environment] on the one hand, *versus* complexity and high administrative and monitoring costs combined with sharp DfE incentives on the other." See Walls, *EPR Policy Goals and Policy Choices: What Does Economics Tell Us?*, in OECD, *ECONOMIC ASPECTS OF EPR*, *supra* note 96, at 37. She concludes that policy-makers must recognize and grapple with these tradeoffs "sooner rather than later." *Id.*

¹¹² WEEE Directive, *supra* note 7.

¹¹³ *Id.*, Annex IA, at 33.

¹¹⁴ *Id.*, pmbl. §§ 15 & 20, at 25; *id.*, art. 5, § 2(a), at 28.

¹¹⁵ *Id.*, pmbl. § 17 at 25; *id.*, art. 6, ¶ 1, at 28. To facilitate the take-back mechanism, each producer must place a unique visual identifier on its products sold within the EU that are subject to the WEEE Directive. *Id.*, art. 11, ¶ 2, at 31.

ing “historic waste” already on the market, where there can be no design incentives.¹¹⁶ For “new” products placed on the market after August 2005, the WEEE Directive states that “each producer shall be responsible for financing [treatment and recovery operations] relating to the waste from his own products,”¹¹⁷ which seems to be a straightforward pronouncement in favor of individual responsibility. Indeed, inserting this provision was a major objective of the European Environmental Bureau, a Brussels-based umbrella group for 134 European environmental organizations.¹¹⁸

However, the Directive then adds that “[t]he producer can choose to fulfill this [financing] obligation either individually or by joining a collective scheme.”¹¹⁹ In other words, the WEEE Directive acknowledges the goal of individual responsibility, but in allowing participation in collective schemes, such as Producer Responsibility Organizations, the Directive may defeat the objectives of individual responsibility and cost-internalization in the long run. As INFORM, Inc., a leading U.S. supporter of the WEEE Directive notes:

How individual responsibility could be implemented in a collective system is unclear. The challenge is to arrive at a fee structure that reflects the actual cost of recycling a specific product. Such systems have been developed for packaging by basing fees on weight and material composition. However, this would be far more difficult for complex electrical and electronic products, which may contain hundreds of different types of materials.¹²⁰

While it is too early to determine all the details of how each Member State will choose to implement the WEEE Directive, it does appear that many large Member States are not implementing the Directive on an individual responsibility basis. A comprehensive study in January 2005 of how the WEEE Directive was being transposed in Member States showed that several large states, such as France and Germany, were implementing

¹¹⁶ *Id.*, pmb. § 20, at 25; *id.*, art. 8, ¶ 3, at 30. For WEEE discarded by non-household users, the Directive originally required producers to fund collection and recovery of historical waste. *Id.*, art. 9, at 30. However, recognizing the enormous liability this might impose, the EU, in 2003, passed an Amendment that stated that funding for “historical waste” must come from producers only when the products are being replaced by new equivalent products. Historical waste must be funded by non-household consumers when the WEEE is not being replaced by new equivalent products. See Directive 2003/108/EC of the European Parliament and of the Council of the 8 December 2003 amending Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), 2003 O.J. (L 345) 106.

¹¹⁷ WEEE Directive, *supra* note 7, art. 8, ¶ 2, at 30.

¹¹⁸ See INFORM, INC., THE WEEE AND ROHS DIRECTIVES: HIGHLIGHTS AND ANALYSIS (2003), available at http://www.informinc.org/fact_WEEE.pdf [hereinafter INFORM, INC., THE WEEE AND ROHS DIRECTIVES].

¹¹⁹ WEEE Directive, *supra* note 7, art. 8, ¶ 2, at 30.

¹²⁰ INFORM, INC., THE WEEE AND ROHS DIRECTIVES, *supra* note 118, at 1.

collective-responsibility systems in which manufacturers jointly manage the WEEE waste stream, though allowing individual producers to opt for individual responsibility for their own products (such as through paying extra to have their individual products sorted at collection points).¹²¹

Furthermore, many of the existing Producer Responsibility Organizations for electronics in the European Union (created in response to national EPR legislation that predated the WEEE Directive) are implementing product take-back without any incentives for changing the design of products. The Swedish PRO for electronics, El-Kretsen AB, charges producers flat fees to put products on the market, such as up to 180 SEK for a television, 7 SEK for a VCR or DVD player, and 45 SEK for a dishwasher.¹²² The Belgian PRO for electronics, Recupel, also charges flat fees, such as 1.5 euros for a car stereo, 20 euros for a refrigerator, and 2 euros for a circular saw.¹²³ These flat fees may reflect differences in waste management costs among product classes, but they provide little incentive for a manufacturer within a product class to alter the design of its products, such as by reducing toxic constituents or dioxin-forming plastics, or to design the product for recyclability.¹²⁴ In the Netherlands in 2003, IT manufacturers switched from a take-back system of individual responsibility for their own brands to a collective system with costs allocated based on market-share, principally because of the logistics of implementing individual responsibility and associated problems of free riders (producers who never register with the system) and orphan products (products from defunct producers).¹²⁵

In short, the evidence from the European Union strongly suggests that high transaction costs hinder achievement of cost-internalization and design incentives through EPR, at least for products that are more complex than packaging. The WEEE Directive will likely achieve one of its major goals—reducing the amount of WEEE sent to landfills and incinerators—but it appears unlikely to provide significant incentives to change product design, undermining one of the primary arguments of EPR proponents. If

¹²¹ See generally PERCHARDS, REPORT TO DIVISION OF TRADE AND INDUSTRY OF THE UNITED KINGDOM, TRANSPOSITION OF THE WEEE AND ROHS DIRECTIVES IN OTHER EU MEMBER STATES (2005).

¹²² See EL-KRETSEN AB, PRODUCT LIST AND FEES (Aug. 1, 2005), available at http://www.el-kretsen.se/El-Kretsen%20i%20Sverige%20AB-filer/English/Pricelist%2005_v2.pdf.

¹²³ See RECUPEL, RECUPEL ET L'OBLIGATION DE REPRISE DES APPAREILS USAGÉS: LISTE DE PRODUITS 2005-2006, NOUVEAUX TARIFS, NOUVEAUX PRODUITS (2005), available at <http://www.recupel.be/recupel/pdf/fardeinfo.pdf>.

¹²⁴ See Catherine M. Rose & Ab Stevels, Applying Value Chain Analysis to Product Take-Back Systems § 4.6, available at <http://www.productstewardship.us/supportingdocs/AppEnviroSys.pdf> (last visited Dec. 1, 2005) (noting that in three out of four European take-back systems studied, the take-back mechanism provided no incentive to make less wasteful or more recyclable products). The one take-back system studied that did provide such incentives was a physical take-back program organized voluntarily by Siemens in Germany for its own products. See *id.* at § 4.5.

¹²⁵ TOJO, *supra* note 110, at 25–26. See also OECD Manual, *supra* note 15, at 85–87 (discussing ways in which problems of free-riders and orphaned products can complicate EPR administration).

collective responsibility is the primary mechanism through which EPR is implemented, the expectation that EPR will lead to a new era of “design for the environment” and improved environmental performance of products is likely a false hope.

Significantly, if EPR fails to achieve substantial improvements in product design, then it loses one of its theoretical advantages over other policy instruments that reduce landfill impacts and spur recycling without producer involvement. There seems little point in undertaking the logistical challenge of EPR if producers are just a conduit for passing along collective waste management costs back to consumers through higher product prices.

3. Significant State Involvement

A major reason that EPR is hailed as a “next-generation” environmental policy is that it seems to rely on economic incentives rather than command-and-control regulatory requirements. Under EPR theory, assigning responsibility to producers does not dictate any particular product design, but rather allows producers to assess the marginal costs and benefits of product redesign, given the prospect of product take-back or the fee structure imposed for waste management. But the market-based aspects of EPR may be overstated. In fact, as practiced in the European Union, EPR involves substantial regulatory mandates and does dictate product design decisions in certain respects. The most far-reaching impacts of the new EU waste legislation are likely to result from these command-and-control mandates rather than from the more market-based mechanism of the product take-back requirements.

One significant regulatory mandate in EU EPR legislation is the mandatory recycling requirements for various product classes or packaging types, which are designed to stimulate recycling substantially over what the market would justify *ex ante*. For instance, under the End-of-Life Vehicle Directive, auto manufacturers must achieve a minimum 80% recycling rate by weight by January 1, 2006, and 85% by January 1, 2015.¹²⁶ Under the WEEE Directive, recycling mandates range from 50% to 80% by weight for the various electronic product classes.¹²⁷ Even if landfilling is more economically efficient than recycling for a particular product or for packaging, EPR legislation in the European Union requires recycling.

Mandatory recycling requirements are important components of EPR programs, as there would be no point in separately collecting products under an EPR program if producers or their contractors were permitted to landfill or incinerate the products once collected. Yet given that the recycling requirements are set *ex ante* by government officials and are designed to be market-forcing, they can lead to significant disruptions in materials mar-

¹²⁶ See ELV Directive, *supra* note 83, art. 7, ¶ 2, at 38.

¹²⁷ WEEE Directive, *supra* note 7, art. 7, ¶ 2, at 29.

kets. The German Packaging Ordinance set such a high target for packaging recycling in its initial years that it led to a flood of collected packaging that could not be handled by Germany's recycling infrastructure, resulting in large costs for storage, dumping on other European markets, and exports of waste to developing countries.¹²⁸ In 1993, for example, Germany collected 414,000 tons of plastics while its total recycling capacity for all materials was 165,000 tons annually.¹²⁹ Furthermore, if the recycling requirements are too onerous, they can lead to substantial production of secondary materials without corresponding demand from customers willing to buy it.

Because recycling usually involves substantial energy consumption and capital investment in heavy machinery (particularly for recycling durable goods and electronics), some have argued that the environmental benefits of recycling versus landfilling or incineration are not always clear.¹³⁰ European studies that have attempted to calculate the life cycle costs and benefits of landfilling versus recycling of WEEE have generated divergent results.¹³¹ The benefits of recycling versus landfilling for various product classes need to be carefully considered, and recycling targets must be realistic to correspond with recycling capacity and the potential markets for secondary materials.

A second area of substantial state involvement in European EPR programs is that the responsibility for collecting targeted products from households is usually assigned to municipal governments. The collection process is a large proportion of overall waste management costs. Separate collection of targeted EPR product classes, which usually involves special bins or trucks or establishment of central drop-off points, may actually *increase* costs for municipalities, even if landfill disposal volumes for the targeted products decrease. While EPR is often described in the literature as shifting a relatively fixed set of waste management costs from municipalities to producers,¹³² in practice costs for both municipalities *and* producers may increase under EPR programs. Again, these costs of separate collection need to be carefully considered in the initial theoretical discussion of where to assign responsibility for product externalities.

Finally, state intervention within European EPR programs is most prominent in the product design mandates that accompany many of the take-back requirements. In practice, European EPR legislation has dictated

¹²⁸ See, e.g., BAILEY, *supra* note 82, at 71; Ariane Genillard, *Recycling Has Neighbors Crying Foul: On Complaints of Cheap Waste Exports to European Countries*, FIN. TIMES, Jan. 25, 1994, at 6; Dean E. Murphy, *Germany's Recycling Nightmare: Once the Envy of Europe, the Nation's Program is Being Buried Under Trash from Diligent Consumers*, L.A. TIMES, Sept. 12, 1993, at D3; Steven P. Reynolds, *The German Recycling Experiment and Its Lessons for United States Policy*, 6 VILL. ENVTL. L.J. 43, 52-55 (1995).

¹²⁹ Reynolds, *supra* note 128, at 52 n.49.

¹³⁰ See Rousakis & Weintraub, *supra* note 16, at 959-60.

¹³¹ Toffel, *Closing the Loop*, *supra* note 81, at 2-167.

¹³² See, e.g., Fishbein, *EPR: What Does it Mean?*, *supra* note 65, at 53-54.

product design in several crucial areas. For example, the WEEE Directive was enacted in tandem with the Directive on the Restriction of the Use of Hazardous Substances (“RoHS Directive”), which bans several toxic substances from electrical products after July 2006.¹³³ Specifically, the RoHS Directive bans lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers from most of the same categories of products covered by the WEEE Directive.¹³⁴ Similarly, the End-of-Life Vehicle Directive bans lead, mercury, cadmium, and hexavalent chromium in autos put on the market after July 1, 2003.¹³⁵

These design mandates directly force removal of toxic constituents from products, and their use in the European Union strongly suggests that a take-back requirement alone would not be sufficient to spur producers to remove hazardous materials from products. Indeed, according to many electronics manufacturers, it is the RoHS Directive rather than the take-back requirement under the WEEE Directive that is now prompting major changes in how electronics are produced globally.¹³⁶ Pursuant to the RoHS Directive, for example, manufacturers are actively finding substitutes for lead solder and mercury switches in electronics.¹³⁷ An old fashioned command-and-control chemical ban, which directly inserts government into the research and development labs of manufacturers, appears to be a far more powerful driver of changes in product design than the take-back requirement.

Given the amount of state control and the centrality of the RoHS substance ban, advocates are likely overstating how market-based EPR really is.¹³⁸ The RoHS substance ban is a useful tool for improving the ecological profile of electronics, and Part V of this Article advocates that the United States enact similar content standards in conjunction with new methods to fund electronics recycling.

¹³³ Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2003 O.J. (L 37) 19 [hereinafter RoHS Directive].

¹³⁴ *Id.* art. 4, ¶ 1, at 21. The RoHS Directive contains several exceptions to the substance bans for products for which no chemical substitutes were available, such as mercury in certain types of fluorescent lamps, or lead as a radiation shield in CRTs. *See id.*, Annex at 23.

¹³⁵ ELV Directive, *supra* note 83, art. 4, ¶ 2(a), at 37. Lead and cadmium in car batteries and a few other automotive uses are temporarily exempt. *Id.* Annex II, at 37.

¹³⁶ *See, e.g.*, INFORM, INC., IMPACT OF THE ROHS DIRECTIVE ON ELECTRONIC PRODUCTS SOLD IN THE UNITED STATES 1 (2003) [hereinafter INFORM, INC., ROHS IMPACT] (describing response to RoHS of manufacturers such as Panasonic and Sony and noting that “major electronics manufacturers generally make design changes and adopt new technologies on a global scale, affecting all of their products regardless of where they are manufactured and sold”). *See also* Marla Cone, *Europe’s Rules Forcing U.S. Firms to Clean Up*, L.A. TIMES, May 16, 2005, at A1; Toshio Aritake, *Japanese Electronics Makers Outline Plans for Early Compliance with EU Directives*, BNA INT’L ENV’T REP., Feb. 23, 2005, at 117.

¹³⁷ *See* INFORM, INC., ROHS IMPACT, *supra* note 136, at 1.

¹³⁸ For examples of scholarship describing EPR as market-based, *see* Fishbein, *EPR: What Does It Mean?*, *supra* note 65, at 55; Kroepelien, *supra* note 8, at 168.

C. Implications of Product-Oriented Environmental Legislation

If EPR is the leading edge of a wave of product-oriented legislation under the EU's Integrated Product Policy, what are its implications for environmental regulation in the European Union, and in the United States? If environmental policy begins to focus on the environmental impacts of products themselves, supplementing the traditional focus on regulating particular industrial sources of pollution, how will firms and regulatory agencies adapt? A few important implications deserve mention.

First, there will likely be very different enforcement challenges under product-oriented environmental regulations compared to enforcing facility discharge and emissions limits. Under a facility-based regime, a few dozen or a few hundred major industrial sources need to be monitored and policed, but the success of EPR legislation involves the actions of millions of consumers (in returning their products for collection) and thousands of municipalities and producers. Regulators will likely face substantial obstacles in monitoring and punishing violators, such as producers who put products on the market without paying an EPR fee, or producers who overstate their recycling figures.¹³⁹ On the other hand, the consequences of such non-compliance under product-oriented legislation are likely to be less grave for the environment than major industrial sources exceeding discharge or emissions limits.

Problems of enforcement and monitoring are similar whether an EPR program is implemented by a government entity or through a private Producer Responsibility Organization, as under the German Packaging Ordinance. Key objectives would be to minimize free-riding, both by consumers (who might use collection bins for non-covered waste) and by producers (who might falsely identify their products as part of an EPR system). Enforcement and monitoring issues "are not insignificant for a country the size of Germany, and they would be monumental for a country as populous and geographically large as the U.S."¹⁴⁰

Product-oriented legislation will likely prompt some rethinking about desired levels of enforcement. While some enforcement of EPR regulations will be important as a deterrent, the regime as a whole will likely need to tolerate an inevitable degree of free-riding and non-compliance. Sustaining compliance of the system as a whole, through soft instruments such as consumer education campaigns and incentives for retailer and municipal cooperation, will ultimately be more important for the success of product-oriented environmental policies than enforcing against particular instances of non-compliance. The primary objective of policy-makers would be to gain widespread consumer and producer "buy-in" for the goals of the program.

¹³⁹ Palmer & Walls, *supra* note 69, at 7.

¹⁴⁰ *Id.*

Enforcement of the EU Directives poses particular challenges because environmental enforcement in the European Union is a two-level game. Member States have primary authority to enforce the legislation they enact pursuant to the EU Directives. They are monitored to some extent by the Commission, but the Commission has only weak powers to discipline Member States for failing to carry out the Directives.¹⁴¹ Problems of enforcement, including gaining access to accurate information, can arise at both stages of the game. Indeed, numerous scholars have recognized a growing implementation gap in EU environmental law, where Member States have been slow to transpose Directives into legislation, where national legislation often differs substantially from what was intended at the EU level, and where Member States do not enforce their own legislation effectively.¹⁴² The WEEE and RoHS Directives began inauspiciously on this front. Twenty-four of the twenty-five Member States missed the August 2004 deadline to transpose the Directives into national legislation.¹⁴³

Successful implementation of product-oriented legislation such as EPR, which focuses on the back end of the product chain, is highly dependent on collection of goods from consumers prior to recycling. Regardless of the level of compliance by producers, if consumers do not cooperate in separating the targeted items, or if municipalities manage to collect only small amounts of the targeted items, the goals of EPR will be difficult to achieve, and products not separately collected will still be sent to landfills and incinerators. For example, the WEEE Directive requires that each Member State separately collect four kilos of WEEE per capita annually,¹⁴⁴ but four kilos is an aggregate figure across all product categories, meaning that the target could be met by collecting heavy appliances such as air conditioners and refrigerators. If that occurs, and lighter products such as cell phones or cordless phones are not collected, then the recycling targets that apply to those products will be rendered meaningless.¹⁴⁵ Product-oriented policies designed to spur recycling must therefore ensure that an adequate collection system is in place to supply the recycling facilities.

Finally, the cross-border trade implications of environmental regimes focusing on products are far greater than for regimes that target fixed industrial sources of pollution. In the European Union, the EPR Directives

¹⁴¹ See BAILEY, *supra* note 82, at 38–39. For a description of the procedures under which the Commission enforces against a Member State for failure to implement a Directive, see JEAN-PIERRE HANNEQUART, EUROPEAN WASTE LAW 36–38 (1998).

¹⁴² BAILEY, *supra* note 82, at 36–39. See also Stephen Breyer & Verle Heyvaert, *Institutions for Regulating Risk*, in ENVIRONMENTAL LAW, THE ECONOMY, AND SUSTAINABLE DEVELOPMENT, *supra* note 86, 335–36.

¹⁴³ See Press Release, European Commission, Electronic Waste: Two Important Directives Due to be Implemented in EU Member States, (Aug. 13, 2004), available at <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/1033>.

¹⁴⁴ WEEE Directive, *supra* note 7, at art. 5, ¶ 5.

¹⁴⁵ INFORM, INC., THE WEEE AND ROHS DIRECTIVES, *supra* note 118.

have been enacted pursuant to Articles 175 and 176 of the EC Treaty, relating to environmental protection, and those provisions provide that the EU Directives serve as a floor that Member States are permitted to exceed.¹⁴⁶ For instance, Member States may establish higher recycling targets, stricter timetables, or more reporting requirements, or they may apply the Directives to additional classes of products. Industry groups are concerned that such national variation in laws applying to products sold across Europe will be trade distorting and is antithetical to the Common Market.¹⁴⁷ Similar concerns may arise in the United States under the Dormant Commerce Clause, if individual states begin to enact product take-back legislation or specific product content standards, in the absence of Congressional action.¹⁴⁸

On the international plane, policies that address externalities from products have a global reach and can affect manufacturing practices around the globe, unlike facility-based regulation, which is necessarily restricted to sources within a jurisdiction. As noted above, the RoHS Directive is leading to major changes in electronics manufacturing in the United States, Europe, and Asia, as manufacturers seek substitutes for the substances banned under the Directive.

By focusing on products directly, countries are implicitly extending their jurisdictional reach in environmental policy. In theory, this could lead to a “race to the bottom” (as countries relax product standards to encourage foreign investment), but more likely, it will lead to a “race to the top” as a few large markets with stringent product policies (such as the European Union or Japan) are able to “export” their policies globally because foreign manufacturers will not want to be shut off from lucrative markets. Smaller foreign manufacturers that cannot easily retool their factories to serve different markets may be placed at a disadvantage. Will product-oriented environmental policies be used as disguised protectionist measures to favor local industry? Will such measures be deemed to be in conflict with the General Agreement on Trade and Tariffs (“GATT”), even if the measures are facially neutral, i.e., take-back requirements apply equally to domestic

¹⁴⁶ See Treaty Establishing the European Community, *supra* note 55, art. 176.

¹⁴⁷ See DETAILED POSITION OF ORGALIME’S ELECTRICAL & ELECTRONIC LIAISON COMMITTEE (EELC) IN COOPERATION WITH EUROPEAN SECTOR COMMITTEES ON THE WEEE AND RoHS DIRECTIVES 4 (Sept. 5, 2000) (noting that basing waste directives on Article 175 of the Treaty will lead to “differing national approaches and market distortions”); THE EU COMMITTEE OF THE AMERICAN CHAMBER OF COMMERCE, INITIAL DISCUSSION PAPER ON THE PROPOSED WEEE AND RoHS DIRECTIVES (Oct. 5, 2000) (arguing that if waste directives are based on Article 175, “[m]anufacturers will have to deal with variations of the same law in each member state.”).

¹⁴⁸ Because product-oriented environmental legislation would likely apply equally to products produced in a state and outside a state, courts would likely consider such legislation to be facially neutral, and any Dormant Commerce Clause would likely be considered under the balancing test of *Pike v. Bruce Church, Inc.*, 397 U.S. 137 (1970). Under this test, courts will sustain the regulatory measure as long as it is rationally related to a legitimate state interest, the effects on interstate commerce are incidental, and the burden on interstate commerce is not clearly excessive in relation to the state’s asserted interest. See *id.* at 142.

and foreign producers? While the GATT implications of product-oriented environmental legislation are beyond the scope of this Article, these are critical questions that policy-makers need to address. The American Electronics Association has already prepared a detailed position paper on why the WEEE Directive and bans on certain toxic substances in electronics violate the GATT.¹⁴⁹ On the other hand, one scholar has concluded that, at least with respect to packaging, take-back requirements would be deemed GATT-compliant or would fall under GATT's Article XX exception for measures related to conservation of exhaustible natural resources.¹⁵⁰

IV. EPR IN THE UNITED STATES

In contrast to Europe, the United States has not enacted product take-back legislation on a wide scale, and it has no comprehensive product policy to speak of. Numerous analysts have studied the differences in political culture between the United States and Europe that might explain the greater willingness in the European Union to impose new environmental obligations on producers.¹⁵¹ Relevant differences that have been cited include a stronger conception of individual and property rights in the United States, the legacy of the western frontier and the relative abundance of open space in the United States, and a greater mistrust of government in the United States.¹⁵² A Presidential model of government may contribute to more environmental gridlock compared to a parliamentary model, as legislators have less incentive to adopt the President's agenda (particularly if different parties control the Congress and White House) or concern themselves with issues of

¹⁴⁹ See AMERICAN ELECTRONICS ASSOCIATION, POSITION OF THE AMERICAN ELECTRONICS ASSOCIATION (AEA) ON THE EUROPEAN COMMISSION'S DRAFT DIRECTIVE ON WASTE FROM ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) (1999), available at <http://www.svtc.org/cleancc/weee/directive/weeeaea.htm> (arguing that the EU's proposed electronics substance bans would infringe GATT's prohibitions on quantitative restrictions as well as the Agreement on Technical Barriers to Trade); NATIONAL FOREIGN TRADE COUNCIL, INC., LOOKING BEHIND THE CURTAIN: THE GROWTH OF TRADE BARRIERS THAT IGNORE SOUND SCIENCE 72-73 (2003), available at <http://www.nftc.org/default/white%20paper/TR2%20final.pdf> (noting conflicts between the RoHS Directive and the GATT). For a detailed response from an environmental organization, see CLEAN COMPUTER CAMPAIGN, ANALYSIS OF THE AEA CLAIMS THAT THE PROPOSED EUROPEAN DIRECTIVE ON WASTE FROM ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE DIRECTIVE) WILL CONFLICT WITH THE WTO TRADE RULES (1999), available at http://www.svtc.org/cleancc/weee/euweee/directive/cc_aea.htm.

¹⁵⁰ See Salzman, *Sustainable Consumption*, *supra* note 8, at 1284.

¹⁵¹ See generally Breyer & Heyvaert, *supra* note 142; Marco Verweij, *Why is the River Rhine Cleaner than the Great Lakes (Despite Looser Regulation)?*, 34 LAW & SOC'Y REV. 1007 (2000); Robert A. Kagan, *Should Europe Worry About Adversarial Legalism?*, 17 OXFORD J.L. STUD. 165, 166 (1997) (explaining that the United States has a "uniquely aggressive" legal culture and that in no other country are "political decisions, such as the drawing of electoral district lines or the formulation of pollution control standards, so often re-examined and reversed by judges").

¹⁵² See, e.g., William E. Kilbourne et al., *A Multinational Examination of the Role of the Dominant Social Paradigm in Environmental Attitudes of University Students*, 33 ENV'T & BEHAV. 209 (2001); Verweij, *supra* note 151, at 1029-36.

implementation within the executive branch.¹⁵³ There are numerous access points in the American system for industry to block efforts to impose new environmental regulations, through campaign contributions, lobbying, and judicial challenges. In contrast, European institutions, and especially the European Commission, are more politically insulated and technocratic, with weak channels of formal influence by interest groups.¹⁵⁴

Another potential reason for the lack of major product legislation in the United States is that the time period within which waste disposal has become a more pressing policy problem (about twenty-five years) corresponds to the rise of the political right in the White House, Congress, and state houses across the United States. In the past ten years, while interest in EPR has intensified in Europe, the Republican Party has gained control of both houses of Congress, then the White House. There has not been a major environmental statute passed in the United States since 1990,¹⁵⁵ and key committee chairmen and congressional leaders are hostile to new environmental legislation. Major new legislation involving recycling mandates, new fees on producers, and a nationwide take-back obligation for products is highly unlikely in the current Administration and Congress, and there is no existing federal statutory authority in the United States for EPA to implement a product take-back requirement on its own.

In contrast, the European Parliament, which has had a strong influence on the EU's waste directives, is one of the most left-leaning and environmentally conscious legislative bodies in the world, with strong Green Party representation.¹⁵⁶ The Amsterdam Treaty strengthened the Parliament's decision-making powers with respect to environmental policy, and most environmental legislation now goes through a co-decision procedure between the Parliament and the Council.¹⁵⁷ These new procedures "have therefore created an avenue whereby the European Parliament can extend

¹⁵³ Verweij, *supra* note 151, at 1033 (using the Clean Water Act as an example of a Democratic Congress enacting legislation with unrealistic timetables, against the opposition of President Nixon).

¹⁵⁴ See Breyer & Heyvaert, *supra* note 142, at 309–10, 338–39 (comparing the adversarial approach to risk regulation in the United States with the more corporatist and technocratic approach in the EU).

¹⁵⁵ The Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified at 42 U.S.C. §§ 7505–7671 (2000)), are widely considered to be the last major piece of U.S. environmental legislation. See, e.g., E. Donald Elliott, *Chevron Matters: How the Chevron Doctrine Redefined the Roles of Congress, Courts, and the Agencies in Environmental Law*, 16 VILL. ENVTL. L.J. 1, 5 n.18 (2005). However, there have been some subsequent, but less significant legislative changes, such as the Food Quality Protection Act, Pub. L. No. 104-170, 110 Stat. 1513 (1996), the Safe Drinking Water Act Amendments of 1996, Pub. L. No. 104-82, 110 Stat. 1613 (1996) (codified at 42 U.S.C. §§ 300g–300j (2000)), and the Small Business Liability Relief and Brownfields Revitalization Act of 2002, Pub. L. No. 107-118, 115 Stat. 2356 (2002) (amending 42 U.S.C. §§ 9601–9675 (2000)).

¹⁵⁶ The Green Party won 5.46% of the seats in the 2004 elections. European Parliament Elections Website, Members of the EP, at http://www.elections2004.eu.int/ep-election/sites/en/results1306/parties_perc.html (last visited Oct. 23, 2005).

¹⁵⁷ BAILEY, *supra* note 82, at 21.

its influence on environmental decisions beyond those customary for a national parliament.”¹⁵⁸ Unlike in the United States, where the federal government cannot directly require states to adopt or implement environmental policy, the European Union has implemented environmental policy through a top-down structure in which EU Directives establish broad policy that Member States are required to carry out. As a result, concludes one leading scholar of EU environmental law, “the EU is now the driving force behind environmental policy across the majority of the continent.”¹⁵⁹

The lack of adoption of EPR in the United States likely reflects the United States’ historic neglect of product externalities in general. In the 1970s, when the major environmental statutes were enacted, Congress and the public focused on regulating emissions from major industrial sources, which were (and still are) the largest and most visible contributors to air and water pollution.¹⁶⁰ Emissions contributions from individual activities, or from specific products (other than automobiles), were simply too low in priority to receive regulatory attention.¹⁶¹ Exclusions for small polluters inserted into most environmental laws reflected the practical difficulties of imposing onerous administrative, record-keeping, and disposal requirements on individuals and small businesses. Notably, this focus on major industrial sources likely contributed to a widespread belief that the actions of individuals were not a significant cause of environmental harm.¹⁶²

U.S. environmental law has rarely regulated how products should be made, or the materials that should be used. In the thirty-five years of modern environmental law in the United States, there have been very few regulations aimed directly at product design or product externalities, other than those governing automobile fuel efficiency and emissions (which manufacturers fought bitterly), and laws in several states mandating recycled content in plastic packaging and newsprint.¹⁶³ In contrast, EU risk regulation has historically focused to a far greater extent on standard-setting for products themselves because of the origins of the European Union as a promoter of trade harmonization for goods and services.¹⁶⁴ The European Union has relied to a far greater degree than the United States on so-called “positive integration,” which involves adoption of harmonized product standards to smooth the functioning of the Common Market.¹⁶⁵ EU environmental policy now seems directly aimed at shaping the design of prod-

¹⁵⁸ *Id.* at 22.

¹⁵⁹ *Id.* at 17.

¹⁶⁰ See Michael P. Vandenbergh, *The Social Meaning of Environmental Command and Control*, 20 VA. ENVTL. L.J. 191, 206–08 (2001).

¹⁶¹ See Vandenbergh, *From Smokestack to SUV*, *supra* note 2, at 527–28.

¹⁶² See Michael P. Vandenbergh, *Order Without Social Norms: How Personal Norm Activation Can Protect the Environment*, 99 NW. U. L. REV. 1101, 1130–32 (2005).

¹⁶³ For a discussion of auto emissions standards and standards for plastic packaging and newsprint, see Salzman, *Sustainable Consumption*, *supra* note 8, at 1261–62.

¹⁶⁴ See Breyer & Heyvaert, *supra* note 142, at 316.

¹⁶⁵ *Id.*

ucts, at least at the margins, to “green” the flow of materials through the European economy.

The lack of political pressure in the United States regarding new waste management practices also reflects the relative abundance of landfill space in the United States. While the number of landfills in the United States declined by 78% between 1986 and 2001, from 7683 to 1858, disposal capacity remained constant because modern landfills are larger.¹⁶⁶ The National Solid Waste Association estimates that, using only existing landfills, the United States has twenty more years of landfill capacity.¹⁶⁷ There is enormous regional variation in capacity. Texas, for instance, is estimated to have forty-six years of capacity, while California has about thirteen years remaining and New York has less than ten.¹⁶⁸ In a recent survey, forty-one states indicated that landfill capacity would be added in the next few years.¹⁶⁹

Given these regional differences, there are heated arguments over whether there is a solid waste “crisis” in the United States,¹⁷⁰ and one’s position on this baseline issue is likely to be strongly correlated with one’s position on EPR or other recycling initiatives. That producers and consumers both face a zero price for waste disposal has undoubtedly contributed to a throwaway mentality in production and consumption decisions, to greatly excessive packaging, and to an inattention to the environmental impacts of product design. Despite these concerns, there is very little sense of crisis among the American public, and very little public pressure in the United States to take a more comprehensive approach to waste and consumption decisions.

The differences between the world’s two largest economic powers on environmental policy are reflected in their particular approaches to EPR. There are fundamental disagreements between the United States and the European Union on the utility of EPR and, in particular, whether producers should have any particular responsibility for environmental externalities from their products. The question of “who is the polluter?,” discussed *supra* in Part II, was debated at length in the first federal discussions on EPR, which occurred in the mid-1990s under the auspices of the Clinton Administration’s President’s Council on Sustainable Development (PCSD). U.S. industry groups strongly resisted the label of “polluter” with respect to discarded products, and to preserve consensus, the PCSD adopted the term “Extended Product Responsibility” to reflect a shared responsibility

¹⁶⁶ American Society of Civil Engineers, Report Card for America’s Infrastructure: Solid Waste [C+], <http://www.asce.org/reportcard/2005/page.cfm?id=33> (last visited Oct. 1, 2005) (on file with the Harvard Environmental Law Review).

¹⁶⁷ *Id.*

¹⁶⁸ See *The State of Garbage in America*, BIOCYCLE MAG., Jan. 2004, at 40. New York data estimated from landfill capacity in Table 7 (90,000,000 tons), and annual MSW landfilling in Table 4 (13,143,000 tons). *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ See, e.g., John Tierney, *Recycling is Garbage*, N.Y. TIMES MAG., June 30, 1996, at 24.

model in which mitigating the environmental impacts of products should be shared up and down the product chain (i.e., among manufacturers, distributors, retailers, consumers, and municipalities).¹⁷¹

Today, the rhetoric of Extended Product Responsibility continues to dominate discussions about product externalities in the United States, disfavoring waste policy solutions that impose particular take-back or other responsibilities on producers. Extended Product Responsibility is closely related to the concept of Product Stewardship, which is growing in importance as a waste management strategy in the United States. Product Stewardship programs usually involve voluntary approaches and multi-stakeholder dialogues between state governments, industry, and consumer and environmental groups to arrive at better management practices for particular products. Some states have implemented Product Stewardship initiatives for electronics waste, in which state environmental officials work with industries on voluntary measures to green the supply chain, educate consumers about disposal, and, in some cases, return discarded products to manufacturers.¹⁷² According to one study, more than fifty-two pieces of legislation concerning electronics waste have been introduced in twenty-six state legislatures.¹⁷³

Voluntary approaches to managing particular classes of hazardous products need to be encouraged. They allow for experimentation and close public-private cooperation on waste issues, and some progressive manufacturers are beginning to take proactive measures to manage their own products. Sony has a well-functioning program in Minnesota to take back Sony products, for example, and Apple recently announced it will take back its iPods for recycling. Major computer manufacturers such as Dell, IBM, and Sony, and retailers such as Best Buy, have also established voluntary programs to take back electronic waste, and in some cases they will take back products made by other manufacturers, or sold by other retailers.¹⁷⁴

¹⁷¹ Young, *supra* note 11, at 74–75; Gary A. Davis et al., *Extended Product Responsibility: A Tool for a Sustainable Economy*, ENV'T, Sept. 1997, at 12.

¹⁷² See, e.g., Amy Porter, *Minnesota is First State to Propose Extended Producer Responsibility Program*, BNA DAILY ENV'T REP., May 17, 1999 (describing Minnesota's voluntary product stewardship initiatives for carpets, paints, and CRTs).

¹⁷³ Joe Truini, *Stewardship Could Fall on States' Shoulders*, PLASTICS NEWS, at 71, June 23, 2003. See also Fishbein, *EPR: What Does It Mean?*, *supra* note 65, at 54. In March 2005, the Northeast Recycling Council and the Council of State Governments' Eastern Regional Conference began a joint effort to develop draft legislation for management of used electronics in the Northeast. See Linda Roeder, *10 Northeastern States Join in Seeking Unified Approach to Used Electronics*, 36 BNA ENV'T REP. 540 (2005).

¹⁷⁴ See, e.g., *Mail-Back Not Seen As Final Solution for Computer Waste in the US*, BUS. & ENV'T, July 1, 2001, at 11. Dell will recycle computers of any brand upon purchase of a Dell computer, and, even without a purchase, will recycle computers for an airbill fee of \$10.00. See Dell, *Dell Recycling* (2005), http://www1.us.dell.com/content/topics/segtopic.aspx/dell_recycling (last visited Jan. 3, 2006) (on file with the Harvard Environmental Law Review). Best Buy offers drop-boxes for cell phones and batteries in its stores and offers regional recycling events for a wide range of consumer electronics. See also Best Buy, Best

However, the voluntary model of product stewardship, standing alone, is probably not sufficient to make a significant difference in the U.S. waste stream, particularly for product classes with dozens of manufacturers. One of the earliest voluntary product stewardship programs was the rechargeable battery take-back program organized by the Rechargeable Battery Recycling Corporation (“RBRC”), a nonprofit created by battery manufacturers after passage of the Mercury Containing and Rechargeable Battery Management Act of 1996,¹⁷⁵ which lowered regulatory barriers to battery recycling. RBRC has established municipal and retailer collection points for rechargeable batteries and charges manufacturers a license fee for putting batteries on the market, the proceeds from which are used to fund collection and recycling (the fee is not scaled to provide incentives for better design). An independent study of RBRC activities conducted in 2005 concluded that the RBRC was falling far short of its recycling goals, and researchers had difficulty finding battery drop-off bins in retail stores that the RBRC website indicated as drop-off locations.¹⁷⁶ Due to lack of consumer knowledge and the ease of discarding electronics in the trash, voluntary initiatives by manufacturers and retailers have made only a small contribution to diverting e-waste from the municipal waste stream.

V. RECOMMENDATIONS

The EU experience with EPR highlights that a novel theory of environmental regulation, based on internalizing product externalities and incentivizing design changes through price signals from waste management, is difficult and costly to implement effectively. This Article therefore recommends that the United States examine alternative policy instruments to develop a more comprehensive product policy for the product classes that pose the most environmental hazards.

A U.S. product policy should include some components of Europe’s Integrated Product Policy, such as increased use of ecolabeling and government procurement standards that could help steer manufacturers toward producing greener products with minimal regulatory intervention. On the recycling front, the United States should identify the product classes that

Buy Community Relations—Recycling Events, <http://communications.bestbuy.com/communityrelations/Recycling.asp> (last visited Sept. 29, 2005) (on file with the Harvard Environmental Law Review). IBM will take back any manufacturer’s computer and peripherals for a fee of \$29.99. See IBM, Environment—Product Recycling Programs, <http://www.ibm.com/ibm/environment/products/perservice.shtml> (last visited Sept. 29, 2005) (on file with the Harvard Environmental Law Review).

¹⁷⁵ Pub. L. No. 104-142, 110 Stat. 1276 (1996), (codified at 42 U.S.C. §§ 14301–14336 (2000)).

¹⁷⁶ See INFORM Inc., *Inform Reports*, Spring/Summer 2005, at 3, 9, available at <http://www.informinc.org/INFORMReportsSMSP2005.pdf> (noting that RBRC was about 70% short of meeting the recycling goals in 2003 and 2004 that it had set in 1998). Less than half the stores listed on RBRC website as collection points actually had battery drop-off boxes. *Id.*

pose the greatest environmental impacts from production or disposal and then determine which party is in the best position, taking into account transaction costs, to fund an improved recycling infrastructure: consumers, taxpayers/municipalities, or, perhaps, producers funding recycling efforts on a collective basis. For electronics, available evidence from the European Union suggests that producer responsibility is an inefficient way to fund the system.

Electronics are at the top of the list of product classes that the United States needs to address.¹⁷⁷ This toxic waste stream is growing rapidly and is becoming increasingly difficult to manage. Many consumer electronics fail the Toxicity Characteristic Leaching Procedure (“TCLP”), a test for hazardous characteristics used in the United States and many other developed countries to simulate the acidic conditions of landfills.¹⁷⁸ In other words, if not for RCRA’s exclusions for household wastes, described in Part II, much of the consumer electronics waste stream would be stringently regulated as hazardous waste in the United States and would be required to be disposed in licensed hazardous waste facilities.

Ironically, EPA promulgated the household hazardous waste exclusion in 1980,¹⁷⁹ just as the consumer electronics revolution was in its infancy. While it is still infeasible to subject every household in the United States to RCRA’s stringent requirements for hazardous waste disposal, new kinds of policies are needed in the United States to reduce the trashcan disposal of electronics and ensure that a higher proportion of these products are recycled within the United States. The United States recycles only about 10% of its electronics waste stream.¹⁸⁰ A substantial portion of the U.S. electronics waste stream diverted to recycling is sent to Asia,¹⁸¹ where it

¹⁷⁷ Looking at the European experience, packaging appears to be a feasible item to which to apply EPR principles and spur changes in design, but there is little pressure to implement producer responsibility for packaging, with attendant transportation and logistical costs, in the United States. Indeed, given the low population density in many parts of the United States, the environmental impacts from transporting packaging long distances to recycling centers may outweigh recycling’s environmental benefits. Reynolds, *supra* note 128, at 67–68. On the supply side, the United States also has abundant supplies of natural resources, with relatively cheap access to paper, metals, and plastics, which could make it difficult for recycled materials to compete in the marketplace with virgin resources. *Id.*

¹⁷⁸ See 40 CFR § 261.24 (2004). TCLP results for computer monitors average about 18.5 mg/l for lead, or nearly four times the U.S. regulatory standard. See EXPORTING HARM, *supra* note 35, at 27. Circuit boards leach lead at an even higher rate. According to an Australian study, TCLP results for circuit boards range from 142 mg/L to 1325 mg/L for lead. ENVIRONMENT AUSTRALIA, GUIDANCE ON THE HAZARD STATUS OF WASTE ELECTRICAL AND ELECTRONIC ASSEMBLIES OR SCRAP UNDER THE HAZARDOUS WASTE ACT 13 (1999), available at <http://www.com-it.net.au/scrap.pdf>.

¹⁷⁹ See 45 Fed. Reg. 33,099 (May 19, 1980).

¹⁸⁰ NATIONAL SAFETY COUNCIL, *supra* note 43, at viii.

¹⁸¹ The Basel Action Network has estimates that eighty percent of U.S. electronics waste sent for recycling is actually shipped to Asia. EXPORTING HARM, *supra* note 35, at 11–12. In February 2003, fifteen recycling firms in the United States signed a “Pledge of True Stewardship” in which they agreed not to export hazardous electronics waste to developing countries. See Press Release, Basel Action Network and Silicon Valley Toxics Coalition,

is dismantled under abysmal environmental conditions, such as open burning of electronics, backyard acid-baths to extract metals from circuit boards, and dismantling electronic equipment without proper ventilation.¹⁸² As the United States develops a more comprehensive management plan for electronics waste, it should be based on the principle that the waste stream should be managed within our own borders.

A product policy targeting electronics need not be as sweeping as in the European Union, where the WEEE Directive encompasses many products that may have minimal environmental impacts, such as toys, hair dryers, power tools, and even electric fry pans.¹⁸³ The United States should focus on the largest contributors to the waste disposal problem, such as televisions, information technology equipment, audio equipment, and cell phones.

A key component of a U.S. product policy targeting electronics should be content standards similar to the EU's RoHS Directive. The RoHS Directive is already spurring large U.S. electronics manufacturers (and foreign manufacturers that sell in the United States and in the European Union) to change their production practices and find substitutes for the banned hazardous substances. Therefore, U.S. manufacturers may be receptive to similar content standards enacted in the United States, which would reduce the hazardous content of electronics and associated impacts from land-filling and incineration, even if electronics were not recycled.

Notably, California's Electronic Waste Recycling Act of 2003 already mandates that certain electronic products sold in California, with video displays larger than four inches, must be RoHS-compliant.¹⁸⁴ This state provision is likely to affect manufacturing nationwide for these products, given the size of the California market, and may elevate RoHS into a kind of

Finally, A Responsible Way to Get Rid of that Old Computer!: Electronics Recyclers Pledge: No Export, No Dumping, No Prisons (Feb. 25, 2003), *available at* <http://www.crra.com/ewaste/articles/finally.html>.

¹⁸² The environmental impacts of exported e-waste were amply documented in EXPORTING HARM, *supra* note 35. That report documents an undercover investigation in Guiyu, a town largely dedicated to e-waste dismantlement, in the Guangzhou region of southeast China. Common "recycling" practices in Guiyu included open burning, unregulated acid baths to remove precious metals from chips, manual dismantlement of toner cartridges with no respiratory protection, de-soldering circuit boards over open fires to extract lead, and dumping of unusable components and by-products along the banks of the Lianjiang River. Lab testing on one water sample from Guiyu found lead levels 190 times higher than WHO drinking water guidelines. Barium, tin, and chromium were found in sediments at 10, 152, and 1338 times EPA reporting thresholds, respectively. *See* EXPORTING HARM, *supra* note 35, at 17–22.

¹⁸³ *See* WEEE Directive, *supra* note 7, Annex 1B.

¹⁸⁴ *See* CAL. HEALTH & SAFETY CODE, § 25214.10(b) (2004) ("The department shall adopt regulations . . . that prohibit an electronic device from being sold or offered for sale in this state if the electronic device is prohibited from being sold or offered for sale in the European Union on and after its date of manufacture, to the extent that Directive 2002/95/EC, adopted by the European Parliament and the Council of the European Union on January 27, 2003, and as amended thereafter by the Commission of European Communities, prohibits that sale due to the presence of certain heavy metals.").

global electronics standard. Not only does the California legislation expressly reference RoHS, but it also provides that the list of prohibited substances in California will expand as the European Union amends RoHS to ban new substances.¹⁸⁵ It also precludes the California Department of Toxic Substances Control from issuing substance bans for electronics that are “in addition to, or more stringent than” RoHS.¹⁸⁶ That a U.S. state has adopted the product design standards of a foreign jurisdiction is a new frontier in environmental regulation and reflects the global reach of the EU’s move toward product-oriented environmental regimes. Enacting a RoHS-like content standard at the federal level is a sensible adjunct to the changes that are already taking place in the U.S. marketplace.

Because some toxic substances in electronics cannot be phased out (such as lead in CRTs or mercury in fluorescent bulbs), a more comprehensive U.S. policy for electronics should also include mechanisms for increased recycling. Prospects for increased recycling have improved since major electronics industry players committed, preliminarily, to the concept of a national management system for discarded electronics in the United States. The commitment came during talks under the National Electronics Product Stewardship Initiative (“NEPSI”), an EPA-sponsored dialogue among electronics manufacturers, environmentalists, retailers, and state and local regulators.¹⁸⁷ The goal of NEPSI was to achieve consensus among stakeholders on a management plan and then present model legislation to Congress. In a February 2004 consensus statement, the NEPSI participants recommended the creation of a national electronics management system to “ensure a level playing field and the environmentally sound management of used electronics.”¹⁸⁸ The NEPSI talks quickly fell apart, however, due to disagreements over how the new system would be financed.¹⁸⁹

A new recycling program for electronics in the United States should have two main goals: first, it should raise substantial new funds to create an improved collection and recycling infrastructure, and second, it should encourage manufacturers that choose to take back their own products on an individual basis to do so. If companies can design their products to contain fewer hazardous substances or to be more recyclable or more easily dismantled, they should be able to reap the financial benefits from doing

¹⁸⁵ *Id.*

¹⁸⁶ CAL. HEALTH & SAFETY CODE, § 25214.10(f)(1) (2004).

¹⁸⁷ NEPSI was organized in early 2001 with the goal of “develop[ing] a system, which includes a viable financing mechanism, to maximize the collection, reuse, and recycling of used electronics, while considering appropriate incentives to design products that facilitate source reduction, reuse and recycling; reduce toxicity; and increase recycled content.” See Press Release, NEPSI, National Dialogue Begins to Develop National Reuse and Recycling Solutions for Used Electronic Products (June 29, 2001), available at <http://eerc.ra.utk.edu/clean/nepsi/pdfs/PressRelease~6-29.pdf>.

¹⁸⁸ NEPSI Compromise Resolution (Feb. 26, 2004), available at http://eerc.ra.utk.edu/clean/nepsi/word_docs/NEPSI%20Final%20Resolution.doc.

¹⁸⁹ See *NEPSI Meets in Seattle for Crucial Session*, WARREN’S CONSUMER ELECTRONICS DAILY, June 12, 2003.

so within a closed-loop take-back system for their own products. Under such a system, individual responsibility would be “nested” within a larger recycling system and would remain a viable option for companies that believe there are cost savings from handling their own products.

A consumer-financed Advance Recovery Fee is a viable alternative to producer-financed systems that could achieve these dual goals. Retailers would forward the proceeds to a governmental authority that would fund municipal collection centers and subsidize private recycling operations to make recycling economical.¹⁹⁰ Tax incidence theory holds that some of the ARF would actually be absorbed by manufacturers or retailers, so the burden of funding the new recycling infrastructure would be shared.¹⁹¹

In 2003, California implemented an ARF for certain electronic devices containing video displays larger than four inches,¹⁹² and the Netherlands and Switzerland have used an ARF for a wide variety of consumer electronics and appliances.¹⁹³ The amount of the ARFs could be set based on the size, weight, or type of product.¹⁹⁴ If feasible, government officials could also correlate the fees with the constituents and environmental characteristics of products, but such correlation is not essential to the success of the program, as promoting design change is not the purpose of the fee. Rather, the purpose is to provide a dedicated source of funds for a substantially improved recycling infrastructure.

From the perspective of state and local governments, ARFs are attractive because they put a steady source of cash into government accounts to fund the recycling infrastructure that will be needed to manage waste (even “historic waste” already on the market when the ARF is enacted).¹⁹⁵ Recall that separate collection of waste is one of the major expenses of recycling programs, including those under EPR, and municipalities want to ensure that new requirements for recycling electronics do not become an unfunded mandate. Many manufacturers favor an ARF as well, because it leaves producers out of the collection and recycling process and may lead to a steady supply of subsidized secondary materials. However, in the NEPSI

¹⁹⁰ Subsidizing recycling would help reduce the flow of e-waste to Asia. According to a study prepared for EPA, the cost of recycling a computer is approximately \$0.38 per pound in the United States, but only \$0.15 to \$0.30 per pound in Asia, including all transportation costs. See Global Futures Foundation, *supra* note 22.

¹⁹¹ See, e.g., Eric Kades, *Drawing the Line Between Taxes and Takings: The Continuous Burdens Principle, and Its Broader Applications*, 97 NW. U. L. REV. 189, 241 (2002) (“Just because consumers nominally pay a sales tax at the time of purchase does not mean that they bear the entire burden of the tax, or indeed any of it.”).

¹⁹² CAL. PUB. RES. CODE § 42463(f)(1) (2005).

¹⁹³ TOJO, *supra* note 110, at 25, 32, 35–36. In both countries, the ARFs are flat fees that are not scaled to approximate environmental impacts. *Id.*

¹⁹⁴ The California law varies the fee depending on the size of the video display. CAL. PUB. RES. CODE § 42464(a) (2005). Retailers are permitted to keep three percent of the fees they collect to cover their administrative costs. CAL. PUB. RES. CODE § 42464(c) (2005).

¹⁹⁵ See *Much at Stake at Final NEPSI E-Waste Meeting*, WARREN’S CONSUMER ELECTRONICS DAILY, Feb. 10, 2004.

discussions, some manufacturers, such as Dell and Hewlett-Packard, opposed an ARF, favoring an individual responsibility model for product take-back that would allow them to reap the benefits of their efforts to “green” their products and make them more recyclable.¹⁹⁶

To satisfy these competing interests—raising revenue with minimal administrative costs while still providing options for companies that want to take back their own products—products whose manufacturers establish their own closed-loop product return systems could be exempted from the ARF. This kind of ARF “opt-out” would make products from manufacturers that establish their own take back systems cheaper in the marketplace. In other words, the ARF would be a kind of “play-or-pay” dedicated sales tax, in which companies could decide to establish their own product return-and-recycling systems or have their customers pay an extra fee to the state at the point of purchase to fund recycling.¹⁹⁷

An ARF has an additional benefit, not present in a producer funded take-back system: it would help consumers understand that there is a real environmental and disposal cost for products that they purchase that contain hazardous substances. It also would help consumers understand that pollution is not caused only by industrial firms, but also by individual consumption decisions.

U.S. environmental groups that have been active on the electronics waste issue generally oppose an ARF and advocate EPR policies that directly assign take-back responsibility to producers,¹⁹⁸ on the grounds that only EPR provides incentives for ecological design of products. As the Clean Computer Campaign, a coalition of U.S. environmental groups, has asserted, “[a] system that merely collects money at point of sale and hands it over to a government agency to ‘solve the problem’ does little to encourage clean production—since there are no built-in incentives in the approach to encourage better design”¹⁹⁹

¹⁹⁶ See *Govt. Groups to Push for Interim Financing System at NEPSI*, WARREN’S CONSUMER ELECTRONICS DAILY, Sept. 19, 2003. Cell phones are another example of a product for which it might be attractive to establish a closed-loop return system. Cell phones are usually sold at retail locations that also sell phone service, and the ongoing contract between the consumer and the phone service provider (which itself has contracts to buy millions of phones from manufacturers) would likely help cell phone manufacturers to implement take-back programs for their products on an individual responsibility basis. See Linda Roeder, *Cell Phone Businesses Leading Efforts to Recycle Electronics Products*, EPA SAYS, 36 BNA ENV’T REP. 420 (2005).

¹⁹⁷ Proceeds from an ARF would be used to fund collection of historic waste and orphan waste, in addition to “new” waste. An electronics recycling policy would have to ensure that companies that opt out by taking back their own products still make some financial contribution, at least in the initial years of the program, toward management of historic and orphan waste.

¹⁹⁸ See Computer TakeBack Campaign, *Advance Recovery Fees (ARFs) and the Need for Extended Producer Responsibility (EPR)*, http://www.computertakeback.com/legislation_and_policy/arf_epr.cfm (last visited Oct. 19, 2005) (on file with the Harvard Environmental Law Review).

¹⁹⁹ *Id.*

This view ignores the practical problems of implementing EPR on an individual-responsibility basis nationwide in the United States and the apparent preference in the European Union for collective EPR systems, which dilute or eliminate design incentives. Given the logistical hurdles of implementing mandatory product take-back on an individual responsibility basis, the real choice is between ARFs and recycling systems financed by producers on a collective basis—for example, on the basis of market-share, or flat fees paid by producers for putting certain products on the market—which provide few design incentives. An ARF with an opt-out for producers that establish their own take-back mechanisms at least provides some incentive for voluntary design changes.

VI. CONCLUSION

Extended Producer Responsibility, as outlined in the theoretical literature, appears to be a potentially revolutionary environmental policy that goes beyond facility-based regulation to shape the environmental impacts of products themselves. However, this Article, which critiques EPR in theory and practice, demonstrates that EPR may not be living up to expectations, and, indeed, does not appear to be providing dramatic incentives for a new era of ecologically friendly product design. While there is widespread agreement on the need to internalize externalities and “get the prices right” to achieve more sustainable production and consumption, it is often difficult to quantify the externalities from particular products, let alone force those costs back on producers with reasonable transaction costs. As a consequence, most of the existing EPR programs in the European Union have implemented collective-responsibility systems, which substantially dilute the necessary price signals and incentives for reducing the environmental impacts of products. The transaction costs of individual responsibility systems that could force true cost internalization—including, at the front end, assessment of fees correlated to product constituents and recyclability and, at the back end, separate collection from consumers of specific products or specific brands—appear to be substantial. Policymakers need to consider carefully such transaction costs in evaluating which parties are best positioned to absorb long-term responsibility for the environmental impacts of products.

Proponents of EPR may be relying on one policy to accomplish too many goals, including raising revenue for recycling, shifting the waste burden from municipalities, reducing use of virgin materials, and providing a financial incentive to improve the environmental characteristics of products. An economics maxim holds that at least as many policy instruments are needed as policy objectives,²⁰⁰ and a mix of policy instruments will

²⁰⁰ Margaret Walls & Karen Palmer, *Upstream Pollution, Downstream Waste Disposal, and the Design of Comprehensive Environmental Policies*, 41 J. ENVTL. ECON. & MGMT.

likely be necessary to mitigate the environmental externalities from products. The EU's Integrated Product Policy reflects this multi-pronged approach. The United States does need a more comprehensive approach to product externalities, which are neglected under environmental regimes that focus only on manufacturing facilities, but the lessons from implementing EPR should prompt thorough consideration of alternative approaches.

94, 96 (2001). See also Margaret Walls, *EPR Policy Goals and Policy Choices: What Does Economics Tell Us?*, in OECD, *ECONOMIC ASPECTS OF EPR*, *supra* note 96, at 21 (noting that the goals of EPR need to be clarified and that it is an open question of whether EPR is "intended to deal with waste volumes, the toxic constituents of waste, the method of waste disposal, or a combination of these things").