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E-wasted Time The Hazardous Lag in Comprehensive Regulation of the Electronics Recycling Industry in the United States

Maya Abela and Jacob Campbell



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*Winners of the 2009 Lillian S. Fisher Prize in
Environmental Law and Public Policy*

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Maya Abela, a 2009 graduate, *cum laude*, of the James E. Rogers College of Law at the University of Arizona, became interested in the topic of electronic waste as a result of her longstanding curiosity about the environmental and social consequences of international trade. Abela currently lives in Washington, DC, and is a trial attorney with the U.S. Department of Justice, Environment and Natural Resources Division (ENRD), Environmental Enforcement Section. The views expressed in this paper are those of the authors and do not necessarily represent the views of ENRD, the Department of Justice, or the United States government.

Jacob Campbell, a PhD student in the School of Anthropology at the University of Arizona, developed an interest in e-waste as part of his broader research concern with the social and environmental implications of contemporary patterns of non-renewable resource consumption. He currently is preparing to embark on a year of dissertation fieldwork in Trinidad and Tobago, where he will investigate the politics and local experiences of natural gas-based sustainable development programs in a context of rapid resource depletion.

E-wasted Time: The Hazardous Lag in Comprehensive Regulation of the Electronics Recycling Industry in the United States

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Abstract

The emergent problem of how to recycle or dispose of the vast quantity of electronics being discarded in the United States has eluded systematic regulation, which has fomented diverse responses within both the public and private sectors. These responses have had wide-ranging, even contradictory, effects, such as environmental degradation and creative entrepreneurship, in the US and abroad. In this paper, we seek to address the status of electronics recycling regulation in the US, as well as how this regulatory climate influences industry practice. First, we discuss the evolution of the US regulatory response to the electronics recycling industry, with attention paid to evidence of self-, state, and federal regulations. We follow with a case study on Tucson, Arizona, describing the networks through which used electronics flow in and through the city. We conclude with a forecast for the regulation of electronic waste processing in the US, and call for a more comprehensive approach to managing the life cycle of these materials.

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Introduction

In the town of Guiyu, located in southeast China, the blood of the children runs with lead and literal mountains of computer circuit boards and stripped electrical wire dot the landscape. The prospect in parts of Lagos, Nigeria, and Accra, Ghana, in addition to many other parts of the developing world, is much the same.

While these locales may seem far-removed from the latest trends in cell phones and laptops, there is an intimate connection. Increased demand for new electronics products feeds a steady stream of used electronics into the developing world, where an emergent local industry now expects the continued flow of electronics waste to recycle into material for new production.

The origin of such waste could be nearly anywhere in the developed world, anywhere people are getting rid of their old technologies to make way for the next breakthrough. The market in electronics recycling is intrinsically global and the waste of developed countries is the raw material of the developing world.

Because the market in electronics recycling is so broad in scope, the industry (both formal and informal) that has been created around it comprises a variety of actors and networks. These parties have both shaped and are shaped by the development of regulation in the electronics recycling industry. Through an examination of the evolution of the regulatory response to electronics waste and recycling—and a case study of the actors and networks within the industry in Tucson, Arizona—this paper analyzes the local and global forces influencing the life cycle of electronics materials.

The present work examines the relatively short history of e-waste regulation and considers what the future may hold for the electronics recycling industry and the actors and networks included therein.

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Evolution of the US Regulatory Response to the Electronics Recycling Industry

Though electronic devices of all sorts have been moving in the market for many years, the last decade has seen an explosion of market production and consumer demand in personal electronics. This change in the demand for electronics is compounded by other factors, including the increasingly rapid rate of technological obsolescence and mandatory technology phase-outs, the switch from analog to digital television being one recent example. That phase-out alone is expected to create roughly thirty million analog televisions destined for recycling and disposal.¹

Thus, the question of how all these used electronic devices will be properly managed is one of increasing importance. At the heart of this issue is a problem of definition: are used electronics waste, commodity, or both? If used electronics are waste, are they hazardous waste? If used electronics are hazardous waste, should there be exceptions to their treatment as such if they are saleable?

The answers to these questions are largely dependant on perspective. There is disagreement over the appropriate treatment and classification of used electronics not only among nations, but also within nations, making even discussion of management solutions a complicated endeavor. This fundamental tension is the backdrop against which the US regulatory response to the electronics recycling industry must be examined.

With any new waste stream, there is a traceable logic to the evolution of the management response: at the beginning, the waste is simply disposed of according to already existing waste management practices. If, however, the waste can somehow be utilized, the development of a market and industry in recycling the waste—and its dismantling to access the profitable material—is the next part of the evolution. After the industry becomes established, a period of voluntary self-regulation, where the market is left to its own devices, often precedes management on a mandatory basis.

What typically follows, and can take a good deal of time to develop, is some type of government regulation of the industry that emerges in response to the new waste stream and its attendant recycling enterprises.

¹ Stefanie Olsen, "Congress, Green-peace move on e-waste," Green Tech CNET news (Aug. 6, 2008), news.cnet.com/8301-11128_3-10007998-54.html?tag=mncol (last visited June 22, 2010).

Industry self-regulation: Voluntary certification programs

When the wheels of the government regulatory structure do not keep up with the development of the industry and the market, the industry itself will often begin some process of self-regulation. The general structure for self-regulation that has evolved in the electronics recycling industry is that of voluntary company “certification.” The certification process typically requires that a recycling company “pledge” to uphold and operate under certain set standards and agree to periodic third-party auditing of their business practices to ensure the standards are being met. In exchange for adhering to these requirements, the company can advertise that they are a “certified recycler” under the program. While this is the basic structure of all the electronics recycler certification programs, the substantive requirements established by the standards vary significantly.

There are several “preventive” reasons for why an industry might be interested in self-regulation, including: (1) an attempt to avoid or at least delay the imposition of government regulation by demonstrating that the industry can adequately regulate itself, (2) a desire to keep costs of regulation to a minimum, as the industry’s self-imposed methods of regulation are likely to be less costly than those externally mandated, and (3) a desire to influence what mandatory regulation might eventually entail by establishing infrastructure for the type of regulation that is preferential to the industry.

When the International Association of Electronics Recyclers (IAER) established the first voluntary certification program for the electronics recycling industry in 2005, it cited increased government interest in certification programs as a reason why companies should obtain certification under its program.²

IAER was very much in tune with the inclinations and movements of other actors in the network of electronics recycling, including government and manufacturers. Its certification program appears to be designed with the intent to set the stage for how an electronics recycling certification program should operate and demonstrate to the US Environmental Protection Agency (EPA) that the industry was capable of self-regulation.

In early 2009, the Institute of Scrap Recycling Industries, Inc. (ISRI), another trade group, acquired IAER, and integrated the IAER certification program into the ISRI Recycling Industry Operating Standard (RIOS) program.³

²“Why Obtain IAER Certification?: The Benefits of Being a ‘Certified Electronics Recycler®’,” International Association of Electronics Recyclers, www.iaer.org/communications/cer-benefits.htm (last visited June 22, 2010).

³In a policy statement issued in April 2010, the ISRI stated that “On March 25, The ISRI board voted unanimously to adopt a policy that urges members exporting electronic scrap to ship the product to safe and responsible overseas processors. The new policy statement also calls for safe and responsible recycling of e-scrap in the United States.” www.isri.org/imis15_prod/CMDownload.aspx?ContentKey=9074279f-aaa7-4165-be56-8a37e1fc60f2&ContentItemKey=31e1afe9-ab16-4ee5-8f61-df36af081263 (last visited June 22, 2010).

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There are also more “reactive” reasons why an industry would choose to self-regulate, which have also occurred in the context of electronics recycling. For instance, such a response might be found when companies take advantage of the lack of regulation to conduct fraudulent business, and thereby jeopardize the reputation and future prospects of legitimate industry business.

A recent example of this occurred in the voluntary carbon offset industry, where, in reaction to “carbon cowboys” selling the credits from carbon offset projects that do not exist or selling the same credits to several different customers, the legitimate voluntary offset industry took steps toward self-regulation.⁴ Thus far, self-regulation has basically tracked the regulatory measures required by the non-voluntary European Union carbon offset market, including the setting of industry standards of operation and account auditing.⁵

A similar reaction has occurred of late in the US electronics recycling industry, which remains largely unregulated. Some electronics recycling businesses have taken advantage of the lack of regulation to perform collections of used electronics, deceiving clients about how the electronics are ultimately handled by assuring proper, domestic recycling and then exporting the waste to developing nations lacking the infrastructure for safe and environmentally sound recycling.⁶

The recent wide public exposure of such practices created new industry interest in several voluntary certification programs that came into operation at around the same time.⁷

Since the formulation of the IAER-ISRI certification program, several other actors within the network, but outside the industry itself, became involved in developing different standards and certification programs. One of these programs represents the only action taken by the US government in response to managing the growing electronics recycling industry: the “R2” Practices. The EPA released this set of standards in October 2008, in a guidance document, “Responsible Recycling (‘R2’) Practices for use in Accredited Certification Programs for Electronics Recyclers.”⁸

The standards were created by a working group brought together by the EPA and comprises state representatives, multiple federal stakeholders (i.e., the Occupational Safety and Health Administration, Department of Defense, Department of Justice), electronics recyclers, and non-governmental organizations.⁹

The impetus cited for creating the standards included that the “various voluntary standards do not have wide acceptance” and that there was “no established method for assuring conformity with these standards.”¹⁰

⁴ Diana Liverman, Co-Director, Institute for Environment and Society, Presentation at Law, Economics, and the Environment Seminar, James E. Rogers College of Law (Apr. 17, 2009); Fiona Harvey, Beware the carbon offsetting cowboys, *Financial Times*, Apr. 25, 2007, www.emissierechten.nl/CO2-cowboys.pdf (last visited June 22, 2010).

⁵ Harvey, *supra* note 4.

⁶ EPA Needs to Better Control Harmful U.S. Exports Through Stronger Enforcement and More Comprehensive Regulation 25-6, US Government Accountability Office (Aug. 28, 2008), www.gao.gov/new.items/d081044.pdf [hereinafter “GAO Report”]; “Following the Trail of Toxic E-Waste,” 60 Minutes (Nov. 9, 2008), www.cbsnews.com/stories/2008/11/06/60minutes/main4579229.shtml (last visited June 22, 2010).

⁷ See e.g. Responsible Recycling (“R2”) Practices, www.decideagree.com/R2_Document.pdf; Basel Action Network e-Stewards Initiative, www.e-stewards.org.

⁸ “New Guidelines Encourage Responsible Recycling of Electronics,” US EPA News Release, Oct. 31, 2008, yosemite.epa.gov/opa/advpress.nsf/0/C36B0D65F8DDA9BA852574F-3004FOAF6 (last visited June 22, 2010).

⁹ DeAnne Toto, “Rules of Engagement,” *Recycling Today* (Jan. 15, 2009), recyclingtoday.texterity.com/recyclingtoday/200901?folio=108#pg108 (last visited June 22, 2010).

¹⁰ John Cross, US EPA, Responsible Recycling Practices for Electronics Recyclers, Presentation at Federal Environmental Symposium-East, www.fedcenter.gov/_kd/go.cfm?destination=ShowItem&Item_ID=9581 (last visited June 22, 2010).

The R2 practices document does not set forth legally binding requirements or standards—it is merely a guidance document, and as the introduction notes, “[e]lectronics recyclers that adhere to this set of R2 practices are doing so on a voluntary basis.”¹¹

The practices have met with a mixed reception among the various actors within the electronics recycling network. The R2 practices were clearly favored by the EPA (under the Bush Administration) and received significant support from the electronics recycling industry, whose RIOS certification program now has a streamlined process for companies seeking to achieve certification under both the R2 and RIOS programs.¹²

However, main stakeholders among nongovernmental organizations have not embraced the R2 practices. In fact, the nongovernmental organizations that were invited to participate in the R2 working group, including the Basel Action Network (BAN) and the Electronics TakeBack Coalition (ETBC), have been some of the harshest critics of the R2 practices. The BAN and ETBC left the R2 working group after two years because they would not compromise certain core principles relating to prison labor, landfilling, and export requirements.¹³

In reaction to the perceived deficiencies of the R2 practices in these areas, BAN established its own voluntary standards and certification program called the e-Stewards Initiative.¹⁴ Regarding the purpose of its certification program, BAN executive director Jim Puckett stated that “[t]he e-Stewards project is a response to the failure of government and industry to act as responsible global citizens in the age of information technology.”¹⁵

With the goal of representing those interests left behind by the government and industry, the e-Stewards Initiative proclaims itself to be the only electronics recycler certification program supported by the environmental and social justice community.¹⁶ To date there are thirty-four electronics recycling companies in the US and Canada that are certified under the e-Stewards program.¹⁷

In the absence of any comprehensive, mandatory regulation by which companies in the US can be assessed as “law-abiding” or simply “responsible,” the electronics recycling industry has embraced a host of voluntary certification programs that have evolved to fill the gap. Developed by different actors within the electronics recycling network, these programs share similar structures but vary significantly in their substantive requirements. While there is little doubt that some regulation and accountability is preferential to none,

¹¹ Responsible Recycling (“R2”) Practices For Use In Accredited Certification Programs for Electronics Recyclers, US EPA, Oct. 30, 2008, www.decideagree.com/R2%20Document.pdf

¹² Introduction to RIOS, ISRI, www.isri.org/AM/Template.cfm?Section=Home1&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=9415 (last visited June 22, 2010).

¹³ Toto, *supra* note 9.

¹⁴ Id.; “BAN to Develop Certification Program for Electronics Recyclers,” *Recycling Today* (Dec. 18, 2008), recyclingtoday.texterity.com/recyclingtoday/200812?pg=12#pg12 (last visited June 22, 2010).

¹⁵ “BAN to Develop Certification Program for Electronics Recyclers,” *Recycling Today* (Dec. 18, 2008), www.recyclingtoday.com/articles/article.asp?ID=7659&IssueID=397 (last visited June 22, 2010).

¹⁶ The e-Steward Solution, e-Stewards Initiative, e-stewards.org/ (last visited June 22, 2010).

¹⁷ Find Your Local e-Stewards, e-Stewards Initiative, e-stewards.org/find-a-recycler/ (last visited June 22, 2010).

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there remains a serious concern as to whether voluntary regulation is sufficient and whether it can truly hold businesses accountable.

One obvious concern is the fact that all the certification systems are voluntary—there is nothing requiring electronics recyclers to be certified by one of the existing programs, and neither are there any comprehensive requirements that businesses and consumers patronize only certified electronics recyclers. A uniform set of standards for all electronics recyclers in the US is a concept with a great deal of promise, however the full benefit of any such system will likely remain unrealized unless the industry is actually required to meet the standards.

An additional concern is that there are now multiple voluntary certification systems requiring different levels of accountability in different sectors. As one of the primary purposes of certification from the industry perspective is to create a signal of corporate social responsibility for the public, when there are multiple standards and labels given to companies across the industry, it is not a stretch to assume that one of two things will likely occur: (1) the general public will conflate all the programs, seeing them as all denoting the same basic standard, to the detriment of those companies participating in the more restrictive programs, or (2) the general public will be confused by the various labels and thus discount their meaning, to the detriment of all companies participating in voluntary certification.

Thus, the existence of multiple standards and programs for certifying electronics recyclers in the US creates an uncertain system of regulation, because the “market” can only hold companies within the industry accountable for their corporate practices to the degree that the public can actually discern a difference between non-certified and certified companies, and among companies certified by different programs.

State regulation: Extended producer responsibility model

In a noteworthy example of federalism at work, the general uncertainty of industry self-regulation and the absence of any comprehensive direct federal regulation in the area has spurred several states to enact legislation to manage electronics disposal and recycling within their own borders. By 2009, eighteen states had enacted such legislation, with many of the regulations coming into force beginning in 2009 or later.¹⁸ Another sixteen states were considering electronics recycling legislation in 2009, including Arizona.¹⁹

¹⁸ The states with e-waste extended producer responsibility laws include: CT, HI, IL, ME, MD, MI, MN, MO, NJ, NC, OK, OR, RI, TX, VA, WA, and WV. California has a consumer fee law, and has adopted a resolution to use extended producer responsibility model in formulating future policy. See generally “State Legislation,” Electronics TakeBack Coalition, www.electronicstakeback.com/legislation/state_legislation.htm (last visited June 22, 2009).

¹⁹ Id.; see also Ariz. Leg. HB 2194, “Amending Title 49, Chapter 4, Arizona Revised Statutes, by Adding Article 11; Relating to the Large Electronics Recycling Program.”

Though the exact details and scope of the laws vary by state, the “extended producer responsibility” (EPR) model has generally been the guiding principle behind the regulations. EPR essentially encompasses the idea that the producer (manufacturer) of a product bears the responsibility for its proper end-of-life disposal—the concept encapsulated by the phrase “cradle to grave.” This approach has been embraced by the European Union in its electronics disposal and recycling directives.²⁰

In the context of these state laws, EPR typically requires a manufacturer to provide for in-state electronics “take-back” or recycling programs if the manufacturer sells its products in that state.²¹

Though the initiative demonstrated by the state actors in enacting electronics recycling laws is commendable, such regulation alone is unlikely to prevent the movement of used electronics to countries without capabilities for proper disposal. Indeed, the laws will undoubtedly have the effect of increasing the volume of electronics destined for the international recycling market. While most of the state regulations require producers to develop or participate in an electronics take-back or recycling program, they impose few substantive demands on the electronics recycling industry itself.

A handful of states have taken a more direct approach to managing the electronics recyclers by requiring that recyclers comply with state or industry-established guidelines for environmentally sound recycling practices.²²

However, in general, the most that is required is that producers utilize electronics recyclers and collectors that are “registered” with the state, but what exactly this means is often not explained. Aside from this limited requirement, the states have basically tracked the federal regulation of electronics recyclers, making the very limited coverage of electronics under the Resource Conservation and Recovery Act (RCRA, discussed below) essentially the only substantive regulation pertaining to foreign export of used electronics.

This system establishes more of a “cradle-to-hearse” model for liability of used electronics, because it fails to extend responsibility to the true final disposition of the products. Unless the requirements that electronics recyclers register with the state are interpreted to include proof that the recycler’s business practices are socially and environmentally sound, or more states follow the lead of the few that have required recyclers to follow established guidelines for environmentally sound management, the minimal requirements imposed on electronics recyclers are otherwise not likely to greatly affect the export of used electronics from the US. However, as the majority of these state electronics recycling laws are quite new, it is possible that future rule-

²⁰ See EU Waste Electrical and Electronic Equipment (WEEE) Directive, eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0096:EN:HTML; EU Restriction of Hazardous Substances Directive (RoHS) Directive, eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML.

²¹ See generally Comparison of State E-Waste Laws, Electronics TakeBack Coalition, Oct. 10, 2008, www.electronicstakeback.com/legislation/Detailed%20State%20Law%20Comparison%20ALL.pdf.

²² See e.g. Me. Rev. Stat. Ann. tit. 38, § 1610(5)(C) (2008), requiring electronics recyclers to provide sworn certification that their processes meet guidelines for environmentally sound management published by the Maine Department of Environmental Protection; 30 Tex. Admin. Code § 328.149 (2008), adopting the ISRI “Electronics Recycling Operating Practices” as the standard for electronics recyclers.

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making will yet develop vague requirements into regulation of electronics recyclers that has more substance.

Federal regulation

The leadership of the US federal government in regulating used electronics recycling has thus far been remarkably limited. With one minor exception, in the US there is no direct federal regulation of used electronics destined for reuse or recycling.

The one federal statute that is relevant to the discussion is the Resource Conservation and Recovery Act (RCRA) of 1976, regulating the handling and disposal of hazardous waste. Returning to the problem of definition discussed above, one key reason much of the used electronics market does not fall under federal regulation is because it is not considered “hazardous waste” under RCRA, where something must be first determined to be “waste” before it can be classified as “hazardous waste.”

In order to reinforce the EPA’s hierarchy of waste management (reuse, recycle, dispose), used electronics determined to have reusable or recyclable components are classified as a commodity, rather than waste.²³ Thus, many of the most common electronic parts (precious metals, scrap metals, circuit boards) which otherwise meet the toxicity levels requiring classification as “hazardous waste” are either exempt or excluded from the category if they are destined for reuse or recycling rather than disposal.²⁴ The steps to be taken prior to disposal are therefore key to determining the classification of the used electronics, which in turn determines the ultimate question of liability for proper handling and final disposition. Thus, if a business sends used electronics for reuse or recycling rather than disposal, it will generally avoid liability under RCRA.²⁵

Liability under RCRA can technically be “re-created” by electronics recyclers if, in the recycling or disassembly process, the recycler itself creates separate wastes classifiable as hazardous. In reality, however, US electronics recyclers might be more appropriately termed “electronics brokers” because the vast majority of used electronics that enter the US recycling and reuse market are sold to foreign processors and actually disassembled or recycled outside of the US.²⁶

In this scenario, liability under RCRA would not attach itself to the US recycler because the used electronics left the US as a marketable commodity,

²³ Robert Tonetti, EPA’s Regulatory Program for “E-Waste” 3, 7-8 (2007), US EPA Office of Solid Waste, www.epa.gov/osw/conserve/materials/recycling/docs/e-wasteregs.pdf.

²⁴ Id. at 7-8.

²⁵ Id. at 11.

²⁶ Data in this area is notably difficult to obtain, but estimates based on end markets for CRT-containing electronic devices indicate that over 87% of such devices collected in the US are processed for reuse or recycle outside of the US. See Electronics Waste Management in the United States: Approach 1, Final 29 (2008), US EPA Office of Solid Waste, www.epa.gov/waste/conserve/materials/recycling/docs/app-1.pdf.

not as regulable “hazardous waste.” Thus, while RCRA liability does apply to the US recycler for any new hazardous wastes created in processing—because the great majority of this new waste is “created” after the electronics have been sold and exported to a foreign processor—the bulk of the hazardous waste contained in used electronics from the US is beyond the jurisdictional reach of RCRA. In short, “exporters can ship most types of used electronic products, such as computers, printers, and cell phones, without restriction” and without fear of liability.²⁷

The only mandatory requirements present in this otherwise gaping regulatory loophole are those specifically applying to cathode ray tubes (CRTs). CRTs were formerly classified as hazardous waste under RCRA due to their extremely high lead content, and no exceptions for this classification existed until the EPA issued the “CRT Rule” in 2006.²⁸

The rule reduced regulatory requirements that previously applied by creating an almost complete exception to CRTs destined for recycling or reuse domestically, and triggering only notice and consent requirements for foreign export.²⁹ Conspicuously lacking in the export provisions of the rule is any requirement that the foreign country accepting the used CRTs verify, let alone demonstrate, that it has the capacity to process the material in a manner that is safe to both workers and the environment.³⁰

The intent of the CRT Rule was ostensibly to “encourage recycling, protect human health and the environment, and ensure that the subject materials are handled as commodities rather than as wastes.”³¹

While there is no doubt that recycling of used electronics is preferable to outright disposal, and the elimination of liability under RCRA is indeed likely to favor increased levels of recycling, the EPA’s willingness to adjust the definition of hazardous waste has other serious repercussions. By shifting the responsibility for proper disposal to downstream processors without more than the exporter’s own description of what that processing will entail,³² the CRT Rule creates a system ripe for abuse in export situations, where the downstream processor itself cannot be held liable under RCRA for disposal of “new” wastes produced in processing.

Additionally, any regulation is only as strong as it is enforced, and a recent Government Accountability Office report exposed the fact that the EPA has failed to take steps toward enforcing the CRT Rule since it came into effect in January 2007.³³ A related sting investigation also revealed multiple knowing violations of the CRT Rule by US electronics recyclers who, claiming that the notice and consent requirement didn’t apply to their company

²⁷ GAO Report, *supra* note 6, at 22.

²⁸ See Hazardous Waste Management System; Modification of the Hazardous Waste Program; Cathode Ray Tubes, 71 Fed. Reg. 42,928 (July 28, 2006) (to be codified at 40 C.F.R. §§ 9, 260, 261, 271) [hereinafter “Final CRT Rule”].

²⁹ 40 C.F.R. § 261.4(a)(23)(i).

³⁰ See 40 C.F.R. § 261.39 (requiring only that the exporter include in the intent-to-export notice “[a] description of the manner in which the CRTs will be recycled in the foreign country that will be receiving the CRTs”).

³¹ Final CRT Rule, *supra* note 28, at 42,929.

³² See 40 C.F.R. § 261.39, *supra* note 30.

³³ GAO Report, *supra* note 6, at 26.

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because they conducted only US processing, nonetheless offered to export CRTs to fictitious foreign brokers without filing any notice with the EPA.³⁴

To add insult to injury, many of the recyclers that offered to ship illegally the CRTs abroad also actively cultivate a “green” image, stating that their practices are “environmentally friendly,” with some going so far as to claim they are meeting their goal of being “globally responsible” by charging customers \$10-\$30 for “responsible, domestic recycling costs.”³⁵

Therefore, even in the narrow segment of the market where US electronics recyclers are actually regulated, the regulations (1) do not adequately protect global environmental and health interests, (2) are not enforced, and (3) are knowingly and blatantly violated. One of the important lessons to be drawn from this reality is that if US electronics recyclers are not only failing to follow the mandatory requirements of the CRT Rule, but are flagrantly and knowingly violating them, there seems little reason to believe that the industry will be inclined to follow any voluntary guidelines for responsible recycling like those established by the R2 Practices, discussed above.

Summary regulatory assessment

Due to the choices made by both the electronics recycling industry and government, the complications inherent in defining and categorizing used electronics, and the dynamism of the whole network itself, the regulation of used electronics in the US has reached a state of confusion and uncertainty, for both industry and consumers. The proliferation of new state electronics recycling laws, of which no two are exactly alike, require both electronics manufacturers and recyclers to determine and comply with each state’s individual requirements.

Additionally, those businesses and individuals seeking to patronize a responsible electronics recycler are faced with choosing among recyclers deemed “certified” by the multiple different certification programs currently in use, with no clear way to differentiate between them. The current state of US regulation of the electronics recycling industry also arguably fails to adequately address the problems created by export of used electronics from the US. Definitional maneuvering at the federal level has created an enormous regulatory loophole in RCRA, excepting from regulation practically all used electronics destined for reuse or recycling, and imposing minimal pro forma notice and consent requirements for the export of only CRTs.

Additionally, the new state laws pertaining to electronics recycling generally do not outline any specific requirements of electronics recyclers, let alone any requirements regarding the export of electronics. Of the select few state

³⁴ Id. at 24-25.

³⁵ Id. at 25-26.

laws that do actually impose substantive requirements on electronics recyclers, none address exports with particularity beyond requiring that they comply with all applicable laws.

Case Study: The Tucson, Arizona, Region

Electronics waste and scrap is defined or interpreted in many ways: as an environmental and health liability, a regulatory conundrum, a logistical challenge, and an economic opportunity, to name several. As the quantity of these materials has grown through the past two decades, the purposes and manner in which they are administered has become increasingly complex.

This section will identify a number of the principal actors that buy, sell, dispose of, or otherwise process used electronics in the Tucson, Ariz., region. This section describes the networks through which these materials flow, focusing on how an emergent array of agents and institutions, operating with different social and economic interests, are determining the life cycle of a steadily expanding stream of used electronics.

Tucson is a city with approximately 526,000 residents in south central Arizona.³⁶ Due in part to its close proximity to the Mexican border, and the presence of the University of Arizona, Tucson is a site where large quantities of used electronics are exchanged and processed through dynamic networks of private, non-profit, and governmental actors. The non-profit RISE Equipment Recycling Center, previously named Desert Waste Not Warehouse (DWNW), received as many as 500 used computers per day in 2001, a figure that has likely increased.³⁷

The prior year, City of Tucson Environmental Services officials identified electronic waste as a problem requiring further attention. A waste-reduction planner with the city, anticipated a “tsunami of computers” coming to the end of their life cycle and initiated a recycling program aimed at intercepting this wave before it hit the landfills.³⁸

The waste-reduction planner and waste management officials around the country, realized that citizens and businesses were consuming electronics (particularly computers) faster than municipal systems were designed to handle. This escalation has been primarily due to price reductions, commodity fashion, and “built-in obsolescence,” an increasingly pervasive industry practice that ensures a repeated cycle of purchase and manufacture by designing products to break or become useless.³⁹

³⁶ Population Estimates: Cities and Towns (2007), US Census Bureau, www.census.gov/popest/cities/files/SUB-EST2007-4.csv (last visited June 22, 2010).

³⁷ Jodi Perin, et al., Computer Recycling: Networks and Possibilities for Expansion in Tucson, Arizona, *Ariz. Anthropologist*, 2005, at 10-37.

³⁸ Interview with waste-reduction planner, City of Tucson, in Tucson, Ariz. (Apr. 17, 2009) [notes on file with author].

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To help deal efficiently with the high volume of used and unwanted electronics in Tucson, the waste-reduction planner initiated a partnership between the City of Tucson and a non-profit recycling center in 2000. While the city redesigned and amplified its public awareness campaigns, the recycling center began picking up electronic materials from landfill drop-off sites, and accepted direct donations from individuals, businesses, and the University of Arizona. The recycling center refurbished and redistributed items that still functioned, and sent components from dead machines to a Casa Grande-based manufacturer for recycling.⁴⁰

While computers and other electronics continued to end up in landfills, the waste-reduction planner claims Tucson's multi-stakeholder recycling program succeeded in significantly limiting the quantity of improperly dumped materials. According to the waste-reduction planner, the way that his office, and many waste managers around the country, thought about the chain of custody for scrap electronics processing changed dramatically in 2004, due to the Basel Action Network's (BAN) release of the film, "The Digital Dump," the supplementary report of the same name, and the ensuing media attention.⁴¹

BAN's work documented their investigations into the dumping and processing of electronic waste in Nigeria and China, revealing how North American and European materials were poisoning the people and environments of these developing countries. Realizing that greater rigor was required in monitoring the city's waste streams, the waste-reduction planner began to ask the recycling center where their materials ended up, only to be told that, "if there is any chance of this being a marketable process you can't ask too many questions."⁴²

When the recycling center's contract ended, the waste-reduction planner and his team issued a request for proposals with the intention of finding a partner with greater transparency. A company with bases in Arizona and another state won the bid for its subsidiary operation located in Mexico.

However, the decision was overturned at the urging of a Tucson official because the company was not local, and the local recycling center's contract was renewed. Numerous for-profit electronics processing companies operate in Tucson, generally either collecting non-functioning equipment from businesses and individuals in order to extract metals, or repairing machines for resale. Examples include Allied Precious Metals Recycling Company, Desert Metals Recycling, and AMCEP. These enterprises accept personal computer CPUs and a variety of other electronics components, but not monitors, due

³⁹ Kate Herrington, *Exporting from Middlebury, VT* (2009), US Small Business Administration.

⁴⁰ Waste-reduction planner interview, *supra* note 38.

⁴¹ *Id.*

⁴² Waste-reduction planner interview, *supra* note 38.

to the cost and difficulty of processing the hazardous lead in the screens.⁴³

CompTech and Computer Renaissance are two local businesses that concentrate on accepting computers for both reuse and recycling. Global Investment Recovery, Inc., is a Tucson company that specializes in recycling end of life-cycle electronics so that data is securely destroyed in a manner that satisfies the requirements of clients such as the US Department of Defense and other government agencies. Similarly, as part of the UNICOR (Federal Prison Industries, Inc.) work program instituted in the federal prison on South Wilmot Road in Tucson, inmates are paid 50 cents an hour to disassemble electronics and strip data to meet government standards. Much of the volume processed by UNICOR comes from the US Department of Veterans Affairs system, which is one of the largest producers of used computers in the federal government.⁴⁴

Non-profit organizations also play a critical role in redistributing and recycling used electronics in Tucson. The Brewster Center and the Chaparral Foundation both accept donations of computers and cell phones, which they repair and provide to area residents in need.⁴⁵

Similarly, the Rural Disabled Assistance Foundation accepts electronics, which are upgraded and given to disabled rural citizens. The Country Fair White Elephant Shop collects and resells computers and other electronics as a fundraiser for local schools. Finally, Tucson Clean & Beautiful Inc. is a non-profit established through the support of the Arizona Department of Environmental Quality to serve as a clearinghouse for these and other businesses and organizations by publishing an annual directory of electronics recycling outlets in the Tucson area.⁴⁶

Tucson's used electronics and the US-Mexico border

Electronics recycling and waste processing networks regularly spread across international boundaries. The disastrous dumping of waste materials in China, Nigeria, and other countries that BAN has revealed is one outcome of transnational used or scrap electronics flows. However, other more nuanced and often mutually beneficial forms of international exchange of these materials exist as well.

Lax and nebulous regulations in the US facilitates the dumping of e-waste in developing countries, yet these same conditions also make it relatively easy for inexpensive used computers to be transported out of the country for communities that desire them. Tucson's proximity to the border provides

⁴³ Perin, *supra* note 37.

⁴⁴ Waste-reduction planner interview, *supra* note 38.

⁴⁵ See The Brewster Center, www.thebrewstercenter.org/; The Chaparral Foundation, chaparraledfoundation.com/.

⁴⁶ See Tucson Clean & Beautiful, www.tucsonaz.gov/tcb.

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opportunities for many Mexican schools and families in the region to have access to affordable electronics from the city, though a high percentage of these machines are near the end of their life cycle and after several years of use will go to a landfill or unsanctioned garbage pile rather than being recycled.⁴⁷

A higher education program director who is based in the US but coordinates academic programs in Sonora, Mexico, is well positioned to consider the paradox inherent in this flow of used electronics from Tucson to Mexico. The program director was born and continues to reside in Nogales, Sonora, where he worked for 15 years as an industrial engineer before working in business promotion in Nogales, Ariz., and then helping to establish a Tucson-based non-profit organization.⁴⁸

In addition to his work as an academic program director, on the side, he buys used computers in Tucson, then refurbishes and loads them with Spanish language software before selling them in Nogales. He considers this work to be more of a service than a business enterprise, since he rarely earns more than \$50 per system, and the computers are primarily purchased by low-income families.

The program director buys his computers from garage sales, newspaper ads, and Craigslist posts, and from contacts in Tucson who deal with bulk electronics. He rents a storage unit on the US side and brings one system at a time into Mexico, which is considered by the authorities to be an informal sector activity that does not require registration or taxation.

According to the program director, the transportation of used electronics across the border is monitored more carefully than ever before. If someone wishes to make this their primary business, it is now nearly impossible to avoid registering with the government. Tightened security on the border due to drug activity and immigration has made the smuggling of electronics through the hills and bribes at the gate uncommon. In 2004, Mexican legislation changed to allow greater numbers of used computers to enter the country from the US, primarily in response to equipment shortages in schools.⁴⁹

The program director stated that compendium laws exist to ensure that these electronics are tracked and properly disposed of, but the statutes are not enforced. "There are graveyards of these machines in the areas surrounding Nogales, and the kids go there to play with the junk," he

⁴⁷ Interview with higher education program director, in Tucson, Ariz. (Apr. 6, 2009) [notes on file with author].

⁴⁸ *Id.*

⁴⁹ Higher education program director interview, *supra* note 47.

explained. “Now and again the city will try to clean this up, but then it all ends up in the landfill.”⁵⁰

So what then to make of this dilemma, wherein Nogales serves as a “dumpster” for Tucson’s e-waste but is nevertheless dependent upon these end-of-life cycle machines? According to the program director, it is not sufficient to accuse US companies and municipalities of being exploitative and domineering in these cases. Families in Nogales want a computer or a TV, and many buy used equipment originally from Tucson because they cannot afford new goods. This is a manifestation of the economic relationship between two bordering countries with dramatically asymmetrical standards of living, in the program director’s view.

Las Chicas Bravas, a women’s co-operative in Fronteras, Sonora, are also experiencing the benefits to be gleaned from Arizona’s e-waste stream. The group partially owns, and works in, a maquiladora in their town that de-manufactures electronics for recycling. American Retroworks Inc., which partially owns and oversees the enterprise, collects material in Glendale, Green Valley, Sierra Vista, and Tucson.⁵¹ Used electronics are then warehoused in Douglas, before being transported to the Fronteras facility for dismantling.⁵²

No material remains in Mexico—all scraps are shipped back to Douglas and ultimately recycled at various sites around the US. One employee at the Douglas facility, noted that many electronics recycling companies attempt to obscure the path their materials take, shifting responsibility from sub-contractor to sub-contractor. According to a company official, American Retroworks logs and tracks every component of electronics they process, so that an individual or auditor is able to discern where the material ends up.

Reliability and transparency is of central importance to American Retroworks’ founder and CEO, Robin Ingenthron. In addition to running his company, Ingenthron also presides over the World Reuse, Repair and Recycling Association (WR3A), which he initiated in 2004 as a non-profit business consortium to promote Fair Trade standards for international electronics recycling.⁵³

WR3A acts as a liaison between international buyers and sellers of used electronics, utilizing contracts and purchase orders to make deals based on fair prices and quality materials. Ingenthron observes that “it’s not uncommon for companies to coordinate with exporters to ship junk. Exporters negotiate with buyers in developing countries, who dictate the amount of junk they will accept in exchange for a specified number of high-value items.”⁵⁴

⁵⁰ Id.

⁵¹ American Retroworks collects electronics in the Tucson area primarily through event organizing.

⁵² Phone interview with Oscar Orta, Marketing Representative, American Retroworks West Inc. (May 12, 2009) [notes on file with author].

⁵³ See World Reuse, Repair and Recycling Association, www.wr3a.org.

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Yet these practices not only result in degraded environments and health, they also drive down the prices a buyer will pay. Through the example of American Retroworks, and the services provided by WR3A, Ingenthron and his team have advocated for higher standards and accountability in international electronics recycling.

Local and global e-waste

This Tucson case has revealed some of the networks through which electronic materials move towards the end of their life cycle. While local actors and institutions play significant roles in guiding waste and recycling streams, used electronics processing has become a global phenomenon with emergent, ill-defined and poorly regulated properties. As the examples above show, however, international electronics recycling in Tucson and on the Arizona-Mexico border yields profound opportunities as well as potential dangers.

Forecast for the US Electronics Recycling Industry

The forecast for developing appropriate electronics recycling regulation in the US no doubt contains quite a few stormy days—striking a balance between protecting the global environment and other interests is alone a difficult task, but is here made even more complicated by the fact that the electronics recycling industry itself, at least in one regard, exists to serve an environmental end. However, according to the Tucson waste-reduction planner mentioned in the previous section, there is room for optimism, and models already exist which have proven effective.⁵⁵

He points to car batteries and tires, which in Arizona, are taxed at the point of sale to cover the cost of recycling. Both of these commodities have established disposal locations that achieve high rates of use by Tucson residents. The waste-reduction planner notes that these policies represent the most effective means to date of ensuring proper processing of used electronics—the only thing missing is the political will to set federal standards.

Current discussions of ways to structure regulation of the electronics recycling industry at the national level in the US generally focus on ways to regulate the electronics directly. These potential reforms include, among other things, classifying all end-of-life electronics as hazardous waste, thereby restricting its movement. While such redefinition could be a crucial piece to solving the problems caused by foreign export of used electronics, a restriction on exports alone is unlikely to bring electronics recyclers into compliance.

⁵⁴ Charles Schmidt, *Unfair e-Waste Trade in Africa*, *Envtl. Health Perspectives*, Apr. 2006, at 232-235.

⁵⁵ Waste-reduction planner interview, *supra* note 38.

As was amply demonstrated by the GAO-conducted sting investigation, prohibition of exports without proper notice and consent is simply not adequate to stem the tide of illegal exportation if recyclers are willing to violate the law and there is no enforcement. What is needed is uniform federal regulation of the US electronics recycling industry itself through mandatory certification and enforcement of standards that adequately account for global environmental protection and worker safety. Such a system would eliminate much of the uncertainty, confusion, and insufficiency present in the current regulatory morass that has evolved from multiple different actors attempting to manage a global problem in their own way.

Among the global responses to the export problem is the prohibition of used electronics export to countries that do not meet the waste management standards of the exporting country. This approach has been adopted by the EU through its WEEE and RoHS directives,⁵⁶ and while it certainly has merit, it is not a stretch to imagine that the US will ultimately favor regulation that does not cripple the electronics recycling export industry.

Given the strength of the market, and the potential benefits provided to developing countries that receive the used and recyclable material, this is not an unreasonable position. Ultimately, there should not be a need for such a de facto ban on export of used electronics, provided that recyclers are uniformly subject to regulations that adequately account for global environmental and health concerns, and that such regulations are actually enforced.

⁵⁶ See *supra* note 20.

Conclusion

This paper has analyzed how the regulation of electronics waste recycling has evolved in the US, and how the inherent complexities of the issue itself, as well as those of the network and interests of the various actors within it, have created the current reality of regulatory disorder. Given the global scope of the electronic waste problem, we conclude that this approach is inadequate for comprehensively managing the movement and proper end-of-life treatment of used electronics. While all the actors in the US electronics recycling network have important perspectives and roles to play in formulating an appropriate regulatory system, the solution to managing this complex problem does not lay in each acting on their own.