E-Waste & the Regulatory Commons: A Proposal for the Decentralization of International Environmental Regulation

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E-WASTE & THE REGULATORY COMMONS: A PROPOSAL FOR THE DECENTRALIZATION OF INTERNATIONAL ENVIRONMENTAL REGULATION

INTRODUCTION

In an isolated junkyard at the edges of Lagos, Nigeria, hundreds of laborers, including young children, pick apart remnants of discarded electronics to recover valuable minerals such as gold and copper. Unaware of the dangerous carcinogens and harmful chemicals that abound in the electronic waste (“e-waste”), these workers often burn the e-waste in open air and further expose themselves to extremely toxic materials. Today, increasing demand for the latest technologies drives the fastest growing, and potentially most dangerous, waste stream worldwide. Developing countries are the most common destinations


2. Studies indicate that the bodies of those who live near these e-waste dumps have the highest amount of cancer-causing dioxins in the world. See Janet K.Y. Chan et al., Body Loadings and Health Risk Assessment of Polychlorinated Dibenzo-p-dioxins and Dibenzofurans at an Intensive Electronic Waste Recycling Site in China, 41 ENVTL. SCI. & TECH. 7668, 7672 (2007) (noting that breast milk of women who worked in electronic waste recycling centers had more than two times the concentration of dioxins than do women working in a control site and that their placentas had nearly three times the concentration of dioxin than do women at the control site).

for these wastes. For instance, the United Nations Environment Programme ("UNEP") reports that African countries are quickly becoming the final destination for the world’s e-waste. Usually this waste is broken apart and burned by young boys in countries like China. A 2007 study found that blood lead levels of children in Guiyu, China were 50% higher than the maximum safe exposure set by the Centers for Disease Control and Prevention in the United States.

Electronics represent the world’s largest and fastest growing manufacturing industry, and the exponentially growing pace of consumer demand for new gadgets fuels the growth in e-waste. This waste includes electronic devices such as computers, mobile phones, television sets, entertainment devices, and refrigerators. Additionally, any components of these products,
E-WASTE

including cathode ray tubes ("CRTs"), circuit boards, and ink cartridges, which are "sold, obsolete, broken or discarded by their original owners," are also considered e-waste. As a result of the rapid pace of innovation and the related issue of product obsolescence, e-waste is one of the fastest growing types of waste in the industrialized world. In fact, the United Nations projects global e-waste volumes will grow from 48.9 million metric tons in 2012 to 65.4 million metric tons in 2017, or "the weight equivalent of 200 Empire State Buildings or 11 Great Pyramids of Giza." Yet consumers who choose to refurbish or recycle their unwanted electronics often must spend large sums of money or make long trips to designated recycling centers, and often have few affordable and accessible disposal options for electronic waste.

As this Note will discuss, in addition to the Basel Convention on the Transboundary Movement of Hazardous Wastes and

There is, however, no legal definition for e-waste. For example, California has not been able to determine if certain items, like microwave ovens and similar appliances like toaster ovens or blenders, should be considered e-waste).


15. See Billinghurst, supra note 13, at 400.

16. Id.
their Disposal of 1989 ("Basel Convention")\textsuperscript{17} and the proposed Basel Ban Amendment,\textsuperscript{18} the promulgation of various regulations to manage e-waste—such as the European Union’s Waste Electrical and Electronic Equipment ("WEEE") Directive\textsuperscript{19} and the Directive on the Restriction of the Use of Hazardous Substances ("RoHS"),\textsuperscript{20} as well as the United States’ Resource Conservation and Recovery Act ("RCRA")\textsuperscript{21}—has done little to address the growing e-waste problem or the loopholes associated with the Basel Convention.\textsuperscript{22} The Basel Convention also conflicts with international trade law as enforced by the World Trade Organization ("WTO").\textsuperscript{23} Despite various efforts to regulate e-waste disposal, the proliferation of legislation has yielded unsatisfactory outcomes and has even created adverse effects.\textsuperscript{24} Examined together, the inefficiencies of e-waste regulation exemplify the findings of the "regulatory commons" as described by Professor William Buzbee.\textsuperscript{25} These inefficiencies can be overcome by shifting the burden of regulation from weak international entities to more authoritative private actors through

\begin{itemize}
  \item \textsuperscript{21} 42 U.S.C.A. §§ 6901-6992k (1976).
  \item \textsuperscript{22} See generally Christine Terada, Recycling Electronic Wastes in Nigeria: Putting Environmental and Human Rights at Risk, 10 NW. U. J. INT’L HUM. RTS. 154 (2012).
  \item \textsuperscript{24} Terada, supra note 22.
\end{itemize}
democratic experimentation analogous to Japan’s Specified Home Appliance Recycling Law (“SHAR”).

The regulatory commons is a reinterpretation of the classic paradox of the tragedy of the commons, in which a natural resource is exploited due to lack of regulation and accountability; in the regulatory commons, however, regulation itself is the overexploited resource. Overregulation poses regulatory challenges and, ironically, gives rise to decentralization mechanisms that actually enable more effective regulation. The coexistence of multiple forms of regulation often produces problems, including “jurisdictional mismatch” and “regulatory fragmentation.” Furthermore, in contrast to the tragedy of the commons, in the regulatory commons there is rarely a single government regulator.


27. The tragedy of the commons is commonly used to characterize environmental resource management problems, as first put forth in Garrett Hardin’s seminal paper. In the classic tragedy of the commons, each private actor, for example, as a fisherman, has an incentive to catch as many fish as possible. The unchecked pursuit of self-interest, however, under circumstances where a given resource (e.g., fish) is finite, leads to overexploitation of the resource. Over time, resource extraction (e.g., fishing) exceeds the reproduction and replacement rates, which in turn leads to the depletion of fish stocks and the ultimate failure of fishing businesses. Hardin proposes that private property rights in a resource help actors avoid such market failure because property rights incentivize the holders of those rights to manage the resource sustainably, leading to optimal, long-term productivity of the resource. Garrett Hardin, The Tragedy of the Commons, 162 SCIENCE 1243 (1968).


29. Id.


regulatory commons, this Note proposes that in the context of the growing e-waste stream, decentralization, while counterintuitive at first glance, is a better approach to effectively promoting human and environmental health because it capitalizes on solutions inherent in the regulatory commons.

Part I provides an overview of e-waste, its harmful effects on the developing world, the backdrop for e-waste regulation, and the weaknesses of e-waste regulation as embodied in the Basel Convention, the proposed Basel Ban Amendment, the WEEE and RoHS Directives in the European Union, and RCRA in the United States. Part II presents the paradox of the regulatory commons, a twist on the classic model of the tragedy of the commons, by showing that the regulatory opportunity is the overregulated resource. Part II then applies this paradox to existing e-waste regulations, including the Basel Convention, the proposed Basel Ban Amendment, the WEEE and RoHS Directives, and RCRA, as well as potential conflicts with the WTO’s trade regulation, and discusses how the proliferation of these regulations manifests problems of the regulatory commons. Finally, Part III proposes ways in which international environmental laws can be decentralized to reconcile the regulatory commons paradox and more effectively regulate e-waste.

I. BACKGROUND OF E-WASTE AND ITS REGULATION

A. Harmful Effects of E-Waste on the Developing World

E-waste poses significant risk to humans and the environment. It consists of recyclable materials, such as plastics and aluminum, as well as many toxic organic pollutants known as polychlorinated biphenyls (“PCBs”). This class of pollutants includes copper, gold, iron, lead, thallium, and zinc, all of which can lead to birth defects. The CRTs in computer and TV mon-

35. *The Friday Times*, supra note 10. See also Joseph F. C. DiMento, *The Global Environment and International Law* 111 (2003) (citing a notorious anecdote in 1988 involving a shipment from Italy of 18,000 drums of waste, including PCBs and asbestos, to an “unscrupulous businessman” in Koko, Nigeria, which led to so many hospitalizations and premature births that
itors also contain lead, leading to the serious consequence of lead poisoning. Additionally, many electronics contain cadmium, which is a carcinogen, and mercury, which, in large doses, can cause neurological disorders. Furthermore, plastic parts often contain toxic flame retardants. A common method of taking apart e-waste is to burn electronic equipment in an open fire in order to melt away plastics and inexpensive metals. Many disposal methods, including burning, unleash dangerous carcinogens and neurotoxins, pollute water supplies, and lead to allergic reactions, not limited to skin and respiratory tract disorders. The methods used in the disposal of e-waste also release pollutants, such as black soot, carbon dioxide, and carbon monoxide, into the atmosphere. Moreover, e-waste lying undisturbed in landfills can be just as harmful because it contains heavy metals such as copper, lead, and merc-

Nigeria subsequently banned the importation of hazardous wastes and implemented the death penalty for violations).

36. Approximately 75% of all CRTs disposed of in the United States are exported for refurbishing, but only approximately 30% are actually appropriate for such refurbishing; the remainder of the CRTs are dumped. MADELEINE COBBING, TOXIC TECH: NOT IN OUR BACKYARD, UNCOVERING THE HIDDEN FLOWS OF E-WASTE, 47 (2008), available at http://www.greenpeace.org/international/Global/international/planet-2/report/2008/2/not-in-our-backyard-summary.pdf. See also Childhood Lead Poisoning, CTR. FOR DISEASE CONTROL & PREVENTION, http://www.cdc.gov/lead (last visited Jan. 17, 2014) (noting that lead poisoning results in serious harm to nearly every bodily system, as well as learning disabilities, behavioral problems, and even seizures, coma, and death).


40. THE FRIDAY TIMES, supra note 10.

41. Id.

cury, which can leach into the soil and groundwater over time.43 Developed countries have strict regulations that seek to curb e-waste’s damage within their borders, often dumping them in developing countries, which disproportionately bear the toll that e-waste inflicts on environmental and human health.44 Although a number of Western countries have banned disposing of old computers in landfill sites and have required that they be recycled, recycling can cost “tens of dollars per computer.”45 For many developed countries, the more cost-effective alternative is to export old electronics to developing countries, where regulations on e-waste are either nonexistent or neglected.46 In Europe, for example, only one third of e-waste is treated in compliance with the WEEE Directive.47 Exporters often disguise illegal e-waste as “secondhand goods” and “for charities” to developing countries in Africa.48 As a result, China, India, and African countries, which can provide cheap labor and adhere to less stringent environmental laws, or lack such environmental laws entirely, are the end destinations for e-waste.49 Thus, the same countries regulating e-waste are also often the ones illegally exporting e-waste to the developing world.50 Nevertheless, developing countries have embraced e-waste recy-

43. The Friday Times, supra note 10.
44. Mountains of Toxic E-Waste, supra note 42.
46. Mountains of Toxic E-Waste, supra note 42. See also Black, supra note 45.
49. Mountains of Toxic E-Waste, supra note 42.
clinging for its employment opportunities and the potential to recover economic value from precious metals such as copper, gold, silver, indium, and palladium.\textsuperscript{51}

\textbf{B. Global E-Waste Regulations: An Overview}

The Basel Convention presents the foundation for international regulation of the movement of hazardous waste from industrialized to developing countries.\textsuperscript{52} The Basel Convention sets forth three primary goals: 1) the minimization of hazardous waste ("waste reduction principle"), 2) the disposal of waste close to its source of origin ("proximity principle"), and 3) the decrease of transboundary movement of waste.\textsuperscript{53} In an effort to achieve these goals, the Basel Convention establishes six rules. First, waste is a "bad," as opposed to a usable and tradable good, that harms human and environmental health and thus should not be traded.\textsuperscript{54} Second, waste must be minimized at its source and disposed of in the state where it was created.\textsuperscript{55} Third, developed countries that originally generated the waste must manage its disposal in a more acceptable fashion and must only export waste to other countries when it is for recycling and upon the prior, informed consent of the importing

\textsuperscript{51} Mountains of Toxic E-Waste, supra note 42.


\textsuperscript{53} About the Convention, BASEL CONVENTION, http://www.basel.int/convention/basics.html (last visited Jan. 17, 2014). The Basel Convention identifies waste either by its place of disposal or by its recovery process. Annexure IV of the Convention lists these various recovery processes. For example, almost all materials recycled or processed in order to recapture a metal, or an organic or inorganic substance for future use, are listed as waste. On the other hand, electronic components that can be used without further processing are not generally defined as waste. The Basel Convention further divides waste into two lists: List A in Annexure VII for "hazardous" waste that "poses serious threats to the environment and human health" and that requires "special handling and disposal processes," and List B in Annexure IX for non-hazardous waste, which is not regulated by the Basel Convention. Most e-waste is categorized under List A and is subject to the Basel Convention.


\textsuperscript{55} Basel Convention, supra note 17, art. 4.
country. 56 Fourth, the Basel Convention acknowledges that
countries have a “sovereign right” to ban the import, entry, or
disposal of hazardous wastes. 57 Fifth, the Basel Convention
bans trade between parties to the convention and nonparties. 58
Sixth, the Basel Convention bans export of hazardous wastes to
those member states whose domestic laws prohibit the import
of hazardous wastes. 59

Despite the Basel Convention’s noble goals, various parties
stand to benefit economically from e-waste trade that violates
the Basel Convention. 60 For example, importers, traders, and
recyclers have continued to exploit loopholes in the Basel Con-
vention under pretexts of e-waste disposal for recycling or re-
use. E-waste recycling is often profitable to importers because
electronic equipment contains small quantities of valuable ma-
terials such as gold and copper that can be extracted, re-
claimed, and then resold. 61 In fact, the Basel Action Network
(“BAN”), a nonprofit group named after the Basel Convention
and focusing on combating toxic waste, estimates that as much
as 99% of the waste that is shipped to developing countries is to
be recycled or reused. 62 At the same time, developing countries
lack the infrastructure needed to track the e-waste or oversee
handling. 63 Furthermore, people are often uninformed of the
procedure to report a claim to international authorities such as
Interpol and to take action against e-waste that is disposed of

56. Id. arts. 4, 6.
57. Id. preamble.
58. Id. art. 4.5.
59. Id. art. 4.1.(a). The Basel Convention does, however, permit trans-
boundary movement of hazardous waste if the country of origin is unable to
safely dispose of it. Id. art. 4.9.(a).
60. See Jerrold A. Long, Protocol on Liability and Compensation for Dam-
age Resulting from the Transboundary Movements of Hazardous Wastes and
instance, the Basel Convention does not hold exporters liable for damages
occurring after the importer received “operational control” of the waste. Con-
sequently, countries lack incentive to ensure that facilities exist in the im-
porting country, so that importing countries disproportionately bear the costs
of enforcement.
61. Vinutha V., The E-Waste Problem, EXPRESS COMPUTER ONLINE (Nov.
62. Charles W. Schmidt, Environmental Crimes: Profiting at the Earth’s
63. Id. at 102.
When authorities are unable or unwilling to oversee the waste and monitor illegal dumping, e-waste is dumped as an afterthought. Therefore, countries like China, India, and Pakistan continue to be the primary dumping grounds for e-waste from industrialized countries.

In 1995 developing countries sought to overcome the Basel Convention’s loopholes in connection with recycling and reuse through the Basel Ban Amendment, which seeks to ban the export of all hazardous wastes from the twenty-nine “Annex VII countries” (Basel Convention signatories that also belong to the European Union or to the Organisation for Economic Co-operation and Development (“OECD”)) to the non-Annex VII countries (all other signatories to the Basel Convention). If implemented, the Basel Ban Amendment would ensure that developed countries keep e-waste within their own borders, and would effectively shift the burden from developing countries—to turn away imports of hazardous wastes—to industrialized countries—to prevent such exports. Nevertheless, the Basel Ban Amendment has not taken effect because it has not yet met the Basel Convention’s requirement for ratification by three-fourths of Basel Convention parties. In fact, when the Basel Ban Amendment was proposed, Greenpeace, a leading non-governmental organization dedicated to environmental protection, labeled several developed countries the “sinister seven” for they were key opponents of the Basel Ban Amendment. Against this backdrop of the failures of the Basel Con-

64. Id. at 98.
65. Id. at 98.
66. Vinutha, supra note 61.
68. Basel Ban Amendment, supra note 18.
69. Id.
70. The Basel Ban Amendment requires sixty-six country ratifications, representing three-fourths of the eighty-seven parties present at the Third Meeting of the Conference of the Parties, to take effect. Despite the fifty-one ratifications, the issue as to when the Basel Ban Amendment shall enter into force remains controversial. Ban Ratification Deposit Box, Basel Action Network, http://www.ban.org/deposit-box/ (last updated Mar. 27, 2013).
71. These countries are: Australia, Canada, Germany, Japan, the Netherlands, the United Kingdom, and the United States. Jim Puckett & Cathy Foigel, A Victory for Environment and Justice: The Basel Ban and How it Hap-
vention, global regulations have proliferated and aim to tackle e-waste disposal. These additional regulations, however, actually exacerbate the problem by fostering the exploitation of a resource, namely regulation itself. This exploitation is manifested by the paradox of the regulatory commons.

The EU’s enactment of the WEEE Directive in January 2003 represents the first significant producer takeback, or Extended Producer Responsibility (“EPR”), program, along with the recent WEEE Recast Directive in July 2012. Both measures, however, fall short of achieving their intended goals. The WEEE Directive mandates that private sector producers fund and coordinate collection facilities for consumers to properly dispose of or recycle e-waste at no cost to the consumer. On its face, the WEEE Directive is a blanket regulation covering all e-waste, regardless of its source or quantity. Ideally, the WEEE Directive would shift the entire burden of e-waste recycling and disposal to the original producers and compel manufacturers, retailers, consumers, waste operators, and the government to participate in all steps of the waste recovery process.

72. EPR places the onus on producers to provide for the long-term environmental responsibility of their products in a “cradle-to-grave” chain, from production to distribution to recycling, reuse, and sustainable product design. Noah Sachs, Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States, 30 HARV. ENVTL. L. REV. 53, 53, 65-69 (2006). Before 2003, the EU’s e-waste management landscape was similar to the present situation in the United States, in that there was no comprehensive e-waste policy, although some EU countries such as Belgium, Denmark, Germany (e.g. Packaging Ordinance legislation enacted in 1991), Italy, the Netherlands, Norway, and Sweden had such manufacturer takeback policies before 2003.


75. See Sachs, supra note 72, at 77 (discussing how the WEEE Directive mandates that manufacturers take back all household appliances and electric tools, among other wastes).

tionally, the WEEE Recast Directive seeks to expand the scope of the original WEEE Directive, strengthen takeback programs, increase EU member states’ waste collection rates, and streamline registration and reporting requirements, among other goals. Nevertheless, the effectiveness of the WEEE Directive and the WEEE Recast Directive are undermined by inconsistencies.

The European Union also sought to structure the WEEE Directive to create ways for manufacturers to develop more environmentally friendly electronics and implemented the RoHS Directive in February 2003, in tandem with the WEEE Directive, to ensure that hazardous materials are removed from electronic devices. The RoHS Directive mandated that manufacturers cease using six substances in electronic goods sold within the European Union by 2006: lead, mercury, cadmium, hexavalent chromium, polybrominated bi-phenyls, and polybrominated diphenyl ethers. Similarly to the WEEE Directive...
rective, the EU recast the RoHS Directive ("RoHS II") and expanded the scope of the original RoHS Directive to all electronic equipment, cables, and spare parts by 2019. In effect, RoHS II seeks to establish “improvements in implementation, enforcement and coherence.” Although most electronics manufacturers have been able to modify products to satisfy the RoHS Directive, the RoHS Directive and RoHS II’s strict mandate, in combination with the WEEE Directive, manifest the challenges of the regulatory commons. Collectively, the RoHS and WEEE Directives reduce the sense of social need in regulatory actors charged with their enforcement.

In the United States, RCRA was enacted in 1976 to oversee creation and disposal of waste. In pertinent part, RCRA exempts the export of potentially hazardous e-waste from any export controls to other countries by claiming it is intended for recycling. Additionally, RCRA states that equipment with the glass components of CRTs because there is no suitable alternative. Council Directive 2011/65, art. 2, 2011 O.J. (L 174) 5 (EU) (delineating the scope of products affected by the RoHS Directive, which does not include devices with medical or military applications). See also Directive 2002/95/EC, supra note 20, art. 4.


84. The RoHS Directive has led to more investment by manufacturers into research and development in order to develop new, cleaner designs and manufacturing techniques, and to clean up devices sold worldwide. Kutz, supra note 11, at 328. See also Sachs, supra note 72, at 93-94.


“potential for reuse” is not waste, so many electronic products at the end of their usable life cycle are not classified as “waste” and are therefore excluded from the RCRA regulation. The reach of RCRA is further limited by the EPA’s narrow definition of “hazardous.” Additionally, RCRA only covers materials that emit dangerous chemicals during their use, so electronics and harmful e-waste are generally excluded, even though they harm human and environmental health after the end of their life cycle.

Unfortunately, a 2004 gathering convened by the EPA further reinforced the fact that RCRA can no longer control today’s overwhelming, and ever increasing, e-waste stream, a fact which could not have been anticipated at the time RCRA was enacted. To date, there is no nationwide e-waste recycling or safe disposal law in the United States. Even if RCRA were fully relevant, it is undermined by conflicting overlap with EPA regulations. For example, RCRA is only enforced against large businesses, not private consumers and small businesses.

88. U.S. GOV’T ACCOUNTABILITY OFFICE, supra note 8.
89. Even though the EPA now considers CRT computer monitors to be hazardous, for many years CRT computer monitors were not registered on Toxicity Characteristic Leachate Procedure (“TCLP”) lead toxicity tests. Courtney, supra note 76, at 205-06.
90. OFFICE OF TECH. POL’Y, U.S. DEPT. COMMERCE, RECYCLING TECHNOLOGY PRODUCTS: AN OVERVIEW OF E-WASTE POLICY ISSUES 3-4 (2006), available at http://www.bvsde.paho.org/bvsacd/cd57/recycling/intro.pdf. The National Electronics Product Stewardship Initiative (“NESPI”) brought stakeholders in waste disposal together, including state and local governments, recyclers, and environmental organizations. NESPI recognized the need for a national law to better manage waste but no consensus has been reached on a financing method for such regulation.
92. See 40 C.F.R. §261.4(b)(1) (2010) (exclusion for household waste); 40 C.F.R. §261.5(f)(3) (2010) (conditional exclusion for companies that produce less than 100 kilograms of hazardous waste per month). See also Sachs, supra
RCRA “has exempted more and more toxic wastes simply because they allegedly destined for recycling operations” or to other economically challenged institutions that take these wastes in the guise of “donations.” Organizations that take public donations like Goodwill and the Salvation Army are reluctant to accept discarded computers because of high disposal costs. Taken together, the loopholes present in RCRA enforcement manifest regulatory fragmentation in e-waste control.

Thus, this Note proposes that global regulators may improve the effectiveness of environmental laws by adopting the lessons of the regulatory commons to create economic incentives for e-waste producers, recyclers, and consumers alike, while enabling states, especially in the developing world, to better protect human and environmental safety. In the particular context of the growing e-waste stream, this Note suggests that, while counterintuitive at first glance, decentralization may be a better approach to effectively promoting human and environmental health.

II. THE PARADOX OF THE REGULATORY COMMONS

A. The Classic Tragedy of the Commons: The Regulatory Commons

The regulatory commons is a variation on the classic paradigm of the tragedy of the commons. In the tragedy of the commons, rational, individual actors overuse a resource that no one individual owns or controls, resulting in the destruction of each individual’s long-term interest. This overused resource is

note 72, at 58 (noting that U.S. households produce over 1.6 million tons of hazardous waste annually).
93. Thakker, supra note 86, at 60 (citing a 2002 report from BAN).
96. Buzbee is the first to engage in serious exploration of the existence of the “regulatory commons.” See Buzbee, supra note 25. Other legal scholars have only referenced the concept in passing. See, e.g., William A. Fischel, Vot-
called a “fugitive resource” and each actor uses that resource in a way that most immediately benefits him or herself. In the long run, the actors in the tragedy of the commons overuse and deplete the particular resource. The traditional solution, in theory, is to privatize property by creating property rights so that individual actors can better manage externalities, share information, and reduce transaction costs.

The regulatory commons centers on regulation itself, also known as the “regulatory opportunity,” as the overused resource, in lieu of some natural resource that is vulnerable to depletion. Whereas the tragedy of the commons assumes that the actor is a rational individual motivated by monetary interests, the regulatory commons assumes that the government actor is not only motivated by monetary interests but also by electoral, ideological, and political interests. Such symptoms

ing, Risk Aversion, and the NIMBY Syndrome: A Comment on Robert Nelson's “Privatizing the Neighborhood,” 7 GEO. MASON L. REV. 881, 896-97 (1999) (noting that local governments tend to overregulate and that the Takings Clause of the U.S. Constitution deters “local governments [from] devolv[ing] into a kind of regulatory commons, in which each knows that its behavior may be harmful to the larger area, but none has the incentive to mend its ways on its own”); Thomas W. Merrill, Golden Rules for Transboundary Pollution, 46 DUKE L.J. 931, 985 (1997) (noting that any legal government system is akin to “a kind of regulatory commons, where effective action is dependent upon alliances of groups overcoming collective action barriers and pressuring administrators to respond.”).


99. Completely privatized rights in a resource prone to depletion, however, still rely on robust legal frameworks to maintain and enforce those rights through judicial and regulatory regimes. They also introduce new costs of creating and policing the private property regime and the tradeoff with a community property system. James E. Krier, The Tragedy of the Commons, Part Two, 15 HARV. J.L. & PUB. POL’Y 325, 332-35 (1992) (citing Harold Demsetz, Toward a Theory of Property Rights, 57 AM. ECON. REV. 347 (Papers & Proc. 1967)).

100. Buzbee, supra note 25, at 22.

are already present in laws aimed to manage such varied resources as aquaculture, urban sprawl, global warming, and bioengineered foods. For instance, aquaculture involves an industry where conflicting regulation over harvesters of ocean and river resources creates a state in which individual fishers are unable to privatize property and consequently are unable to exclude other fishers from taking the resource.

Overuse of the regulatory opportunity in the regulatory commons poses a range of legal and societal problems. Consider, for example, the problem of “jurisdictional mismatch.” When no regulator has primacy over other regulators of the regulated activity (such as the lack of a central government exerting power over local governments and administrative agencies), regulators experience mass political inattention and actually neglect the underlying problem. Additionally, “regula-

cussing how legislators’ ideology is “the most potent explanatory variable” used in evaluating legislators’ actions).

102. On a domestic level, in the United States, there is no clear primary regulator. Jurisdiction is shared by the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the Fish and Wildlife Service, and the Food and Drug Administration, as well as state and local fisheries and wildlife agencies. See Erin R. Englebrecht, Can Aquaculture Continue to Circumvent the Regulatory Net of the Magnuson-Stevens Fishery Conservation and Management Act?, 51 EMORY L.J. 1187, 1199-1207 (2002).

103. Again, on a domestic level in the United States, urban sprawl continues to be a problem but various forms of political action on the state level have not been effective in addressing the issue. See, e.g., William W. Buzbee, Sprawl's Dynamics: A Comparative Institutional Analysis Critique, 35 WAKE FOREST L. REV. 509 (2000).


106. See Englebrecht, supra note 102, at 1190-91 (defining aquaculture).


108. See also Esty, supra note 30, at 1538.

109. See Krier & Ursin, supra note 30.
tory fragmentation” arises from the lack of centralization and the prevalence of loopholes in the existing but disconnected regulations.110 Furthermore, existing regulation may “overlap” or create conflicts among jurisdictions both geographically and at different jurisdictional levels of regulation.111 Consequently, regulators may experience a reduced perception of social urgency and are less able to recognize and respond to ineffective regulations.112 These challenges are more severe where the government is either smaller or, in some cases, larger than the underlying resource that is being overly regulated because the poor fit exacerbates the mismatch between legal control and the regulatory resource in question.113 A tendency to maintain the status quo shapes behavior and suppresses change.114 Moreover, government actors actually compete to attract or keep businesses and offer regulatory ease as a carrot, resulting in a race to the bottom, where each regulatory authority actually provides less protection than it would if it were acting independently.115

110. See Wiener, supra note 31, at 701-04.
113. Oceans represent an example where the government is smaller than the resource that is threatened. At the same time, a particular resource may be highly localized so that an expansive government may not effectively regulate it. Buzbee, supra note 25, at 25.
114. Interest groups often try to maintain the status quo, and act in reliance on misconceptions derived from mental shortcuts (the availability heuristic). See WILLIAM N. ESKRIDGE, JR. ET AL., CASES AND MATERIALS ON LEGISLATION: STATUTES AND THE CREATION OF PUBLIC POLICY 798-99 (3d ed. 2001). This can be seen in how United States government policy has allocated public goods such as offshore oil reserves (drilling leases), radio and television airwaves (FCC broadcast frequencies), the air (pollution rights), and various oil and natural gas quotas. See Elizabeth S. Rolph, Government Allocation of Property Rights: Who Gets What?, 3 J. POL’Y ANALYSIS & MGMT. 45, 47-49 (1983).
B. Application of the Regulatory Commons to Existing E-Waste Regulation

The Basel Convention is a perfect example of regulatory fragmentation. As of this writing, 179 nations had adopted the Basel Convention, yet the United States is the only developed country in the world that has not done so.116 Furthermore, the United States is one of three nations worldwide to have signed but not ratified the Convention.117 The other two countries are Haiti and Afghanistan, but neither has the gravitas that the United States carries in the global arena.118 Moreover, the United States is the biggest producer of waste and thus potentially the largest violator of the Basel Convention.119 In effect, the United States’ signing but not ratifying the Basel Convention undermines the authority and effectiveness of the Basel Convention in other countries. In fact, the United States used its leverage as a signatory to weaken the Convention and prevent a complete ban on all exports of hazardous waste to developing nations.120 At the same time, developing countries lack sufficient institutional and legal frameworks to enforce obligations of multinational treaties or cannot do so effectively in collaboration with developed countries.121

As a result of regulatory fragmentation, the Basel Convention faces challenges of poor implementation and enforcement.122 Many Basel members claim that they have been unable to comply with the Basel Convention because of limited resources, lack of staff, poor training, low public awareness, and

117. Templeton, supra note 52, at 795.
118. Id.
120. Templeton, supra note 52, at 794-95; THE DIGITAL DUMP, supra note 9.
122. Schmidt, supra note 62, at 98.
porous border controls. Unsurprisingly, with the exception of the United States, countries with the most violations—namely of the restrictions on export of hazardous wastes—are poorer and have fewer resources. Thus, they are more vulnerable to illegal e-waste dumping and to toxic waste that is imported under the false pretext of recycling. At least one-third of the Basel Convention’s members cannot enforce their treaty obligations due to a complete inability to prevent illegal waste imports. Therefore, in 1995 the global community worked to boost the Basel Convention’s effectiveness by seeking to adopt the Basel Ban Amendment, which would place a complete ban on the export of hazardous wastes from wealthy OECD countries to poor non-OECD countries.

Nevertheless, as in the case of the Basel Convention, the Basel Ban Amendment represents another example of regulatory fragmentation. The Basel Ban Amendment’s status has been severely eroded by the United States, which has not only failed to ratify the Basel Ban Amendment, but also worked to reverse it. Admittedly, to date, many Basel Convention members have adopted the Basel Ban Amendment, including EU countries that have joined together under independent EU initiatives meant to address hazardous waste exports and e-waste issues, such as the WEEE Directive. Nevertheless, at the same time, the Basel Ban Amendment may hurt developing countries that currently trade in e-waste by reducing these countries’ access to affordable electronics, deepening the digital

123. Id. at 101.
124. Id.
125. Id. (noting that countries claim, as causes for noncompliance, “a lack of resources, training, staff, expertise, and public awareness, ... [and] lax border controls.”).
126. See Basel Convention Ban Amendment, supra note 18.
127. BASEL ACTION NETWORK, THE BASEL BAN AMENDMENT: ENTRY INTO FORCE = NOW! (2007), available at http://ban.org/library/BP4_09_07.pdf (explaining that many countries need to ratify the Basel Ban Amendment for it to take effect, how e-waste policies of the United States and Canada are inadequate and led to social injustice against developing nations, and that the United States and Canada actively oppose the Basel Ban Amendment).
128. Templeton, supra note 52, at 795 (noting that France, Germany, and the United Kingdom have adopted the Basel Ban Amendment).
divide between developing and developed countries. Furthermore, the Basel Ban Amendment only prohibits the export of hazardous waste to non-OECD countries and does not prevent the export of clean electronics. Therefore, the effectiveness of the Basel Convention and the Basel Ban Amendment are undermined by the very regulatory fragmentation that they created.

Other examples of the challenges of the regulatory commons—regulatory fragmentation and overlap—can be seen in the EU’s legislation regarding e-waste disposal. Inconsistencies among various member states’ regulations embody the concept of regulatory fragmentation while also creating new transaction costs. For instance, a key weakness of the WEEE Directive is the resulting costs incurred by their manufacturers in recycling individual devices and tracking quantities of returned goods. Similarly, the RoHS Directive actually causes electronics manufacturers to make products of an inferior quality by substituting less effective component parts so as to abide by the ban on restricted substances. The RoHS Directive also hurts the public by forcing manufacturers to rely on underdeveloped or untested technologies and materials, which may be unreliable or even more harmful to the environment and public health than the banned substances. These effects exacerbate the e-waste problem by encouraging manufacturers to opt for collective recycling instead of actively managing the e-waste that they produce. Faced with such a complex regulatory

129. Id. at 796 (noting that if the United States were to ratify the Basel Convention, such action would influence countries such as Canada and Australia to follow suit).
130. Id.
131. See Pak, supra note 74, at 261.
132. Id.
133. Id. at 264-65 (noting that manufacturers originally chose to use the banned substances because they were best suited for their particular purposes, and that substitute materials would not have provided the same results).
135. Id. at 262.
framework, EU manufacturers are forced to export their e-waste overseas in order to avoid compliance with EU regulations. 136

Also at play in relation to the WEEE Directive are the “race to the bottom” effects of the regulatory commons. 137 For instance, China is a popular importing nation for WEEE countries because of its cheap labor and low environmental standards. 138 Taken a step further, the race to the bottom effects of the regulatory commons actually endow China with a competitive economic advantage at the cost of environmental and health risks. The WEEE Directive also allows member states to place “collective” responsibility on industries rather than “individual” responsibility on each manufacturer, so that manufacturers do not actually manage the recycling and disposal costs of their own products. 139 Additionally, the WEEE Directive allows manufacturers to pay a flat fee to recycle, so manufacturers have little incentive to design electronics in ways that minimize use of harmful materials, that have a longer usable life, or that allow them to be disposed of or recycled more easily. 140 Furthermore, the WEEE Directive only sets minimum re-

137. See Revesz, supra note 115; Engel, supra note 115. A “race to the bottom” results when competition leads each regulatory authority to provide less protection than it would if each acted independently.
138. A study demonstrates that the cost of recycling a computer is “approximately US$0.38 per pound in the United States, but only US$0.15 to US$0.30 per pound overseas,” including all transportation and handling costs. Catherine K. Lin, Linan Yan & Andrew N. Davis, Globalization, Extended Producer Responsibility and the Problem of Discarded Computers in China: An Exploratory Proposal for Environmental Protection, 14 GEO. INT’L ENVT'L. L. REV. 525, 533 (2002).
139. “Individual” responsibility refers to a situation in which manufacturers manage products they actually produce, whereas “collective” responsibility refers to a situation in which all manufacturers within an industry must collectively manage all e-waste, regardless of whether it arises from a product that a particular manufacturer produced. Council Directive 2002/96, supra note 74, art. 8.
140. Article 8 of the WEEE Directive allows manufacturers to use collective e-waste management systems and establish common funds that pay a third-party to manage the disposal and recycling of used electronics returned by the public. Id.
quirements and allows all twenty-eight member states individual autonomy in establishing additional mandates. Although the WEEE Recast Directive seeks to harmonize registration, it fails to prescribe labeling requirements and allows EU Member States great leeway in establishing what information must be provided for the proper disposal of their products. Thus, in the regulatory commons, competing governments implement policies in a defensive manner rather than with well-reasoned planning.

Similarly, the regulatory commons’ jurisdictional mismatch also cripples current U.S. law on both a domestic and international level. On the federal level, the EPA has been unable to carry out aggressive regulatory controls to implement RCRA.

A report by the EPA further underscores that, to date, the United States has not adopted federal regulations to specifically handle domestic management or export of e-waste. At the same time, on the state level, the presence of various forms of legislation results in overlap and creates conflicting waste regulation schemes. These regulations can best be characterized as a “patchwork” of inconsistent and often counterproductive policies. In fact, nearly all types of e-waste are freely exported from the United States; the EPA only maintains narrow

143. See U.S. DEP’T OF COM.’S INT’L TRADE ADMIN, supra note 73.
144. Esty, supra note 30, at 1560.
146. See Regulations/Standards, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/waste/conserve/materials/ecycling/rules.htm (last updated Nov. 7, 2013); Existing environmental regulations are intended to limit the pollution created by manufacturing and neglect externalities incurred past the products’ end-of-life cycle. See Sachs, supra note 72, at 57-58 (stating that U.S. regulations are focused on the release of Volatile Organic Compounds (“VOCs”) during manufacturing, but not of finished products that release VOCs during use or upon disposal).
148. Drayton, supra note 95, at 166.
control over CRTs.\textsuperscript{149} The EPA’s CRT rule, introduced in 2006, requires exporters to notify the EPA of their expected exports of CRTs and to acquire consent of importing countries if CRTs are to be recycled overseas.\textsuperscript{150} Nevertheless, exporters can easily get around the law by intentionally mislabeling shipments of CRTs to avoid regulation.\textsuperscript{151}

Moreover, existing environmental legislation also embodies jurisdictional mismatch by creating conflicts with WTO legislation because both attempt to regulate e-waste.\textsuperscript{152} For instance, there are conflicts between the WTO and the Basel Convention where two countries are both members of the WTO, but only one is a Basel Convention Party.\textsuperscript{153} Such conflicts may revolve around whether waste regulated by the Basel Convention is a “product” as defined by the WTO, if complying with the Basel Convention would violate the WTO’s Most Favored Nation Treatment, or if a trade restriction under the Basel Convention could be justified as an exception to the WTO’s laws.\textsuperscript{154} A key source of contention is Article I of the General Agreement on Trade and Tariffs (“GATT”); it states that all rules, advantages, or privileges granted by any WTO member for the import and export of any product originating in or destined for any other

\begin{itemize}
\item \textsuperscript{149} U.S. G\textsuperscript{OV’T} A\textsuperscript{CCOUNTABILITY OFFICE,} \textit{supra} note 8, at 6-7.
\item \textsuperscript{151} \textit{See U.S. G\textsuperscript{OV’T} A\textsuperscript{CCOUNTABILITY OFFICE,} \textit{supra} note 8, at 6-7, 23-31. The GAO found in its August 2008 evaluation that violations of the CRT rule continued to be “widespread” after the EPA adopted the CRT rule. Forty-three U.S.-based electronic recyclers did not comply with the CRT rule when transacting with undercover GAO representatives acting as fictitious Asian buyers.
\item \textsuperscript{152} PAUL P. APPASAMY, INTERNATIONAL CONVENTIONS ON HAZARDOUS CHEMICALS 182 (2006), available at \textit{http://www.mse.ac.in/Trade/pdf/Compendium\%20Part\%20B/5.\%20PPA-chem-conven(2.4.07).pdf}.
\item \textsuperscript{153} WTO regulation applies to “products” and could likely apply to wastes covered by the Basel Convention because they are “moveable items placed in international commerce,” e.g., for recycling. \textit{Id.}
\item \textsuperscript{154} \textit{Id.} at 183-84.
\end{itemize}
country must be given “immediately and unconditionally” to a like product originating in or destined for the territory of all other WTO members.\textsuperscript{155} This represents potential trade conflict and can give rise to challenges at the WTO if a country that is both a party to the Basel Convention and a member of the WTO bans the import and export of hazardous e-waste to and from a country that is a WTO member but is not a party to the Basel Convention.\textsuperscript{156} Under the Most Favored Nation Clause in Article I of the GATT, a country that is not a party to the Basel Convention could bring a dispute in WTO courts that the Basel Convention unfairly favors another country that is trading e-waste, based on the claim that the nonparty country trades products that are “like product” vis-à-vis e-waste.\textsuperscript{157} Given such conflicts, harmful e-waste continues to escape control of both the Basel Convention and the GATT regulatory systems and continues to harm the developing countries to which it is exported.

III. RECONCILING THE REGULATORY COMMONS OF E-WASTE REGULATION

Global e-waste regulations manifest the challenges present in the regulatory commons, i.e., jurisdictional mismatch, regulatory fragmentation, overlap, and regulators’ reduced perception of social need. These regulations would benefit from implementing effective solutions to reconcile the regulatory commons paradox and more effectively manage e-waste. Analyzing e-waste regulation through the lens of the regulatory commons, one can see that government actors are both the cause and the solution to the problem.\textsuperscript{158} On the one hand, government actors cannot claim ownership credit over regulations in the way that a private actor could patent a particular regulation as innova-


\textsuperscript{156} Id.

\textsuperscript{157} APPASAMY, supra note 152, at 184.

\textsuperscript{158} Information, its availability, and various beliefs affect how people attribute and perceive causes of underlying problems. MILES HEWSTONE, FRANK D. FINCHAM, AND JONATHAN FOSTER, PSYCHOLOGY 368-74 (2005). See also ESKRIDGE, supra note 114
tive and gain an early-mover advantage in the market.\textsuperscript{159} On the other hand, government actors can help resolve the paradox of the regulatory commons by unleashing market-based forces.\textsuperscript{160}

First, a possible solution to the problem of the regulatory commons requires a particular government actor to rise as a prominent regulatory leader.\textsuperscript{161} By decreasing the number of potential regulators or increasing the significance of an existing regulator, the system creates a hierarchy of regulatory bodies.\textsuperscript{162} Such a hierarchy would better allocate responsibility so that regulatory bodies can share responsibility, incentivize regulatory action, and avoid regulatory fragmentation and overlap.\textsuperscript{163}

Second, implementing an Open Method of Coordination ("OMC") system could help overcome the challenge of regulatory fragmentation that is present in the regulatory commons.\textsuperscript{164} The OMC is a legal framework created at the Lisbon European Council in 2000 to improve competitiveness for employment opportunities and social cohesion among the EU member states.\textsuperscript{165} The OMC provides for a feedback and adjustment process that emphasizes "mutual correction, not uniformity." Experts across a broad spectrum of fields, drawn from member states, come together in a panel to evaluate and disseminate

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\item[159] See generally Morris Fiorina, Congress: Keystone of the Washington Establishment (2d ed. 1989) (noting that regulators' ability to claim credit is diluted). James Madison also made a similar finding that reputation and credit are "diminished in proportion to the number which is to share in the praise or blame." Randall Strahan, Personal Motives, Constitutional Forms, and the Public Good: Madison on Political Leadership, in James Madison: The Theory and Practice of Government 69 (Samuel Kernell ed., 2003).
\item[160] Buzbee, supra note 25, at 6.
\item[161] Id. at 49-51.
\item[163] Id. (arguing that creating hierarchies helps overcome regulatory inaction and regulatory fragmentation).
\item[164] Buzbee, supra note 25, at 61.
\end{enumerate}
\end{footnotesize}
information about each member state’s regulatory strategies.\textsuperscript{167} As such, the initiative encourages planning, comparison, and coordination of policies\textsuperscript{168} and helps to improve social cohesion across the European nation-states.\textsuperscript{169} The OMC has been expanded to other areas of regulation\textsuperscript{170} and may be a good solution to resolving problems in e-waste regulation.

Third, the problems of the regulatory commons can also be resolved by a shift in power from government actors to private business actors that lead entrepreneurial, decentralized units and can act with a concentrated interest in regulating e-waste.\textsuperscript{171} The promotion of a decentralization approach toward experimentation and information dissemination is commonly known as “democratic experimentalism.”\textsuperscript{172} Here, decentralized actors can be just as prominent as central government actors and can reinforce information sharing.\textsuperscript{173} Unlike regulatory bodies, which have a poor sense of the pressing depletion of the regulatory opportunity, decentralized business actors are more flexible in their behaviors.\textsuperscript{174} Furthermore, private sector businesses are empowered with managerial autonomy and liaison arrangements, placing them in a better position to counteract overregulation. By their very nature, private sector businesses are focused on sharing profits and are not subject to the same sense of transparency and accountability to an electorate or constituency, as regulators often are.\textsuperscript{175} Thus, democratic experimentalism fosters information sharing and reinforces de-

\textsuperscript{167} Id.
\textsuperscript{169} Cohen & Sabel, supra note 166, at 694-95.
\textsuperscript{170} Fritz W. Scharpf, The European Social Model: Coping With the Challenges of Diversity, 4 J. COMMON MKT. STUD. 645, 652-56 (2002).
\textsuperscript{172} See Dorf & Sabel, supra note 171.
\textsuperscript{173} Id. at 354-56.
\textsuperscript{174} See generally id. at 368-69.
\textsuperscript{175} MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION (1965).
centralized autonomy in order to overcome the challenges posed by the regulatory commons.\textsuperscript{176}

Collectively, these solutions will help achieve the goals intended by the current overabundance of e-waste regulations.\textsuperscript{177} By providing for a clear delineation of authoritative hierarchy and responsibilities, the creation of an OMC system, and the promotion of democratic experimentalism, regulators can overcome regulatory fragmentation, reconcile conflicts from overlapping regulations and jurisdictional mismatch, and prevent political inattention. In this way, regulators, who created the problem of the regulatory commons in the first place, can foster regulatory frameworks that overcome collective action problems in the regulatory commons.\textsuperscript{178}

CONCLUSION

To effectively overcome the challenges of the regulatory commons, international regulation of e-waste should shift the burden from weak international entities to more authoritative individuals and better engage actors to increase awareness via democratic experimentalism. Japan’s SHAR system provides a model that stands out for its simplicity and effectiveness. Implemented in 2001, the SHAR system distributes e-waste recycling responsibilities among four stakeholders: producers, consumers, retailers, and the government.\textsuperscript{179} SHAR mandates that consumers must dispose of bulky electrical and electronic products such as televisions, refrigerators, washing machines, and air conditioners at designated collection locations maintained by large appliance retailers and local government agencies.\textsuperscript{180} Manufacturers are divided into two groups.\textsuperscript{181} Within each group, manufacturers collaborate to establish and operate

\textsuperscript{176} See Dorf & Sabel, supra note 171, cited in Buzbee, supra note 25, at 59.
\textsuperscript{177} Id. at 24.
\textsuperscript{178} Id.
\textsuperscript{179} Lin et al., supra note 26, 541-42 (2002).
\textsuperscript{180} Id.
recycling plants and a network of collection centers. Then, other manufacturers and importers can contract with either group to participate in the manufacturers’ takeback and recycling networks. Under SHAR, manufacturers manage the end-of-life processing of electronics after collection and develop facilities and logistics chains necessary to transport and recycle discarded electronics in an environmentally friendly way. Meanwhile, consumers help finance SHAR’s collection and recycling mechanisms by paying disposal fees when dropping off used electronic goods at the collection centers.

Unlike most other developed nations, Japan’s SHAR system effectively promotes public education regarding the e-waste issue and recruits consumers as responsible actors in delivering e-waste and paying for its disposal. Because disposal fees differ based on the cost of recycling individual brands and waste items, SHAR encourages consumers to change purchasing habits, buy less, and, when they do buy, to buy environmentally friendly products. SHAR uses existing networks of retailers and local governments to operate collection centers and more

182. Lin et al., supra note 26, at 542.
183. Id.
184. SHAR holds the largest electronics manufacturers responsible for building the infrastructure and facilities necessary to process e-waste, while smaller manufacturers must negotiate agreements to access these networks. See INFORM, INC., Electric Appliance Recycling in Japan, 1 (2003), available at http://informinc.org/japanepr.pdf. Inform, Inc. is a U.S.-based nonprofit that produces short films to educate the public about the effects of human activity on the environment and human health. This publication explains how Japan enacted responsibility mandates for the disposal of electronic appliances.
185. Manufacturers set recycling fees for their own products and such fees usually range from 2,400 to 4,600 yen, or US$23.50 to US$45. Pak, supra note 74, at 275-78. Under SHAR, consumers pay two types of fees upon disposal of e-waste at collection centers: a collection fee to cover the cost of collection and a recycling fee to cover the cost of recycling a particular item. Id.
187. Pak, supra note 74, at 275-78.
proportionately allocates cost to consumers.\textsuperscript{188} Furthermore, unlike the WEEE Directive, SHAR also serves as a paradigm for individual, producer-led takeback programs by requiring manufacturers to manage the disposal and recycling of their waste and enabling them to determine disposal costs for these products.\textsuperscript{189}

It could be argued that by mandating that consumers both physically dispose of used electronics at specified collection centers and pay end-of-life fees, Japan’s e-waste policies may incentivize some individuals to illegally dump unwanted electronics rather than obey the regulations.\textsuperscript{190} For example, one month after SHAR became effective, the rate of illegal e-waste dumping in Japan increased by 25%.\textsuperscript{191} Coordinating such collection systems and determining individual producers’ costs can also be expensive.\textsuperscript{192} Nevertheless, Japan’s overall success demonstrates that the assignment of individual costs in e-waste regulation can be done effectively. Even if the collective system proves too arduous for certain manufacturers, these manufacturers still have the option to implement their own individual takeback programs, for instance, as Panasonic has done in its home country, Japan, and in many countries outside Japan.\textsuperscript{193} Consumers can also fund transactional expenses as-

\textsuperscript{188.} INFORM, INC., \textit{supra} note 184 (explaining how Japan’s postal service provides ubiquitous and easily accessible collection infrastructure). Additionally, manufacturers are also incentivized to create more environmentally sound electronics with longer product lives. \textit{See} Pak, \textit{supra} note 74, at 272-73.

\textsuperscript{189.} Pak, \textit{supra} note 74, at 272-73.

\textsuperscript{190.} Lin et al., \textit{supra} note 26, at 542.

\textsuperscript{191.} \textit{Id}.


sociated with determining and assigning individual product costs by adapting their purchasing behavior. Thus, international environmental regulation can be decentralized in order to provide economic incentives for e-waste producers, recyclers, and consumers alike, while enabling states to better promote human health and environmental safety.

As a next step, rather than signing onto another multilateral treaty, government authorities and private actors should aim to implement a decentralized model analogous to that of Japan’s SHAR system. Using reduction of e-waste and illegal exports as a measure of experimental success, public and private parties will benefit if they can replicate and adopt such a model on a global scale.

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