Brooklyn Journal of International Law

Volume 39 | Issue 3 Article 9

2014

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"),[1] these workers often burn the e-waste in open air and further expose themselves to extremely toxic materials.[2] Today, increasing demand for the latest technologies drives the fastest growing, and potentially most dangerous, waste stream worldwide.[3] Developing countries are the most common destinations

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1. Electronic components contain small quantities of precious metals such as gold and copper. JIM PUCKETT ET AL., EXPORTING HARM: THE HIGH-TECH TRASHING OF ASIA 8 (Jim Puckett & Ted Smith eds., 2002), *available at* http://www.ban.org/E-waste/technotrashfinalcomp.pdf.

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).

3. Christian Purefoy, *Serious Contamination Threat from Africa's Mounting E-Waste*, CNN NEWS (Apr. 9, 2009), http://www.cnn.com/2009/WORLD/africa/04/08/africa.recycling.computers.ewaste/index.html. More recent projections by the United Nations' Solving the E-Waste Problem Initiative ("StEP") estimate global e-waste volumes to grow by 33% in the next four years, making e-waste the world's fastest growing waste stream. John Vidal, *Toxic "E-Waste" Dumped in Poor Nations, says United Nations,* THE GUARDIAN (Dec. 14, 2013), http://www.theguardian.com/global-development/2013/dec/14/toxic-ewaste-illegal-dumping-developing-countries.

for these wastes.[4] For instance, the United Nations Environment Programme ("UNEP")[5] reports that African countries are quickly becoming the final destination for the world's e-waste.[6] Usually this waste is broken apart and burned by young boys in countries like China.[7] 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.[8]

Electronics represent the world's largest and fastest growing manufacturing industry,[9] 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.[10] Additionally, any components of these products,

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4. Vidal, *supra* note 3.

5. The UNEP was created in 1972 at the United Nations Stockholm Conference on the Human Environment to serve as the "focal point for environmental action and coordination" among United Nations members. Institutional and Financial Arrangements for International Environmental Cooperation, G.A. Res. 2997, pt. II, para. 1, U.N. GAOR, 27th Sess., Supp. No. 30, U.N. Doc. A/8730, at 43 (Dec. 15, 1972). "The UNEP promote[s] international cooperation in the field of the environment." United Nations Conference on Environment and Development: Framework Convention on Climate Change, May 9, 1992, 31 I.L.M. 849, Agenda 21 – Chapter 38, part 22, 388.

6. James Simpson, *Toxics Alert: Africa Emerging as E-Waste Dumping Ground*, TOXICS ALERT (Dec. 2006), http://enews.toxicslink.org/news-view.php?id=3 ("According to a study by the Basel Action Network ("BAN"), a minimum of 100,000 used and obsolete computers a month are entering the Nigerian port of Lagos alone.").

7. Bryan Walsh, *E-Waste Not*, TIME (Jan. 08, 2009), http://content.time.com/time/magazine/article/0,9171,1870485,00.html.

8. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-1044, ELECTRONIC WASTE: EPA NEEDS TO BETTER CONTROL HARMFUL U.S. EXPORTS THROUGH STRONGER ENFORCEMENT AND MORE COMPREHENSIVE REGULATION (Aug. 2008), *available at* http://www.gao.gov/assets/280/279792.pdf.

9. *See* JIM PUCKETT ET AL., THE DIGITAL DUMP: EXPORTING RE-USE AND ABUSE TO AFRICA 7 (Jim Puckett ed., 2005), *available at* http://www.ban.org/library/TheDigitalDump.pdf [hereinafter THE DIGITAL DUMP]. BAN produced this film and report to document, and increase awareness of, the harmful effects of e-waste dumping in Africa.

10. *Pakistan: Environment: The Dark Side of Digital Waste,* THE FRIDAY TIMES (Pak.), May 16, 2010, [hereinafter THE FRIDAY TIMES]; *See also What is E-Waste?,* CAL. DEP'T OF RESOURCES RECYCLING AND RECOVERY, http://www.calrecycle.ca.gov/Electronics/WhatisEwaste/ (last updated Oct. 26, 2012) (stating that the definition of e-waste comprises mobile phones, computers, televisions, batteries, light bulbs, printers, and consumer electronics.

including cathode ray tubes ("CRTs"),[11] circuit boards, and ink cartridges, which are "sold, obsolete, broken or discarded by their original owners," are also considered e-waste.[12] 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.[13] 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."[14] 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,[15] and often have few affordable and accessible disposal options for electronic waste.[16]

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

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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).

11. CRTs refer to the video display components of older non-flat screen televisions and computer monitors. They contain glass tubes made with harmful levels of lead and barium. *See*, *Fact Sheet: Easier Recycling of Cathode Ray Tubes*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/osw/hazard/recycling/electron/crt-fs06.htm (last updated Nov. 15, 2012); *see also* Jennifer Kutz, *You've Got Waste: The Exponentially Escalating Problem of Hazardous E-Waste*, 17 VILL. ENVTL. L.J. 307, 308 (2006).

12. *See* CAL. DEP'T OF RESOURCES RECYCLING AND RECOVERY, *supra* note 10.

13. Betsy M. Billinghurst, *E-Waste: A Comparative Analysis of Current and Contemplated Management Efforts by the European Union and the United States*, 16 COLO. J. INT'L ENVTL. L. & POL'Y 399, 400 (2005).

14. Allie Bidwell, *U.N. Seeks to Solve Growing Global E-Waste Problem*, U.S. NEWS & WORLD REPORT (Dec. 16, 2013), http://www.usnews.com/news/articles/2013/12/16/un-seeks-to-solve-growing-global-e-waste-problem. A report by the Electronics Takeback Coalition states that the 2009 digital conversion of analog televisions in the United States will continue to contribute to e-waste production, because analog televisions are no longer desirable for consumers' reuse. In the United States alone, consumers dispose of more than 550,000 computers and mobile devices per day, based on the EPA's 2010 findings. *Facts and Figures on E-Waste and Recycling*, ELECTRONICS TAKEBACK COALITION 6 (Sept. 25, 2013), http://www.electronicstakeback.com/wpcontent/uploads/Facts_and_Figures_on_EWaste_and_Recycling.pdf.

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

16. *Id*.

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

17. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Mar. 22, 1989, 1673 U.N.T.S. 57 [hereinafter Basel Convention].

18. *The Basel Convention Ban Amendment*, BASEL CONVENTION, http://www.basel.int/pub/baselban.html (last visited Jan. 10, 2014) [hereinafter Basel Ban Amendment].

19. *See generally* U.S. DEP'T OF COM.'S INT'L TRADE ADMIN., *WEEE: Waste Electrical and Electronic Equipment*, EXPORT.GOV, http://export.gov/europeanunion/weeerohs/weeeinformation/index.asp (last updated May 16, 2013).

20. *See* Directive 2002/95/EC of the European Parliament and of the Council of 27 January on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2003 O.J. (L 37), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:en:HTML [hereinafter Directive 2002/95/EC].

21. 42 U.S.C.A. §§ 6901-6992k (1976).

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).

23. *See generally* Tanya Karina A. Lat, *Testing the Limits of GATT Art. XX(b): Toxic Waste Trade, Japan's Economic Partnership Agreements, and the WTO*, 21 GEO. INT'L ENVTL. L. REV. 367 (2009).

24. Terada, *supra* note 22.

25. William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1 (2003).

democratic experimentation analogous to Japan's Specified Home Appliance Recycling Law ("SHAR").[26]

The regulatory commons is a reinterpretation of the classic paradox of the tragedy of the commons,[27] 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.[28] Overregulation poses regulatory challenges and, ironically, gives rise to decentralization mechanisms that actually enable more effective regulation.[29] The coexistence of multiple forms of regulation often produces problems, including "jurisdictional mismatch"[30] and "regulatory fragmentation."[31] Furthermore, in contrast to the tragedy of the commons, in the regulatory commons there is rarely a single government regulator.[32] Applying the framework of the

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26. Japan implemented The Home Appliance Recycling Act in 2001 and it is known by the acronym "SHAR" because it was originally named the "Specified Home Appliance Recycling Law." 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 ENVTL. L. REV. 525, 541-42 (2002).

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).

28. Buzbee, *supra* note 25.

29. *Id.*

30. *See* JAMES E. KRIER & EDMUND URSIN, POLLUTION AND POLICY: A CASE ESSAY ON THE CALIFORNIA AND FEDERAL EXPERIENCE WITH MOTOR VEHICLE AIR POLLUTION, 1940-1975 (1977) (explaining that the lack of a prime or traditional regulator leads to political inattention and duplication of regulation). *See also* Daniel C. Esty, *Toward Optimal Environmental Governance*, 74 N.Y.U. L. REV. 1495, 1538 (1999) (noting that jurisdictional mismatches exist between the breadth of government authorities' reach and the scope of public goods they deliver).

31. *See* Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 701-04 (1999).

32. Buzbee, *supra* note 25, at 9.

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.[33] It consists of recyclable materials, such as plastics and aluminum,[34] 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.[35] The CRTs in computer and TV mon-

33. THE FRIDAY TIMES, *supra* note 10.

34. JOHN GALLAUGHER, INFORMATION SYSTEMS: A MANAGER'S GUIDE TO HARNESSING TECHNOLOGY § 5.8 (2010), *available at* http://www.flatworldknowledge.com/pub/information-systems-managers-g/2374/73228.

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.[36] Additionally, many electronics contain cadmium, which is a carcinogen,[37] and mercury, which, in large doses, can cause neurological disorders.[38] Furthermore, plastic parts often contain toxic flame retardants.[39] 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.[40] 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.[41] The methods used in the disposal of e-waste also release pollutants, such as black soot, carbon dioxide, and carbon monoxide, into the atmosphere.[42] Moreover, e-waste lying undisturbed in landfills can be just as harmful because it contains heavy metals such as copper, lead, and mer-

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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).

37. *Cadmium Compounds Hazard Summary*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/ttn/atw/hlthef/cadmium.html (last updated Nov. 6, 2007).

38. OFFICE OF POLLUTION PREVENTION & TOXIC SUBSTANCES, U.S. ENVTL. PROTECTION AGENCY, REPORT TO CONGRESS: POTENTIAL EXPORT OF MERCURY COMPOUNDS FROM THE U.S. FOR CONVERSION TO ELEMENTAL MERCURY, ix (2009), *available at* http://www.epa.gov/mercury/pdfs/mercury-rpt-to-congress.pdf.

39. *See* SILICON VALLEY TOXICS COALITION, *Just Say No to E-Waste: Background Document on Hazards and Waste from Computers*, U. ARK., http://cmase.uark.edu/teacher/Environmental_Ed/2006%20E-Waste%20Info/E-Waste/Just%20Say%20No%20-%20E-Waste%20Backgrounder.pdf (last updated Jun. 9, 2006).

40. THE FRIDAY TIMES, *supra* note 10.

41. *Id*.

42. *Mountains of Toxic E-Waste in Pakistan Are a Goldmine,* GREEN PROPHET, (Oct. 31, 2011), http://www.greenprophet.com/2011/10/pakistan-e-waste-goldmine/ [hereinafter *Mountains of Toxic E-Waste*].

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-

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43. THE FRIDAY TIMES, *supra* note 10.

44. *Mountains of Toxic E-Waste*, *supra* note 42.

45. Richard Black, *E-Waste Rules Still Being Flouted*, BBC NEWS, http://news.bbc.co.uk/1/hi/sci/tech/3549763.stm. (last updated Mar. 19, 2004).

46. *Mountains of Toxic E-Waste*, *supra* note 42. *See also* Black, *supra* note 45.

47. Jana Viktoria Nysten, *EU Regulation of Electronic Waste: A Revised Directive Reflects Economic and Environmental Concerns*, AMERICAN BAR ASSOCIATION: TRENDS (Sept. / Oct. 2012), www.americanbar.org/publications/trends/2012_13/september_october/eu_regulation_electronic_waste_revised_directive_reflects_economic_and_environmental_concerns.html.

48. *Where Does E-Waste End Up?,* GREENPEACE (Feb. 24, 2009), www.greenpeace.org/international/en/campaigns/toxics/electronics/the-e-waste-problem/where-does-e-waste-end-up/.

49. *Mountains of Toxic E-Waste*, *supra* note 42.

50. UNITED NATIONS ENV'T PROGRAMME, WHERE ARE WEEE IN AFRICA? FINDINGS FROM THE BASEL CONVENTION E-WASTE AFRICA PROGRAMME, 12 (Dec. 2011), *available at* http://www.basel.int/Implementation/TechnicalAssistance/EWaste/EwasteAfricaProject/Publications/tabid/2553/Default.aspx.

cling for its employment opportunities and the potential to recover economic value from precious metals such as copper, gold, silver, indium, and palladium.[51]

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.[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.[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.[54] Second, waste must be minimized at its source and disposed of in the state where it was created.[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

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51. *Mountains of Toxic E-Waste*, *supra* note 42.

52. Basel Convention, supra note 17. *See also* Nicola J. Templeton, *The Dark Side of Recycling and Reusing Electronics: Is Washington's E-Cycle Program Adequate*?, 7 SEATTLE J. SOC. JUST. 763, 766-68 (2009).

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.

54. TOXICS LINK, E-WASTE IN INDIA: SYSTEM FAILURE IMMINENT-TAKE ACTION NOW! (2004), *available at* http://www.toxicslink.org/docs/06040_repsumry.pdf.

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 Convention under pretexts of e-waste disposal for recycling or reuse. E-waste recycling is often profitable to importers because electronic equipment contains small quantities of valuable materials such as gold and copper that can be extracted, reclaimed, 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

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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 transboundary 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 Damage Resulting from the Transboundary Movements of Hazardous Wastes and Their Disposal*, 1999 COLO. J. INT'L ENVTL. L. & POL'Y 253, 254-55 (1999). For instance, the Basel Convention does not hold exporters liable for damages occurring after the importer received "operational control" of the waste. Consequently, countries lack incentive to ensure that facilities exist in the importing country, so that importing countries disproportionately bear the costs of enforcement.

61. Vinutha V., *The E-Waste Problem,* EXPRESS COMPUTER ONLINE (Nov. 21, 2005), http://computer.financialexpress.com/20051121/management01.shtml.

62. Charles W. Schmidt, *Environmental Crimes: Profiting at the Earth's Expense*, 112 ENVTL. HEALTH PERSP. 96, 101 (2004).

63. *Id.* at 102.

illegally.[64] When authorities are unable or unwilling to oversee the waste and monitor illegal dumping, e-waste is dumped as an afterthought.[65] Therefore, countries like China, India, and Pakistan continue to be the primary dumping grounds for e-waste from industrialized countries.[66]

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"))[67] to the non-Annex VII countries (all other signatories to the Basel Convention).[68] 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.[69] 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.[70] 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.[71] Against this backdrop of the failures of the Basel Con-

64. *Id.* at 98.

65. *Id.* at 98.

66. Vinutha, *supra* note 61.

67. The OECD is a coalition of thirty-two countries focused on democracy and the free market. ORG. FOR ECON. CO-OPERATION & DEV., http://www.oecd.org/ (last visited Jan. 10, 2014).

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 Fogel, *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,[72] along with the recent WEEE Recast Directive in July 2012.[73] 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.[74] On its face, the WEEE Directive is a blanket regulation covering all e-waste, regardless of its source or quantity.[75] 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.[76] Addi-

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pened, BASEL ACTION NETWORK (1994), http://ban.org/about_basel_ban/a_victory.html.

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.

73. *See generally* U.S. DEP'T OF COM.'S INT'L TRADE ADMIN., *WEEE: Waste Electrical and Electronic Equipment*, *supra* note 19.

74. *See* Council Directive 2002/96, art. 5, 2003 O.J. (L 37) 24-25 (EC), *available at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32002L0096*; Kutz, *supra* note 11, at 321; Phoenix Pak, *Haste Makes E-Waste: A Comparative Analysis of How the U.S. Should Approach the Growing E-Waste Threat*, 16 CARDOZO J. INT'L & COMP. L. 241, 271 (2008).

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).

76. *See Promoting and Practicing Environmental Stewardship for Electronic Products*, U.S. ENVTL. PROTECTION AGENCY,

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.[77] Nevertheless, the effectiveness of the WEEE Directive and the WEEE Recast Directive are undermined by inconsistencies.[78]

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.[79] 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.[80] Similarly to the WEEE Di-

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http://www.epa.gov/wastes/conserve/tools/stewardship/products/electronics.htm (last updated June 28, 2013); Rob Courtney, *Evolving Hazardous Waste Policy for the Digital Era*, 25 STAN. ENVTL. L. J. 199, 216 (2006).

77. In particular, the WEEE Recast Directive provides a transition period, from August 13, 2012 to August 14, 2018, to expand the scope of the WEEE Directive to all electrical and electronic equipment. The WEEE Recast Directive also requires distributors to set up collection stations at retail locations at no charge to end-users, and sets a target for a minimum collection rate of 45% starting in 2016 to 65% in 2019. *New Recast WEEE Directive (2012/19/EU) Published,* INTERTEK, http://www.intertek.com/consumer/news/v110-new-recast-weee-directive/ (last visited April 9, 2014); *See also* U.S. DEP'T OF COM.'S INT'L TRADE ADMIN., supra note 73.

78. *See* Pak, *supra* note 74, at 262.

79. Catherine Day, *Frequently Asked Questions on Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)*, EUROPEAN COMMISSION DIRECTOR-GENERAL ENV'T, http://ec.europa.eu/environment/waste/weee/pdf/faq_weee.pdf (last updated Aug. 2006); *See* Directive 2002/95/EC, *supra* note 20.

80. The RoHS Directive banned the use of these six substances by both manufacturers within the European Union and manufacturers who imported electronic goods into the EU. The RoHS Directive, however, allows exceptions for the use of the six banned substances when it is "technically or scientifically impracticable" to replace the banned substance with a substitute or when the use of a substitute would result in "negative environmental, health and/or consumer safety impacts" likely to outweigh any benefits derived from the ban. For instance, the RoHS Directive makes exceptions for the use of lead in

rective, the EU recast the RoHS Directive ("RoHS II")[81] and expanded the scope of the original RoHS Directive to all electronic equipment, cables, and spare parts by 2019.[82] In effect, RoHS II seeks to establish "improvements in implementation, enforcement and coherence."[83] Although most electronics manufacturers have been able to modify products to satisfy the RoHS Directive,[84] 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.[85] 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.[86] Additionally, RCRA states that equipment with the

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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.

81. U.S. DEP'T OF COM.'S INT'L TRADE ADMIN, *RoHS: Restriction of the use of Certain Hazardous Substances*, EXPORT.GOV, http://export.gov/europeanunion/weeerohs/rohsinformation/index.asp (last updated May 16, 2013).

82. The original RoHS Directive only applied to several categories of electrical and electronic equipment, such as household appliances and consumer equipment. Press Release, EUROPEAN COMMISSION, *Environment: Fewer Risks from Hazardous Substances in Electrical and Electronic Equipment* (July 20, 2011) *available at* http://europa.eu/rapid/press-release_IP-11-912_en.htm.

83. Memorandum from the European Commission, EUROPEAN COMMISSION, *Questions and Answers on the Revised Directive on Restrictions of Certain Dangerous Substances in Electrical and Electronic Equipment (RoHS)* (Dec. 3, 2008) *available at* http://europa.eu/rapid/press-release_MEMO-08-763_en.htm. RoHS II also promotes better compliance with the new REACH legislation (The Registration, Evaluation, Authorisation and Restriction of Chemicals), which was promulgated in 2006 for the marketing of products in the EU. Press Release, EUROPEAN COMMISSION, *supra* note 82.

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.

85. 42 U.S.C.A. §§ 6901-6992k (1976), *supra* note 21.

86. Nisha Thakker, *India's Toxic Landfills: A Dumping Ground for the World's Electronic Waste*, 6 SUSTAINABLE DEV. L. & POL'Y 58, 60 (2006).

"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.[87] The reach of RCRA is further limited by the EPA's narrow definition of "hazardous."[88] Additionally, RCRA only covers materials that emit dangerous chemicals during their use, so electronics and harmful e-waste are generally excluded,[89] 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,[90] 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.[91] 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.[92]

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87. Robert Tonetti, EPA Office of Solid Waste, EPA's Regulatory Program for "E-Waste" (Oct. 2007), *available at* http://www.epa.gov/waste/conserve/materials/ecycling/docs/e-wasteregs.pdf.

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.

91. Mark Anderson, *Electronics Waste Programs Ineffective in Most U.S. States*, INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (Sept. 11, 2013), http://spectrum.ieee.org/energy/environment/electronics-waste-programs-ineffective-in-most-us-states. In 2010, the EPA partnered with the United Nations' StEP Initiative and executed a cooperative agreement in November 2010. *Cleaning Up Electronic Waste (E-Waste)*, ENVTL. PROTECTION AGENCY, http://www.epa.gov/oiamount/toxics/ewaste/index-uew.html#national (last updated Dec. 16, 2013).

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"[93] or to other economically challenged institutions that take these wastes in the guise of "donations."[94] Organizations that take public donations like Goodwill and the Salvation Army are reluctant to accept discarded computers because of high disposal costs.[95] 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.[96] This overused resource is

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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).

94. Manasvini Krishna & Pratiksha Kulshrestha, *The Toxic Belt: Perspectives on E-Waste Dumping in Developing Nations*, 15 U.C. DAVIS J. INT'L L. & POL'Y 71, 88 (2008). E-waste is dumped in the guise of "donations" on developing countries that lack the financial resources to oversee proper disposal. The Indian embassy in the United States even encourages donations of old computers to schools run by the Indian government.

95. Heather L. Drayton, *Economics of Electronic Waste Disposal Regulations*, 36 HOFSTRA L. REV. 149, 159 (2007).

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.[97] In the long run, the actors in the tragedy of the commons overuse and deplete the particular resource.[98] 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.[99]

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.[100] 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.[101] Such symptoms

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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.").

97. *See generally* H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 J. POL. ECON. 124 (1954), *reprinted in* JOHN A. BADEN & DOUGLAS S. NOONAN, MANAGING THE COMMONS 17 (2d ed. 1998); Hardin, *supra* note 27.

98. *See, e.g.*, Carol M. Rose, *Energy and Efficiency in the Realignment of Common-Law Water Rights*, 19 J. LEGAL STUD. 261 (1990).

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.

101. *See* DANIEL A. FARBER & PHILIP P. FRICKEY, LAW AND PUBLIC CHOICE: A CRITICAL INTRODUCTION 21-33 (1991). *See also* Joseph P. Kalt & Mark A. Zupan, *The Apparent Ideological Behavior of Legislators: Testing for Principal-Agent Slack in Political Institutions*, 33 J.L. ECON. 103, 108 (1990) (dis-

are already present in laws aimed to manage such varied resources as aquaculture,[102] urban sprawl,[103] global warming,[104] and bioengineered foods.[105] 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.[106]

Overuse of the regulatory opportunity in the regulatory commons poses a range of legal and societal problems.[107] Consider, for example, the problem of "jurisdictional mismatch."[108] 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.[109] Additionally, "regula-

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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).

104. The United States remains the only signatory of the Kyoto Protocol that has not yet ratified the convention. Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3, Dec. 10, 1997, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22 (1998), *available at* http://unfccc.int/resource/docs/convkp/kpeng.pdf. Despite executive orders such as the Clear Skies and Global Climate Change Initiatives released in 2002, little has been done in the United States to comply with the Kyoto Protocol. *See* NAT'L OCEANIC & ATMOSPHERIC ADMIN., *President Bush Visits NOAA*, NATIONAL CLIMATIC DATA CENTER (Feb. 14, 2002), http://www.ncdc.noaa.gov/oa/trends.html) (last updated Aug. 20, 2008).

105. *See* THOMAS O. MCGARITY AND PATRICIA HANSEN, BREEDING DISTRUST: AN ASSESSMENT AND RECOMMENDATIONS FOR IMPROVING THE REGULATION OF PLANT-DERIVED GENETICALLY MODIFIED FOODS (2001).

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

107. Buzbee, *supra* note 25.

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]

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110. *See* Wiener, *supra* note 31, at 701-04.

111. James M. Buchanan & Yong J. Yoon, *Symmetric Tragedies: Commons and Anticommons*, 43 J.L. & ECON. 1, 11 (2000) (noting effects of overlapping agencies in environmental laws).

112. Christopher H. Schroeder, *Rational Choice Versus Republican Moment Explanations for Environmental Laws, 1969-73*, 9 DUKE ENVTL. L. & POL'Y F. 29, 30 and 49-52 (1998).

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).

115. *See* Richard L. Revesz, *Rehabilitating Interstate Competition: Rethinking the "Race-to-the-Bottom" Rationale for Federal Environmental Regulation,* 67 N.Y.U. L. REV. 1210, 1221-24 (1992); Kirsten H. Engel, *State Environmental Standard-Setting: Is There a "Race" and Is It "to the Bottom"*?, 48 HASTINGS L.J. 271 (1997).

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

116. *Parties to the Basel Convention*, BASEL CONVENTION (May 5, 1992), http://www.basel.int/ratif/convention.htm.

117. Templeton, *supra* note 52, at 795.

118. *Id.*

119. China is the world's largest emitter of carbon dioxide, though the United States still consumes six times as much energy per capita as does China. Kristi Heim, *Can a Bold New "Eco-City" Clear the Air in China*?, THE SEATTLE TIMES, Nov. 25, 2007, at A18.

120. Templeton, *supra* note 52, at 794-95; THE DIGITAL DUMP, *supra* note 9.

121. Greenpeace claimed that the Basel Convention should be considered criminal activity. BASEL ACTION NETWORK, THE BASEL BAN: A TRIUMPH FOR GLOBAL ENVIRONMENTAL JUSTICE (2012), *available at* http://www.ban.org/wp-content/uploads/2012/09/BP1_Sept2012Final_A4.pdf (noting that several African nations refused to sign the weakened Convention and instead preferred to create their own treaty banning the import of hazardous waste to Africa).

122. Schmidt, *supra* note 62, at 98.

porous border controls.[123] 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.[124] 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.[125] 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.[126]

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.[127] 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.[128] 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.[129] 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.[130] 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.[131] 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.[132] 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.[133] 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.[134] 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.[135] Faced with such a complex regulatory

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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).

134. *See* Commission Decision 2005/618, 2005 O.J. (L 214) 65, para. (1), *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005D0618:EN:NOT (amending Directive 2002/95/EC to allow for "certain concentration values" of banned substances). *See also* Pak, *supra* note 74, at 264-66 (noting that restrictions on lead caused the formation of "tin whiskers," which can cause failures in electrical circuits and indirectly led to the shutdown of a nuclear power plant in Connecticut in 2005).

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-

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136. Article 6 of the WEEE Directive permits manufacturers to export e-waste outside of the European Union as long they can demonstrate that the receiving importer will process e-waste in compliance with the WEEE's standards. Council Directive 2002/96, *supra* note 74, art. 6.

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 ENVTL. 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[141] individual autonomy in establishing additional mandates.[142] 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.[143] Thus, in the regulatory commons, competing governments implement policies in a defensive manner rather than with well-reasoned planning.[144]

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.[145] 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.[146] At the same time, on the state level, the presence of various forms of legislation results in overlap and creates conflicting waste regulation schemes.[147] These regulations can best be characterized as a "patchwork" of inconsistent and often counterproductive policies.[148] In fact, nearly all types of e-waste are freely exported from the United States; the EPA only maintains narrow

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141. *WEEE Member State Contacts*, EUROPEAN COMMISSION, http://ec.europa.eu/environment/waste/weee/contacts_en.htm (last updated Oct. 2012).

142. *See* Consolidated Version of the Treaty Establishing the European Community art. 176, Dec. 24, 2002, 2002 O.J. (C 325) 33, *available at* http://www.frontex.europa.eu/assets/Legal_basis/12002E_EN.pdf.

143. *See* U.S. DEP'T OF COM.'S INT'L TRADE ADMIN, *supra* note 73.

144. Esty, *supra* note 30, at 1560.

145. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 8, at 2.

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).

147. *See generally Brief Comparison of State Laws on Electronics Recycling,* ELECTRONICS TAKE BACK COALITION, http://www.electronicstakeback.com/wp-content/uploads/Compare_state_laws_chart.pdf (last updated Sept. 19, 2013).

148. Drayton, *supra* note 95, at 166.

control over CRTs.[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.[150] Nevertheless, exporters can easily get around the law by intentionally mislabeling shipments of CRTs to avoid regulation.[151]

Moreover, existing environmental legislation also embodies jurisdictional mismatch by creating conflicts with WTO legislation because both attempt to regulate e-waste. [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.[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.[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

149. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 8, at 6-7.

150. 40 C.F.R § 261.39(a)(5) (2007) (Conditional Exclusion for Used, Broken Cathode Ray Tubes ("CRTs") and Processed CRT Glass Undergoing Recycling). *See also Regulation of Cathode Ray Tubes*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/osw/hazard/recycling/electron/index.htm (last updated May 17, 2013); *Export Requirements for Cathode Ray Tubes*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/osw/hazard/international/crts/index.htm (last updated Dec. 21, 2012).

151. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, *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.

152. PAUL P. APPASAMY, INTERNATIONAL CONVENTIONS ON HAZARDOUS CHEMICALS 182 (2006), *available at* http://www.mse.ac.in/Trade/pdf/Compendium%20Part%20B/5.%20PPA-chem-conven(2.4.07).pdf.

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. *Id.*

154. *Id*. at 183-84.

country must be given "immediately and unconditionally" to a like product originating in or destined for the territory of all other WTO members.[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.[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.[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.[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-

155. General Agreement on Tariffs and Trade 1994, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, THE LEGAL TEXTS: THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS 17 (1999), 1867 U.N.T.S. 187, 33 I.L.M. 1153 (1994).

156. *Id.*

157. APPASAMY, *supra* note 152, at 184.

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.[159] On the other hand, government actors can help resolve the paradox of the regulatory commons by unleashing market-based forces. [160]

First, a possible solution to the problem of the regulatory commons requires a particular government actor to rise as a prominent regulatory leader.[161] By decreasing the number of potential regulators or increasing the significance of an existing regulator, the system creates a hierarchy of regulatory bodies.[162] Such a hierarchy would better allocate responsibility so that regulatory bodies can share responsibility, incentivize regulatory action, and avoid regulatory fragmentation and overlap.[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.[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.[165] The OMC provides for a feedback and adjustment process that emphasizes "mutual correction, not uniformity."[166] Experts across a broad spectrum of fields, drawn from member states, come together in a panel to evaluate and disseminate

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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).

160. Buzbee, *supra* note 25, at 6.

161. *Id.* at 49-51.

162. *See* Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297 (1999).

163. *Id.* (arguing that creating hierarchies helps overcome regulatory inaction and regulatory fragmentation).

164. Buzbee, *supra* note 25, at 61.

165. Maria Joao Rodrigues, *The Open Method of Coordination: A New Governance Tool*, 2-3 EUROPA/EUROPE 96 (2001).

166. Joshua Cohen & Charles F. Sabel, *Sovereignty and Solidarity: EU and US*, *in* PUBLIC GOVERNANCE IN THE AGE OF GLOBALIZATION, 694 (Karl-Heinz Ladeur ed., 2004).

information about each member state's regulatory strategies.[167] As such, the initiative encourages planning, comparison, and coordination of policies[168] and helps to improve social cohesion across the European nation-states.[169] The OMC has been expanded to other areas of regulation[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.[171] The promotion of a decentralization approach toward experimentation and information dissemination is commonly known as "democratic experimentalism."[172] Here, decentralized actors can be just as prominent as central government actors and can reinforce information sharing.[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.[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.[175] Thus, democratic experimentalism fosters information sharing and reinforces de-

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167. *Id.*

168. Jos Berghman & Kieke G.H. Okma, *The Method of Open Coordination: Open Procedures or Closed Circuit? Social Policy Making Between Science and Politics*, 4 EUR. J. SOC. SEC. 331 (2002) (highlighting the advantages of the open method of coordination).

169. Cohen & Sabel, *supra* note 166, at 694-95.

170. Fritz W. Scharpf, *The European Social Model: Coping With the Challenges of Diversity*, 4 J. COMMON MKT. STUD. 645, 652-56 (2002).

171. Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism,* 98 COLUM. L. REV. 267 (1998) (noting how design of legal institutions can be modeled after that of business institutions to benefit from decentralized units). *See, e.g.,* HANS WISSEMA, UNIT MANAGEMENT: ENTREPRENEURSHIP AND COORDINATION IN THE DECENTRALISED FIRM 11-12 (1992) (stating that fast changing markets need "an increase in 'entrepreneurial density'" within firms).

172. *See* Dorf & Sabel, *supra* note 171.

173. *Id.* at 354-56.

174. *See generally id.* at 368-69.

175. MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION (1965).

centralized autonomy in order to overcome the challenges posed by the regulatory commons.[176]

Collectively, these solutions will help achieve the goals intended by the current overabundance of e-waste regulations.[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.[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.[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.[180] Manufacturers are divided into two groups.[181] Within each group, manufacturers collaborate to establish and operate

176. *See* Dorf & Sabel, *supra* note 171, cited in Buzbee, *supra* note 25, at 59.
177. *Id*. at 24.
178. *Id*.
179. Lin et al., *supra* note 26, 541-42 (2002).
180. *Id*.
181. Group A includes Matsushita Electric Industrial Co., Ltd., Toshiba Corp., to name a few prominent manufacturers. Group B includes Hitachi, Ltd., Sanyo Electric Co, Ltd, Sharp Corp, Sony Corp, Fujitsu General Ltd., Mitsubishi Electric Corp. Kiyoshi Ueno, *Current Status of Home Appliance Recycling in Japan*, EPC NEWSLETTER, No. 18, *available at* http://www.rezagos.com/descargas/Current%20Status%20of%20Home%20Appliance%20Recycling%20in%20Japan.pdf.

recycling plants and a network of collection centers.[182] Then, other manufacturers and importers can contract with either group to participate in the manufacturers' takeback and recycling networks.[183] 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.[184] Meanwhile, consumers help finance SHAR's collection and recycling mechanisms by paying disposal fees when dropping off used electronic goods at the collection centers.[185] While the WEEE Directive places complete end-of-life management responsibilities on manufacturers, Japan's SHAR system is more effective because it employs democratic experimentalism to solve the problems of the regulatory commons.

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.[186] 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.[187] SHAR uses existing networks of retailers and local governments to operate collection centers and more

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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*.

186. *See id*. Additionally, the EPA has found that most computer users are unaware of the problems e-waste presents. TACHI KIUCHI ET AL., GLOBAL FUTURES FOUNDATION, COMPUTERS, E-WASTE, AND PRODUCT STEWARDSHIP: IS CALIFORNIA READY FOR THE CHALLENGE? (2001), *available at* http://infohouse.p2ric.org/ref/41/40164.htm.

187. Pak, *supra* note 74, at 275-78.

proportionately allocates cost to consumers.[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.[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.[190] For example, one month after SHAR became effective, the rate of illegal e-waste dumping in Japan increased by 25%.[191] Coordinating such collection systems and determining individual producers' costs can also be expensive.[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.[193] Consumers can also fund transactional expenses as-

188. INFORM, INC., *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. *See* Pak, *supra* note 74, at 272-73.

189. Pak, *supra* note 74, at 272-73.

190. Lin et al., *supra* note 26, at 542.

191. *Id*.

192. Hannah G. Elisha, *Addressing the E-Waste Crisis: The Need for Comprehensive Federal E-Waste Regulation Within the U.S.*, 14 CHAP. L. REV. 195, 231 (2010) (stating the opinion of SHAR's critics).

193. Panasonic has set up producer takeback programs under the Electronic Manufacturers Recycling Management Company in collaboration with Toshiba and Sharp in the United States, and similar programs in Germany and Australia. *Environment: Recovery of Resources (Used Product Recycling),* PANASONIC,
http://www.panasonic.net/sustainability/en/eco/resources_recycling/recovery/ (last visited Mar. 30, 2014).

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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* B.A., *cum laude*, University of Pennsylvania (2009); J.D., Brooklyn Law School (2014). Thank you to the entire staff of the Brooklyn Journal of International Journal for their diligent review and helpful feedback in preparing this Note. I would also like to thank the Brooklyn Law School professors who contributed their insights and inspiration throughout this process. I owe special thanks to my family and friends for their endless love and support. Finally, I would like to dedicate this Note to all of the teachers and professors who played a role in my education and personal growth; you have each made profound contributions, whether directly or indirectly, to this Note. Any errors or omissions are my own.