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ELECTRONIC WASTE GOVERNANCE: SUSTAINABLE SOLUTIONS TO A GLOBAL DILEMMA

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Résumé

Le présent mémoire a pour objet les formes, les caractéristiques et les défis de la gouvernance des déchets électroniques. L'auteure explore les impactes socio-économiques et environnementales de divers types d'instruments conçus pour mitiger les risques à la santé humaine et à l'environnement que présentent les produits électroniques en fin de vie, notamment: les traités multilatéraux qui visent à prohiber le transfert des déchets hasardeux au pays en développement, les législations régionales, nationales et provinciales mettant en vigueur des systèmes de recyclage obligatoire des déchets électroniques, ainsi que d'autres initiatives, publics et privées, basées sur le principe de la responsabilité élargie des producteurs (REP). L'objectif de ce travail est de comprendre comment les acteurs impliqués dans le commerce de l'équipement électronique peuvent modeler les systèmes de production, d'usage et du traitement fin de vie des technologies contemporaines pour que ces dernières puissent continuer à faire élever les standards de vie et à avancer le développement des communautés humaines, en respectant simultanément le principe international de l'équité globale, l'environnement naturel et la qualité de vie des générations futures.

Mots-clés: déchets électroniques, produit électronique en fin de vie, Convention de Bâle, responsabilité élargie des producteurs (REP), approche cycle de vie, production durable

Abstract

This thesis addresses the forms, characteristics and challenges of electronic waste governance. The author explores the socio-economic and environmental impacts of a diverse range of instruments that have been developed to mitigate the human health and environmental risks presented by end-of-life electronic equipment, namely: multilateral treaties restricting e-waste trade flows into developing countries, regional, national and provincial legislations imposing mandatory recycling systems for e-waste, as well as other public and private initiatives based on the principle of extended producer responsibility (EPR). The objective of this study is to understand how stakeholders implicated in the electronic equipment sector can model the systems of production, use, and discard of electronics, so that the latter may continue to raise living standards and propel human development while simultaneously respecting the international principle of global equity, the natural environment and the quality of life of future generations.

Key words: electronic wastes, end-of-life electronic equipment, Basel Convention, extended producer responsibility (EPR), lifecycle thinking, sustainable production

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INTRODUCTION

The Dilemma

Technology today pervades all spheres of modern life, facilitating transnational communication, strengthening global social and economic development, and perpetually enhancing human experience, efficiency and expectations. At the same time, from our contemporary unbounded use of the microchip, have emerged new environmental and human health concerns. The unprecedented and rising global demand for newly developed electronic products,[1] has swiftly become a major threat to the environment, contributing to the depletion of natural resources and generating massive, uncontrolled quantities of toxic waste.

Although worldwide consumer preference for cutting-edge electronic commodities certainly signifies that living standards are rising across frontiers, it simultaneously reflects the modern dilemma of electrical and electronic waste (also referred to a e-waste or WEEE[2]), which has become the fastest growing waste stream of the 21st century.[3] The seemingly endless rise of e-waste is problematic from environmental and human health perspectives, as electronic devices contain numerous toxic substances and materials which are known to cause severe pollution upon disposal. In particular, e-waste poses an

[1] For revenue estimates and forecasts for the global electronic equipment industry, see Décision Études Conseil, *World Electronics Industries 2008 – 2013* (Paris, DEC, April 2009).

[2] Waste electrical and electronic equipment.

[3] United Nations Environment Program, "E-waste, the hidden side of IT equipments manufacturing and use", UNEP Environment Alert Bulletin, January 2005.

acute risk to human health in developing countries, as the latter have become commonly known to serve as dumping grounds - both legally and otherwise - for defunct electronics from many post-industrialized nations.[4] The vast aqua-terrestrial pollution caused by informal e-waste "recycling centers" in developing economies, and the ill-health of communities which rely on this type of dangerous work as a source of income, controvert the socio-environmental legitimacy of the international e-waste trade, and further call into question the effectiveness of current international norms which aim to prohibit the import of hazardous wastes into developing countries.

The Perspectives

Since 1990, when American journalist Bill Moyers first directed public attention to industrialized countries' common practice of exporting electronic waste to Asia, through his book and video *Global Dumping Ground: The International Traffic in Hazardous Wastes*,[5] there have emerged various transnational environmental networks committed to tracking and publicly exposing the critically negative impact that the global e-waste trade continues to have on environmental and human health in developing nations. Investigative reports released by environmental activist organizations such as the Basel Action Network, Silicon Valley Toxics Coalition and Greenpeace International, documenting how e-waste is exported from various industrialized countries and subsequently treated at popular destination points in Southeast Asia and Africa, have

[4] *See notes 11 and 24.*

[5] Moyers, B. *Global Dumping Ground : The International Traffic in Hazardous Wastes* (Santa Ana, CA : Seven Locks Press, 1990).

aptly framed this new, technological variation of the hazardous waste trade as a violation of international labour and human rights, in particular the right to occupational and environmental health.[6] Environmental sociologists examining the transnational e-waste trade have also come to similar conclusions on the devastating and unfair environmental burdens that are thus transferred from affluent countries to the third world.[7] David Naguib Pellow has drawn attention to the race and class inequalities embedded in the dumping of hazardous wastes in poor communities of the Global South, a trend evidently followed by global electronic waste streams.[8] In *Challenging the Chip*, the most recent comprehensive, geographically inclusive and pluridisciplinary anthology to date on the ecological and health impacts of the global electronics industry, Watterson and Chang poignantly note that:

> Two disturbing phenomenon are generally found where clusters of electronics manufacturing, assembly and disassembly are located: the generation of serious occupational and environmental hazards for workers and nearby communities (Byster & Smith 1999; Fox 1991; LaDou 1984; Sonnenfeld 2004) and the intensification of social inequalities through low wages and labour

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[6] See Puckett, J. et al. *Exporting Harm : The High-Tech Trashing of Asia* (Seattle : BAN/SVTC, 2002); Puckett, J., Westervelt, S., Gutierrez, R., Takamiya, Y., *The Digital Dump : Exporting Re-Use and Abuse to Africa* (Seattle : BAN, 2005); Silicon Valley Toxics Coalition, *Poison PC's and Toxic TVs : California's Biggest Environmental Crisis That You've Never Heard of* (San Jose, CA : SVTC, 2001); Greenpeace Research Laboratories (K. Brigden, I. labunska, D. Santillo, P. Johnston) *Chemical contamination at e-waste recycling and disposal sites in Accra and Korforidua, Ghana* (Amsterdam : Greenpeace International, August 2008).

[7] Pellows, D.N., "The global waste trade and enviromental justice struggles" in Gallagher, K.P. ed., *Handbook on Trade and the Environment* (Northampton : Edward Elgar, February 2009); Clapp J., *Toxic Exports : The Transfer of Hazardous Wastes from Rich to Poor Countries* (Ithaca : Cornell University Press, 2001); Grossman, E., *High Tech Trash : Digital Devices, Hidden Toxics and Human Health* (Washington DC : Island Press, 2006).

[8] See Pellow, D. N., *Resisting Global Toxics : Transnational Movements for Environmental Justice* (Cambridge : MIT Press, 2007).

disempowerment (Hossfield 1988; Nash & Fernandez-Kelly 1983, Park 1992; Robinson & McIlwee 1989).[9]

Substantiating these claims of environmental injustice is an abundance of newly emerging scientific research which points to severe ecological and human heavy metal contamination in the major e-waste processing regions of China and India.[10]

The Thesis

With electronic wastes representing the newest and most threatening form of hazardous wastes, there have been significant efforts at the international level, to prohibit e-waste export to developing nations, namely through the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal,[11] a multilateral

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[9] Watterson, A., Chang, S., "Environmental Justice and Labor Rights" in Smith, T., Sonnenfeld, D.A.,Pellow, D.N., eds., *Challenging the Chip* (Philadelphia: Temple University Press, 2006) At 107.

[10] Fu J., Zhou, Q., Liu, J., et al., "High levels of heavy metals in rice (Oryza sativa L.) from a typical E-Waste recycling area in southeast China and its potential risk to human health", Chemosphere 71 (2008). 1269-1275; Leung, A., Nurdan, S., et al., "Heavy Metals Concentrations of Surface Dust from e-Waste Recycling and Its Human Health Implications in Southeast China", 42 Environmental Science and Technology 7 (2008)2674-2680; Huo, X., Peng, L., Xu, X. et al., "Elevated blood lead levels of children in Guiyu, an electronic waste recycling town in China", Environmnetal Health Perspective 15 (2007) 1113-1117; Webb. S, "E-waste Hazards : Chinese Gear Recyclers Absorbs Toxic chemicals", Science News (July 14, 2007); Atmospheric Environment (authors W.J. Deng et al.) November 1, 2006; Sepulveda A., Schluep, M., Renaud, F., Streicher, M., Kuehr, R., Hagelkun, C., Gerecke, A.,"A review of the environmental fate and effects of hazardous substances released from electrical and electronic equipments during recycling: Examples from China and India", Environmental Impact Assessment Review (2009 - in press) doi:10.1016/j.eiar.2009.04.001; Walters, A., Santillo, D., *Evidence of environmental and health impacts of electronics recycling in China: An Update* (Amsterdam, Greenpeace International,2008).

[11] *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* 1673 UNTS 126; 28 ILM 657 (1989). [hereinafter the Basel Convention]

environmental treaty adopted in 1989 as a measure to protect developing nations from industrialized countries' hazardous wastes, and to fulfill a more broader objective of ensuring global environmentally sound practices in hazardous waste management.[12] Though it remains the most widely ratified[13] international treaty to regulate transboundary movements of hazardous wastes, the Basel Convention has been criticized as being too weak a mechanism to effectively fulfill its primary objective of minimizing international movements of hazardous wastes towards poor countries, the main reason being the remarkably low ratification rate of the 1995 Basel Ban Amendment, that is the specific instrument to illegalize all transfers of hazardous wastes from OECD countries and Litchenstein to non-OECD countries.[14] This thesis analyzes the legal status of the global e-waste trade under an unenforced Basel ban amendment. It seeks to clarify the limits of the Basel Convention's regulation of electronic wastes, providing a detailed legal examination of existing loopholes in the original Convention that appear to allow hazardous wastes, such as e-wastes, to be internationally traded for the purposes of recycling and reuse. The following questions are addressed: To what extent is the international trade of electronic wastes controlled under the Basel Convention? Is it illegal for industrialized countries to ship their electronic waste to developing countries?

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[12] On the background and negotiating history of the Basel Convention, see Kummer, K., *International Management of Hazardous Wastes: The Basel Convention and Related Legal Rules* (Oxford: Clarendon Press, 1995); Kreuger, J., "The Basel Convention and the Interrnational Trade in Hazardous Wastes", in Stokke, O.S., Thommenssen, O.B., eds., *Yearbook of International Cooperation on Environment and Development* (London: Earthscan, 2001). See also Park, R.S., "An Examination of International Environmental Racism through the Lens of Trasboundary Movement of Hazardous Wastes", 5 Indiana Journal of Global Legal Studies 659-688 (1998).

[13] There are currently 172 Parties to Convention. (Last verified: 31 October 2009).

[14] On political responses to the Basel Convention and the Basel Ban Amendment, see Clapp, J., *supra note* 7.

Further on, this thesis examines resistance to the Basel ban, which has not come exclusively from industrialized nations such as Canada, the USA, Japan and Australia, but also from many developing nations which fear the ban may unjustifiably exclude them from the international waste recyclables market, reducing their opportunities for economic growth, increasing their manufacturing industries' reliance on natural resource extraction, and invoking a significant loss in their international bargaining power.[15] This thesis addresses the important social and economic development implications of the enforcement of the Basel ban, in particular, its impact on the international waste recyclables industry. In this respect, it seeks to provide answers to the following questions: Would an enforced Basel ban infringe upon international free trade rules of the WTO, to which many Basel Parties also belong? Is enforcement of the Basel ban necessary to ensure environmentally sound e-waste management on a global level? Are there other legal mechanisms which can provide effective protection to human and environmental health without negatively impacting recycling industries in developing nations? Can environmental justice be rendered alongside economic growth to the poor communities in China, India and other developing nations involved in the global e-waste business?

[15] Puckett, J., Fogel, C., A Victory for Environment and Justice: The Basel Ban and How it Happened (Amsterdam: Greenpeace International,1994); Poulakidas, D.M., "Waste Trade and Disposal in the Americas", 21 Vermont Law Review 873 (1997); Webster-Main, A., Keeping Africa out of the Global Backyard", 26 Environs Environmental Law and Policy Journal 65 (2002).

This thesis contributes to the existing literature on the legality of the global e-waste trade[16] by further providing a comparative analysis of internationally emerging electronic waste governance strategies, assessing the practical effects of a diverse range of instruments – international treaty regimes, national laws, product design policies and other initiatives – which aim to mitigate the environmental harm of obsolete electronics, in some cases by restricting hazardous e-waste flows into developing countries. The ultimate objective is to understand how stakeholders can model the manufacture, use and disuse of technologies so that they may continue to raise living standards and propel human development, while simultaneously respecting international legal standards, the natural environment and the quality of life of future generations.

Part One begins with a discourse on the definition of e-waste, followed by an overview of the environmental and health hazards with which it is associated. The controversial practice of e-waste export towards developing countries is then presented, its driving factors and human health implications are discussed. The focus then shifts to current international legal efforts to ban the import of e-waste into developing countries via the Basel Convention, which constitutes the primary international treaty regime governing the trade of hazardous wastes.

[16] Kummer, K., *supra note* 12; Kreuger, J. *supra note* 12; Wirth D.A., "International Trade in Wastes: Trade Implications of the Recent Amendment to the Basel Convention Banning North-South Trade in Hazardous Wastes, 7 Review of European Community & International Environmental Law 237 (1998); Guevara, M., Hart M., *Trade Policy Implications of the Basel Convention Export Ban on Recyclables from Developed to Developing Countries* (Ottawa: International Council on Metals and the Environment, 1996).

In Part Two, legal issues surrounding the Basel Convention's attempts to control the e-waste trade are discussed, followed by an examination of implementation and compliance issues under the scope of the Convention. After assessing the effectiveness of the international treaty regime governing the transboundary movements of hazardous wastes, I elaborate on why it is insufficient to focus governance efforts at the disposal or *end-of-life* phase of products, emphasizing the benefits of lifecycle thinking in environmental policy and management.

Part Three discusses the extent to which lifecycle thinking has been integrated into e-waste governance. First I compare European, Chinese, American and Canadian efforts to manage e-waste through sustainable electronics production, which can be understood as the adoption of policies based on extended producer responsibility and environmental product design. Drawing on observations that result from my international comparative analysis of e-waste policy models, I highlight certain key governance areas that merit greater legislative attention in all regions examined. On a concluding note, I discuss the role of sustainable consumption in e-waste management, addressing why this factor has largely been overlooked, and offering insight into the types of legal norms and other innovative mechanisms through which the concept may be operationalized, allowing it to play a more useful role in mitigating environmental pollution caused by the prevalent use and disposal of electronics.

Part One: Tracing the Toxic Unbeing of Modern Electronics

I. E-waste Definitions

The pervasion of human-computer interaction in all aspects of daily life is a salient feature of the contemporary global economy, one that presents new concerns in relation to environmental and human health. While the emergence and popularity of new electronic products in the markets of the world continue to facilitate human life to almost instant gratification, it is when we begin to consider the environmental burden of these products that their long-term benefits become less self-evident. With the impressive pace at which electronic products become available, accessible, obsolete and upgraded, for a constantly expanding consumer market, the world is faced with an estimated 20 to 50 million tonnes of electronic waste each year.[17] Currently, e-waste is the most rapidly growing area of waste production worldwide and following the current trend towards the computerization of almost every imaginable consumer good, or *ubiquitous computing*[18], the generation of electronic waste is very likely to keep increasing. To understand the scope of the challenge that e-wastes brings to global environmental governance, it is imperative to understand what type of consumer products qualify as e-wastes once they have been discarded.

While there is no global consensus on the legal definition of e-waste, it is the commonly

[17] United Nations Environment Program, "Basel Conference Addresses Electronic Waste Challenge," Press Release (Nairobi, 27 November 2006).

[18] Weiser,M., *The Computer of the 21st Century*, Scientific American (Septermber 1991).

used term for waste electrical and electronic equipment (WEEE), also referred to as end-of-life or post-consumer electronics. Every country establishes their own list of e-waste products, which generally range from entertainment and communication technologies (computers, mobile phones, laptops, headphones and video game consoles) to large household appliances.

There is actually a great degree of variation between existing e-waste policies on the scope of electronics that are regulated as e-wastes. Countries belonging to the European Union are expected to legally recognize as e-waste the list of products contained in the EU Waste Electrical and Electronic Equipment Directive.[19] The WEEE directive classifies electronic waste under ten different categories: large household appliances (category 1), small household appliances (category 2), IT and telecommunications equipment (category 3), consumer equipment (category 4), lighting equipment (category 5), electrical and electronic tools (category 6), toys, leisure and sports equipment (category 7), medical devices (category 8), monitoring and controlling instruments (category 9), and automatic dispensers (category 10). Some Asian countries (China, Japan, Korea) have adopted national e-waste classification lists based on the EU model.

In Canada, e-waste is not regulated at the national level, except for voluntary guidelines that have been set by the Canadian Council of Ministers of the Environment, to guide

[19] EU, Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE), Official Journal of the European Union, L. 37/24, Annexes 1A and 1B. [hereinafter the WEEE directive].

provinces in establishing their own e-waste classification lists.[20] The provinces of Ontario, Saskatchewan, British Columbia, Nova Scotia and Alberta have all enacted legislation specifying the scope of products that are to be treated as electronic waste in their respective territories. The province of Quebec's newly released draft bill[21] which regulates e-wastes along with other hazardous wastes, provides an exhaustive list of electronic products that fall under the scope of the prospective mandatory recycling regime. Unfortunately, a lack of harmonization between current provincial e-waste policies with respect to the recyclable product scope and the division of collection and financing responsibilities between the relevant stakeholders results in superfluous administrative costs for manufacturers that must meet compliance requirements in more than one province. While these costs may be relatively minor for global manufacturers, they represent a significant financial burden on small-scale producers. Furthermore, the current regulatory landscape of patchwork policies creates a potentially competitive scenario between provinces, whereby consumers and businesses may choose to purchase electronics in the province where their financial obligations in e-waste recycling are minimal.

While Quebec and Manitoba have come out with proposals for e-waste legislation, in Prince Edward Island, Newfoundland, Yukon, Nunavut and the Northwest Territories there has been limited governmental effort towards electronic waste regulation. The

[20]See Canadian Council of Ministers of the Environment, Canada-Wide Principles for Electronics Product Stewardship: Recommended E-Waste Products (CCME, April 5, 2005).

[21]*Projet de Règlement sur la récupération et la valorisation de produits par les entreprises, Loi sur la qualité de l'environnenment*, (L.R.Q., c. Q-2, a. 31, a. 53.30, a. 70.19, 1er al., par. 15, a. 109.1).

United States framework is similar to that of Canada, with no federal e-waste policy currently in place, and various degrees of regulation emerging at the State-level.

Legal definitions aside, it is impossible to define e-waste in absolute terms, or to narrow it down to an exhaustive list of consumer products, as electronic components are being integrated into an increasing scope of commodities that were not traditionally computerized.[22] Moreover, new types of electronic appliances designed to meet newly emerging human needs are being conceived and placed on the global market continuously. Taking these factors into consideration, the OECD's definition for e-waste: "any appliance using an electric power supply that has reached its end-of-life"[23] is probably most aptly indicative of the massive open-ended scope of commodities that actually qualify as electronic wastes. Ultimately, e-waste encompasses all discarded objects embedded with an electronic chip.[24]

II. Environmental Responsibility Concerns

The common characteristics of all e-waste items, from where stem environmental responsibility concerns, is that their components (glass, wires, circuit boards, cathode ray tubes, plastics and other materials) contain non-negligible quantities of highly toxic

[22] For examples of novel uses of computerization see David, M., "Adidas Designs a Winner with Smart Running Shoes," (April 2005) Electronic Design; Gawel, R., "Electronic Shirt Lets You Rock and Roll," (December 2006) Electronic Design.

[23] OECD, *Extended Producer Responsibility: A Guidance Manual for Governments* (Paris : OECD, 2001).

[24] Hilty, L.M., "Electronic Waste – An Emerging Risk?" (2005) 25 Environmental Impact Assessment Review. 431 – 435.

substances (lead, mercury, cadmium, beryllium and flame retardants, amongst many others), whose extremely harmful effects to human health and the environment have been well documented and internationally recognized.[25] It has also been shown that disposal of e-waste, in the form of landfilling and incineration, releases these toxins into the environment, creating substantial land and air pollution.[26] As such, recycling e-waste – which implies recuperating the valuable, reusable materials found in it and seeing to the safe disposal of toxins – reduces the amount of waste that is landfilled or incinerated, making it the preferred way to manage used electronic equipment, from a human and environmental health perspective.[27] Of course, a minimization of risks can only occur if e-waste is recycled in conditions which respect relevant environmental and human safety standards. For example, the first step of proper e-waste recycling generally involves safe manual disassembly, for which workers must be equipped with protective glass-resistant gloves and arm-wear, face shields and breathing masks to prevent dust and particle inhalation. For the second step of mechanical processing where e-waste is shredded, special systems are needed for the filtration of gas emissions and treatment of effluents, in order to minimize their environmental impact. Worker exposure to potentially harmful

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[25] Five Winds International, *Toxics and Hazardous Materials in Electronics, An Environmental Scan of Toxic and Hazardous Materials in IT and Telecom Products*, Final Report for Environment Canada, National Office Pollution Prevention and Industry Canada, Computers for School Program (Ottawa: Five Winds International, October 2001). Hu, H.,"Human Health and Heavy Metals Exposure", in M. McCally ed., *Life Support: The Environment and Human Health* (Cambridge: MIT Press, 2002). EU, Explanatory Memorandum, Waste Electrical and Electronic Equipment (WEEE) Directive (Third Draft), Brussels, 05.07.1999.

[26] *Id.,* Five Winds International. At 24.

[27] See Hischier, R., Wäger, P., Gauglhofer, J., "Does WEEE recycling make sense from an environmental perspective? The environmental impacts of the Swiss take-back and recycling systems for waste electrical and electronic equipment (WEEE)" 25 Environmental Impact Assessment Review 525 – 539.

e-waste shredding byproducts must be strictly monitored and controlled to not exceed relevant maximum allowable concentration standards.[28]

The main problem presented by the recycling of electronics is that not all recycling industries have access to the knowledge, skills, infrastructure or other resources necessary for the environmentally sound treatment of e-wastes. And very often, even recyclers that are aware of the environmental responsibilities to be assumed with e-waste collection and processing neglect to fulfill their related obligations for reasons that have to do with individual economic viability and profitability. As such, the regulation of e-waste recycling itself is a complex, multi-faceted issue and any initiatives in this regard can only be successful in controlling e-pollution if a comprehensive legislative framework is introduced. The following section points out the major deficiencies in existing e-waste recycling policies.

1. Recycling Choices: To Process or Export?

Having understood the drastic pollutive effects of dumping electronics into ordinary solid waste streams, the European Union and several other industrialized nations, along with progressive U.S. States and Canadian provinces, have introduced legislation imposing landfill bans on electronic products, thus creating mandatory recycling systems. However, while defunct electronics are increasingly being legally recognized as

[28] For more information on the steps of safe e-waste recycling, see Swiss E-waste Competence, *On the E-Waste Wheel of Life*. Web resource available at http://www.e-waste.ch (Last Access : 20 October 2009)

hazardous material that should not be landfilled or incinerated,[29] there are significant costs involved in collecting and dismantling electronic waste in industrialized countries, as strict environmental, and occupational health and safety regulations must be respected throughout the recycling process. Furthermore, the capital-intensive business of recycling electronics is not always public-funded, making it less financially interesting. In developed countries in particular, where the market for secondary raw materials has greatly diminished since the uprooting of most manufacturing industries, there is little market demand for the precious metals and other resources derived from e-waste recycling. For these reasons, waste management and recycling industries of the 'global north', who are continuously faced with larger amounts of e-waste, often export it in massive quantities to the 'global south', where recycling standards are less stringent, if at all applicable.

By turning over domestically generated e-waste into the global market, recyclers - in addition to avoiding the excessive costs and environmental obligations related to dismantling electronic equipment themselves - are able to acquire substantial revenues through collection-related charges imposed on consumers at the time of discard, and evidently, from sale to foreign waste dealers. This form of 'recycling', which is essentially e-waste export, has proven to be highly profitable, accountability-free and environmentally convenient for developed economies.

[29] See WEEE directive, *supra note* 19. For an updated list of U.S. jurisdictions which have passed e-waste disposal bans or where draft bills have been proposed, see Computer Take-back Campaign, *State Legislation on E-Waste*, Web resource available at: http://www.computertakeback.com/legislation/state_legislation.htm (Last Access: 20 October 2009)

The international e-waste trade typically takes place through e-commerce websites (e.g. www.recycle.net) where e-waste brokers and dealers from across the globe – meaning businesses that buy and sell electronic waste or act as middlemen arranging e-waste disposal on behalf of other companies or waste producers – post listings describing the type of e-waste they wish to acquire or sell. Parties interested in a particular listing need only to supply an e-mail address and are instantly put in contact with the buyer or seller. As a 2008 report by the Unites States Government Accountability Office (GAO) disturbingly revealed, very often U.S. e-waste 'recyclers' that claim to process used electronics domestically and in an environmentally sound manner, actually use these trading websites to sell U.S.-generated e-waste to foreign brokers for shipment to Southeast Asia.[30] The GAO study found that at least 43 U.S.-based recyclers were willing to export lead-impregnated cathode ray tubes (CRT's) to Asia, in violation of the U.S. export-notification rules for CRT's.[31]

Figures from the United States recycling industry indicate that eighty percent (80%) of their recuperated e-waste is forwarded to Asia.[32] A report issued by the British Environment Agency indicates that in 2003, 160,000 tonnes of e-waste recuperated in the

[30] GAO, *Electronic Waste: EPA Needs to Better Control Harmful U.S. Exports through Stronger Enforcement and More Comprehensive Regulation* (Washington DC: GAO, August 2008).

[31] *Id.* At 23.

[32] Puckett J., et al., *supra note* 6.

UK was illegally exported to the Indian subcontinent, Africa and China for recycling.[33] Similarly, electronic waste exports destined for non-OECD countries were also found in an inspection of several European seaports conducted between 2004 and 2006,[34] despite the EU's adoption of the Basel Ban, an amendment to the Basel Convention which essentially prohibits EU countries from exporting hazardous waste into non-OECD countries, for disposal or recycling purposes.

2. Export: Bridging the Digital Divide or Dumping Hazardous Waste?

The transfer of obsolete electronics from rich to poor nations, either compensated or gratuitous, is not a trading scheme that manifestly conflicts with social or economic development goals. In fact, the renewal of product lifecycles between the 'first world' and the 'third world' fulfills a significant portion of manufacturing industries' infinite needs for raw materials such as copper, gold and silver, thereby assisting in the preservation of natural resources. Charitable donations of old computers and other IT equipment from industrialized countries to less prosperous ones may also help to bridge the 'digital divide' by making technology available to consumers and social institutions who do not have access to comparable resources. However, the controversial problem surrounding these import schemes into developing countries, is that any social and economic advancement that has resulted from the e-waste trade so far, has taken place in a context of severe environmental degradation. There is no doubt that IT sector growth in

[33] British Environment Agency / Industry Council for Electronic Equipment Recycling, *Green List Waste Study* (ICER, 2004).

[34] European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL), *IMPEL-TFS Project II : 'International Cooperation in Enforcement Hitting Illegal Waste Shipments', Project Report September 2004 – May 2006* (IMPEL, June 2006).

developing countries – largely attributable to second-hand equipment flows from western countries – has enhanced the competitiveness of these nations, in particular by providing widespread access to mobile phone and internet technologies to financially and infrastructurally disadvantaged cities and villages. At the same time, IT equipment donation has also been used as a pretext for hazardous e-waste dumping. For example, of the estimated 400,000 units of used computer equipment which were arriving monthly to the port of Lagos (Nigeria) in 2005, as much as 75% had no potential for repair or reuse.[35] Qualifying only as e-waste, this mass of equipment presenting no possibilities for beneficial use could only be sent for indefinite storage in warehouses, due to the lack of proper, environmentally sound e-waste collection and recycling infrastructure in the region, and the overall scarcity of such programs in all of Africa.[36] While Nigeria does have a prominent and highly skilled IT repair and resale sector, it is far from possessing sophisticated systems for precious metals recovery or e-waste recycling, and thus the common way to deal with this waste stream, like all others, is routine burning in open landfills.[37]

Even in developing countries such as China and India, which contain expansive e-waste recycling markets (in addition to reuse and repair markets such as those in Africa), the salient feature of their electronic waste industries is that they are largely comprised of informal sector businesses, who do not possess the occupational knowledge, or the

[35] Puckett J. et al., *The Digital Dump*, *supra note* 6.

[36] *Id.*

[37] *Ibid.*

financial and technical capacities, to process e-waste in an environmentally sound manner. Their dangerous 'recycling' methods have come under global scrutiny for posing grave, long-term damage to human and ecosystem health.

3. Health and Environmental Effects of E-Waste Exports to Developing Countries

Several studies conducted by environmental and human rights organizations over the last two decades have revealed the starkly polluted reality of electronic scrap yards in developing economies, where informal sector workers recycle imported e-waste items in order to recuperate precious metals and other valuable materials that they subsequently sell to manufacturing industries.[38]

While the livelihood of an entire community can depend on crude e-waste recycling, as observed in the village of Guiyu located in the Guangdong Province of China, the economic benefit derived from this activity comes at a high cost to human health. The typical working conditions and manual disassembly methods of informal recycling networks in Guiyu, such as open-pit acid burning and makeshift charcoal grilling of circuit boards, would simply be deemed illegal in developed countries for the acute occupational hazards they present. Medical evidence from the region substantiates the

[38] Greenpeace Research Laboratories (K. Brigden, I. Labunska, D. Santillo, M. Allsopp, Department of Biological Sciences University of Exeter, UK) *Recycling of Electronic Waste in China and India: Workplace and Environmental Contamination* (Amsterdam: Greenpeace International, 2005); Toxic Links, *Scrapping the High-tech Myth* (Delhi: Toxic Links India, 2003); Silicon Valley Toxics Coalition, *supra note* 6; Thakker,N., "India's Toxic Landfills: A dumping ground for the World's Electronic Waste," (2006) 6(3) Sustainable Development Law and Policy.

devastating human health impacts of processing e-waste in this rudimentary, unprotected manner, as high rates of bone disease, respiratory problems, and neurological disorders have been observed among Guiyu e-waste workers and their children. A recent study indicates that Guiyu's e-waste recyclers have elevated body levels of persistent toxic substances.[39] A separate study shows that the children of these workers possess higher levels of lead in their bodies, as compared to Guiyu children whose parents work in other industries.[40] The long-term human health effects of exposure to heavy metals commonly found in e-waste illustrate the gravity of these findings:

- Barium: high blood pressure, changes to heart rhythm, paralysis, death
- Cadmium: kidney disease, lung damage, fragile bones
- Chromium: liver, kidney, circulatory and nerve tissues damage, cancer
- Mercury: lung and neurological damage, delirium, fetal and infant neural system damage, mental retardation and diminishment in motor function, language and memory.
- Lead: brain and kidney damage, lower sperm production in men, causes pregnant women to miscarriage, disrupts normal growth and development of the brain and

[39] Bi, X., Thomas, G.O., Jones, K.C., Qu, W.Y., Sheng, G.Y., Martin,F.L., Fu, J.M., "Exposure of electronics dismantling workers to polybrominated diphenyl ethers, polychlorinated biphenyls, and organochlorine pesticides in South China"(2007) 41 (16) Environmental Science & Technology. 5647 – 5653.

[40] Huo, X. et al., *supra note* 10.

central nervous system in children and fetuses causing mental retardation and lower intelligence.[41]

Just as critical as the issue of widespread human contamination caused by local e-waste activities, is the manifestly causal relationship between Guiyu's crude recycling sector and the considerable magnitude of aquatic and terrestrial harm by which the village is affected. The local water is considered to have become unfit for consumption "approximately one year after the appearance of the WEEE industry."[42]. As for the extent of contamination, water samples taken from the Lianjiang River in 2001 revealed lead levels to be 190 times higher than safety standards set by the World Health Organization.[43] Through irrigation, this polluted water has infiltrated the soil, resulting in highly contaminated agricultural produce that local farmers do not consume themselves due to health safety concerns, but instead, sell to outsiders unaware of the polluted crop origins.[44] Significant airborne pollution is another major side effect of electronics dismantling in Guiyu, as evidenced by the elevated concentrations of heavy metals found in the surface dust of schoolyards and food markets located in the areas surrounding e-waste recycling workshops.[45] Because heavy metal contamination can be passed to

[41] See Hu, H. *supra note* 24; Center for Hazardous Substance Research / Kansas State University, *Human Health Effects of Heavy Metals*, Environmental Science and Technology Briefs for citizens (15 March 2009).

[42] Hicks, C., Dietmar, R., Eugster, M., "The recycling and disposal of electrical and electronic waste in China – legislative and market responses," (2005) 25 Environmental Impact Assessment Review. 459-471. At 461.

[43] Puckett, J. et al., *The High-Tech Trashing of Asia*, *supra note* 6. At 22.

[44] Sun-Yat Sen University and Greenpeace China Report, cited in Grossman, E., *supra note* 7.

[45] Leung, A., Nurdan, S., et al., *supra note* 10.

humans through dust inhalation, ingestion and dermal absorption, it is clear that all local residents - regardless of whether or not they have been directly implicated in e-waste recycling - are adversely affected by e-waste debris.

Like Guiyu, the city of Taizhou, located in the Zhejiang Province of China, has also been severely polluted by the activities of its informal recycling industry. But unlike Guiyu, where farming has largely been abandoned since the emergence of e-waste recycling, agricultural production remains an integral part of Taizhou's economy. A recent study measuring the levels of heavy metals in rice crops from Taizhou revealed that lead and cadmium levels, both in soil and polished rice, were significantly above their national maximum allowable concentrations, consequently concluding that "daily intake of rice or crops grown in this area could cause detrimental health hazards to the consumers." [46] Considering Taizhou's coastal proximity and the fact that it is one of China's major export-oriented agricultural production areas for grain, fruit, seafood and tea, the adverse human health repercussions of its informal e-waste recycling industry affect a population far greater than the local or even national citizenry. The Taizhou study, in pointing out that crop contamination issues also impact communities living downstream or downwind of affected areas,[47] draws attention to the global dimension of the e-waste problem, specifically, the latter's expansive and geographically indeterminate scope of harm. The latest figures provided by the Municipality of Taizhou indicate that in 2004, revenue from agricultural exports from the region increased by 47.5% from the preceding year, and

[46] Fu, J. et al., *supra note* 10.

[47] *Id*. At 1275.

twenty nine new agricultural projects drew in USD 32.621 million in foreign investment.[48] The same source indicates that Taizhou holds 30% of the world market share for canned oranges, and that its citrus products constitute a large share of exports.[49] Some of Taizhou's canned fruit products are shipped to Canada - for example, from companies such as the Huangyan Canned Food factory No.3.[50] In fact, mandarins, clementines and other citrus hybrids rank fourth in the top Canadian agri-food imports from China.[51] Taking into consideration these international agricultural trade flows, the heavy metal contamination of Taizhou's soil, water and crops that is directly related to informal e-waste processing, constitutes a global consumer health issue.

Other confirmed destinations for e-waste export include India, Pakistan, Nigeria, Ghana, Singapore, the Philippines, and Brazil,[52] all of which have extensive informal e-waste recycling networks operating outside international and national labour and environmental standards.[53] Despite the acute levels of pollution posed by e-waste recycling as it is carried out in these countries, the latter remain compelled, by the economic, social and industrial circumstances of the world economy, to continue to receive obsolete

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[48] Municipality of Taizhou, *Economy: Agriculture*, web resource available at http://www.zjtz.gov.cn/ksp/english/econ.htm (Last Access: 20 October 2009)

[49] *Id.*

[50] According to this company's figures, 85% of their annual output is for the export market. See : http://www.hyl53.diytrade.com/sdp/198434/4/main-1016133/0/Home.html (Last Access: 20 October 2009).

[51] Agriculture and Agri-Food Canada. Markets and Trade Team : *Canada's Agri-Food Imports from China*. 2004-2008, (Agriculture and Agri-Food Canada, 2008).

[52] For more known and suspected e-waste destinations, see Dayaneni, G., Doucette, J., *System Error: Toxic Tech Poisoning People and Planet* (San Jose: SVTC, 2005).

[53] See Widmer R., et al., "Global Perspectives on e-waste" (2005) 25 Environmental Impact Assessment Review. 436 – 458.

electronics from the United States, Canada, Japan, the European Union and other countries of the 'global north'. High levels of poverty and unemployment in developing countries, together with the presence of manufacturing industries and the existence of large secondary consumer markets for secondhand electronics, are factors that have encouraged and facilitated steady e-waste flows into these nations. International debt has also been a contributing factor, as many poor countries have sought fiscal relief through the hazardous waste trade. In fact, the World Bank has been widely accused of advocating and funding these types of hazardous waste export schemes to less developed countries (LDC).[54]

Additionally, it seems that the overall ecological modernization of industrialized societies, propelled by the growing political influence of 'first-world' environmental rights movements, has also inadvertently benefited the global e-waste trade, which, according to an industry research report, was expected to rise to USD 11 billion by 2009.[55] Of course there is no way of confirming with any degree of precision how close actual worldwide trade in e-waste has come to the forecasted figure, as much of this trade, following the legacy of other hazardous waste trade streams, not only lacks transparency but hovers between legal and illegal realms.[56] Still, it is logical to assume that this continually growing amount of e-waste, which is being rejected by an increasing number of western landfills, is entering developing country markets. This is because

[54] Pellow, D. N., *supra note* 7. At 9.

[55] See LaCoursiere, C., *Electronic Waste Recovery Business* (Wellesly: BCC Research, September 2005).

[56] See European Environment Agency, *Waste Without Borders in the EU? Transboundary shipments of waste* (Copenhagen, EEA, 2009).

progressive environmental standards such as e-waste landfill bans, have not always been coupled with mandatory domestic e-waste recycling programs and processing facilities, and have thus only succeeded in diverting electronics from local landfills (protecting local human and environmental health) without however, contributing in any way to the mitigation of health risks at a global level. By failing to provide comprehensive, sustainable e-waste collection and treatment strategies at a local level, these environmental initiatives have served as an export incentive to waste dealers that do not possess environmentally sound recycling technologies or simply seek to maximize profitability on the discarded electronics they have collected and are unable to landfill locally.

In essence, it seems that the new environmental responsibilities related to the disposal of electronics that are being imposed on consumers across many industrialized nations for example, through e-waste landfill bans - do not necessarily translate into better environmental protection worldwide, as export continues to be the prevalent means of 'recycling' electronics in many developed countries. In effect, these type of legislative measures which exclusively seek to protect domestic health interests only encourage international e-waste flows to developing nations. Moreover, a near complete absence of social and environmental responsibility amongst the various stakeholders involved in global e-waste trading results from the ongoing liberalized trade of second-hand electronics and has made it so that the ecological burden of end-of-life technology purchased and enjoyed in industrialized nations, is very directly assumed by the developing world population, alongside certain short-term economic benefits. Ultimately,

the e-waste trade renders privatized benefits to some individuals, at the expense of violating the rights to health and environmental protection of poor communities' on a global scale. In fact, a broad range of internationally guaranteed human rights are negatively impacted by e-waste recycling activities carried out in developing countries.

4. Human Rights Implications

The right to health is clearly affirmed as a fundamental human right, notably under the Universal Declaration of Human Rights, which stipulates that "everyone has the right to a standard of living adequate for the health and well-being of himself and his family." The right to health in the context of work is also recognized as a universal human right, with the International Covenant on Economic, Social and Cultural Rights[57] guaranteeing the right of everyone to safe and healthy working conditions (Article 7b) and the right of children to be free from employment that is harmful to their health (Article 10(3)). Additionally, under the ICSECR, State Parties affirm the "right of everyone to the enjoyment of the highest attainable standards of physical and mental health"[58], and further recognize that measures necessary to ensure the realization of this right include "the improvement of all aspects of environmental and industrial hygiene." Other examples of human rights instruments with stipulations on health include the *African Charter on Human and Peoples' Rights*, the Additional Protocol to the *American Convention on Human Rights in the area of Economic, Social and Cultural Rights*, the

[57] *International Covenant on Economic, Social and Cultural Rights*, December 16, 1966, 993 U.N.T.S. 3 [hereinafter : ICESCR].

[58] *Id.* Article 12.

Convention on the Rights of the Child, the *ILO Occupational Safety and Health Convention* (No.155) and the *ILO Convention on Indigenous and Tribal Peoples in Independent Countries* (No.169).

The international environmental regime has also been attentive to the interconnection between human health, environmental protection, and human rights. This linkage, initially understood as environmental protection being a *precondition* to the exercise of the fundamental human rights to life and health,[59] appeared in the Stockholm Declaration[60], adopted at the United Nations Conference on the Human Environment (1972):

> Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being […]
>
> (Principle 1, Stockholm Declaration)

Human health is also a central concern of sustainable development, a concept contemporarily understood as the purpose of local to global environmental governance, and equally regarded as the ultimate objective of the international economy.[61] The concept was originally introduced by the World Commission on Environment and Development (Brundtland Commission) as a matter of human well-being:

> Sustainable development is development that meets the needs of the present

[59] Shelton, D., *Human Rights, Health & Environmental Protection: Linkages in Law & Practice* (Geneva: WHO, 2002).

[60] Stockholm Declaration on the Human Environment of the United Nations Conference on the Human Environment, 16 June 1972, 11 I.L.M. 1416 (1972) [hereinafter: Stockholm Declaration].

[61] See *Marrakesh Agreement establishing the World Trade Organization*, April 15, 1994, 1867 U.N.T.S. 154. Preamble.

> without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
>
> -the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
>
> -the idea of 'limitations' imposed by the state of technology and social organization on the environment's ability to meet present and future needs.[62]

The Brundtland Commission advanced a new understanding of the interrelationship between human rights and environmental protection, in its assertion of an independent and substantive human right to a healthy environment:

> All human beings have the fundamental right to an environment adequate for their health and well-being. [63]

Since the Brundtland Commission report, the right to a healthy environment has been guaranteed in over one hundred Constitutions of the world – including China- and enforced by courts in India, South Africa, Argentina, Delhi, Costa Rica and Colombia.[64] The protection of human health, referred to in practically all environmental agreements, is also the primary objective of the Rio Declaration, adopted at the 1992 UN Conference on Environment and Development:

> Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.[65]

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[62] World Commission on Environment and Development, *Our Common Future* (Oxford : Oxford University Press, 1987).

[63] World Commission on Environment and Development Experts Group on Environmental Law, "Legal Principles for Environmental Protection and Sustainable Development", in WCED, *Our Common Future* (Oxford: Oxford University Press, 1987).

[64] See Shelton, D., *supra note* 58. At 22.

[65] *Rio Declaration on Environment and Development*, 31 ILM 874 (1992). Principle 1.

As such, the protection of human health has emerged as a forefront concern of international human rights and environmental regimes, with policies from both spheres recalling the fundamental importance of ensuring that economic progress is achieved with due respect to the human right to health. Regarding the human rights implications of global toxic waste industries in particular, the UN Commission on Human Rights, upon appointing a Special Rapporteur on the adverse effects of the movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights [hereinafter Special Rapporteur], drew attention to:

> the growing practice of the dumping in African and other developing countries by transnational corporations and other enterprises from industrialized countries of hazardous and other wastes that constitute a serious threat to the human rights to life and health of everyone, and which they cannot dispose of within their territories of operation.[66]

Since then, rising electronic waste exports from industrialized countries have been explicitly identified, by both former and current Special Rapporteurs, as an obstacle to the realization of the human right to health in developing countries. In 2004, the Special Rapporteur affirmed the clear linkage between wastes and toxic products and the right to health, noting further that the latter was jeopardized by the "export of electronic waste for scrapping, in conditions harmful to the health of workers and populations."[67] The 2006 Report of the Special Rapporteur Okechukwu Ibeanu pointed to patterns of

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[66] Commission on Human Rights, Resolution 1995/81: *Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights* (OHCHR, 8 March 1995). Preamble.

[67] Commission on Human Rights, *Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights: Report submitted by Ms. Fatma-Zohra Ouhachi-Vesely, Special Rapporteur, in accordance with Commission resolution 2003/20*, 60th session, Geneva, 15 December 2003. UN Doc. E/CN.4/2004/46. At 20.

environmental injustice that have characterized the global e-waste trade, stating that:

> the poor, the vulnerable, and the marginalized suffer disproportionately from exposure to toxic chemicals.[…] The continuing export of electronic wastes from developed to developing countries for recycling or disposal in conditions which often directly expose workers and communities to toxic chemicals is another example of the particular burden faced by individuals and communities in developing countries. It is a problem which requires urgent attention, both at the international level and at the level of both exporting and importing Governments.[68]

Evidently, the massive pollution caused by e-waste export into developing countries poses an obstacle to the enjoyment of internationally recognized human rights to life, and to health, as the Guiyu and Taizhou case studies overwhelmingly indicate. The lead-contaminated produce and waterways that characterize these e-waste processing regions deny the local population from essential aspects of their rights to life and to health, that are safe and nutritious food and clean drinking water. Moreover, because crude e-waste recycling is an unregulated informal sector activity, workers are deprived of fundamental labour rights such as the freedom of association, the right to collective bargaining and the right to be free from abusive labour conditions.[69] The use of underage workers, a common trait of crude e-waste recycling networks across borders,[70] is a further affront to children's human right to be free from economic exploitation and dangerous work.[71]

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[68] Commission on Human Rights, *Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights: Report of the Special Rapporteur Okechukwu Ibeanu*, 62nd session, Geneva, 20 February 2006. UN Doc. E/CN.4/2006/42. At 20.

[69] See *ILO Declaration on Fundamental Principles and Rights at Work* (1998) 37 ILM 1233. [hereinafter ILO Declaration]

[70] Toxic Links, *Scrapping the High-Tech Myth: Computer Waste in India* (New Delhi: Toxics Link, 2003).

[71] See ILO Declaration, *supra note* 68.

These human and labour rights issues, and the general lack of decent work opportunities available from transboundary flows of electronic waste towards developing countries, were recently addressed at the ILO Green Jobs for Asia Research Conference.[72] In regards China, it was pointed out that although the e-waste recycling industry created roughly 700,000 jobs, 98% of these workers were employed in informal structures, and did not have access to health insurance, unemployment or pension schemes, occupational health and safety training, or mechanisms for worker association and participation.[73]

With China and other newly industrializing countries' recycling industries expected to evolve into even more massive employment sectors, due to the world manufacturing markets being continually pressured for resources that have become increasingly scarce and costly, the establishment of decent work opportunities in materials management and recycling has become a new priority focus area for the ILO, under its new "Green Jobs Initiative", launched in partnership with the United Nations Environment Program. At the UNESCO Future Forum held in Guiyang City, China, on 21 August 2009, the Director of the ILO Office in China and Mongolia, Constance Thomas, noted that most of the 10 million individuals involved in China's recycling sector were employed in hazardous jobs, with minimal labour protection.[74] Addressing e-waste recycling specifically, she

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[72] Nigata, Japan. 21-23 April, 2008.

[73] Liu, Y., *Recycling and Waste Management : Case Study of China E-waste Recycling Industry*, Presentation at ILO Conference on Green Jobs for Asia Research Conference, 21-23 April, 2008, Nigata, Japan.

[74] Thomas, C., *Green Jobs*, Presentation at UNESCO Future Forum: Moving Towards a Green Economy and Green Jobs, Guiyang City, China, 21 August 2009.

signaled that with China receiving up to 70% of global electronic equipment discards, the area presented high potential for 'decent work' growth, if only labour rights and environmental protection mechanisms were introduced.[75]

Although the social and environmental unsustainability of the electronic waste trade may have only recently been prioritized as a global governance challenge, labour and environmental injustices linked to hazardous waste industries have long been known. The effect of improper hazardous waste management on the ecosystem and on the human right to health became apparent in the 1970's, with the emergence of strong social resistance in developed countries, against hazardous waste siting in their local communities, widely known as the 'Not In My Back Yard' (NIMBY) movement.[76] Since then, waste industries have turned to the global market as a way to manage hazardous wastes, and through many high-profile environmentally catastrophic ship-dumping incidents (1986 Gonaives Beach, Haiti; 1987 Kokos, Nigeria; 1987 Beirut, Lebanon; 1998 Sihanoukville, Cambodia; 2006 Abidjan, Ivory Coast) the global public has become acutely aware that pollution from developed countries' hazardous wastes is externalized to the poorest and least powerful communities of the world. In effect, the international waste trade has propelled to the global level, patterns of environmental injustice witnessed in developed countries, whereby financially, racially and politically

[75] *Id.*

[76] O'Neill, K. "Globalization and Hazardous Waste Management: From Brown to Green?", in UCIAS ed., *Dynamics of Regulatory Change: How Globalization Affect National Regulatory Policies* (Berkeley Electronic Press, 2003). At 3.

disadvantaged communities bear a disproportionate burden of hazardous waste byproducts resulting from various industrial activities.[77]

As exemplified herewith, global trade flows of electronic waste - the newest and most threatening form of hazardous waste - have been extensively documented by transnational non-governmental organizations and environmental sociologists, since the early 1990's. Various field studies on the e-waste markets in China, India, Pakistan and Africa have characterized these growing employment sectors as very acutely endangering human and ecosystem health. In these transnational business realms, fundamental labour and human rights, most importantly, to occupational health and safety, social protection, decent living standards, safe drinking water and environmental health, have not been upheld. Clearly, the practice of e-waste export not only conflicts with global environmental objectives, but also contributes to the violation of a broad set of human rights. This brings us to the focal point of my legal analysis, that is to determine what regulatory boundaries have been set to mitigate e-waste trade towards developing countries, given the apparent contention between this global business practice and contemporary social and environmental norms.

It appears that clear consensus within the international community that rich countries should not transfer hazardous e-wastes to less-developed countries, and even the

[77]Vittes, M.E., Pollock, P.H., *Poverty, Pollution and Solid and Hazardous Waste Siting : How Strong Are the Links?* State University System of Florida, Florida Center for Hazardous Waste Management (Gainesville: FCHWM, December 1994); See also Pellow D.N., *supra note* 7; Park R.S., *supra note* 12.

integration of this principle into international legislation in the form of the Basel Convention, have had only marginal success in curtailing international e-waste flows towards crude, pollutive, dangerous recycling networks located in Asia, Africa and Latin America. Due to definitional ambiguities contained in the Basel Convention regarding whether or not some electronic wastes qualify as hazardous wastes, along with the Convention's failure to regulate certain international transfers of hazardous e-wastes based on their purported use, global traders are able to move massive quantities of hazardous e-waste across borders, without any environmental or social constraints. The weaknesses of the current international legal framework governing hazardous wastes, with respect to controlling transfers of electronic wastes, are now examined.

Part Two: Regulating the International E-Waste Trade

I. The Basel Convention

The export of hazardous wastes from developed to developing countries had become common international practice since long before the emergence of the e-waste crisis. By the 1980's, a series of *toxic trade* scandals in which various developed-world industries were found to be dumping hazardous wastes in developing countries and Eastern Europe, had been brought to global public attention, largely due to the efforts of international NGO Greenpeace.[78] This prompted governments to begin negotiations for a multilateral environmental treaty that would regulate international transfers of hazardous substances.

[78] See Leonard A.,, Vallette, J., "The International Waste Trade: A Greenpeace Report" in J.O. Saunders, ed. *The Legal Challenge of Sustainable Development* (Calgary: Canadian Institute of Resources Law, 1990).

At a diplomatic conference in 1989, the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal* was adopted, its stated mission to address "the risk of damage to human health and the environment caused by hazardous wastes[…]"[79] and the "growing threat to human health and the environment posed by the increased generation and complexity, and transboundary movement of hazardous wastes[…]."[80] The Convention came into force in 1992, and with 172 signatories to date, it still constitutes the primary global legal instrument regulating the trade of hazardous wastes. During negotiation of the Basel Convention, many countries demanded a complete global ban on the international trade of hazardous wastes, but ultimately they only succeeded in establishing a strictly controlled trading regime, based essentially on the principles of transparency, environmental precaution, prior informed consent of receiving countries and respect of individual countries' domestic import prohibitions. In effect, the original Basel regime (agreed upon in 1992) did not entirely prohibit transboundary movements of hazardous wastes, but instead allowed these transfers to take place in very limited situations and under strict reporting conditions outlined in the Convention. Failure of this highly cautionary and strictly monitored regime to reduce toxic waste flows to developing countries became apparent immediately after the Convention was adopted. Although the Basel Convention was intended to decrease the disposal of hazardous wastes in developing countries, various exemptions within the Convention resulted in a drastic *increase* of hazardous waste exports destined for recycling and reuse. In the case of countries belonging to the Organization for Economic Development (OECD), figures show that while hazardous

[79] Basel Convention, *supra note* 11. Preamble.

[80] *Id.*

waste exports for final disposal decreased by 31.1% between 1990 and 1995, hazardous waste exports destined for recycling and reuse increased by 32% in the same period.[81] Responding to fears that hazardous wastes were being dumped in developing countries under the guise of recycling, in 1995, the parties to the Basel Convention agreed to a complete ban of all hazardous waste exports - for disposal, recycling and recovery - from what are known as Annex VII countries (Basel Parties that are members of the OECD, EU and Lietchtenstein) to non-Annex VII countries (all other Basel Parties). Exports of hazardous wastes for disposal were banned as of 22 September 1995, and exports destined for recycling, recovery and reuse were prohibited as of 31 December 1997. Adopted as an amendment to the Basel Convention at the third Conference of the Parties (COP-3), this agreement, formally known as Decision III/1 and commonly known as the Basel Ban Amendment, has not yet been ratified by a sufficient number of Member States to enter into force. Because the current 64 ratifications to the Basel ban amendment do not include at least 62 from original parties, it is argued that the amendment is still not legally enforceable.

The number of ratifications needed for the ban amendment to enter into force remains a point of contention between Basel Parties, due to ambiguous language used in Article 17(5) of the Convention:

> Amendments adopted in accordance with paragraphs 3 or 4 above shall enter into force between Parties having accepted them on the ninetieth day after the receipt by the Depositary of their instrument of ratification, approval, formal confirmation or acceptance by at least three-fourths of the Parties who accepted them[…].

[81] Krueger J., *supra note* 12.

There are two approaches possible under this provision: the *fixed time* approach, under which the ban amendment would enter into force after ratification by 62 of the original 82 parties, or the *current time* approach, which would require ratifications by at least 128 of the current total 170 parties to the Convention.[82] As such, while signatories of the Basel Ban do have a moral obligation to follow its provisions, it remains legally unbinding at the international level. Notable non-signatory countries include Canada, Japan and the United States. The European Union has not only ratified the Basel ban, but further transposed it domestically into the European Waste Shipment Regulation[83]. A statement made by Canada at the Third Conference of the Parties (COP-3) following the adoption of the Basel ban amendment, suggests that the government's primary reason for non-ratification of the ban is the latter's potentially disruptive effects on the hazardous recyclables trade:

> Canada agrees that there exists sufficient evidence to warrant acceptance of the ban amendment relate to hazardous wastes destined for final disposal. Canada will not authorize any shipments of hazardous wastes for final disposal outside of the OECD region or for recycling to countries that prohibit such imports.
>
> […] There will be a need for recycling of hazardous wastes today, tommorow, and for many years to come.

[82] International Center for Trade and Sustainable Development, "Basel Parties Discuss Health Impacts of Hazardous Waste," (2008) 8(13) Sustainability.

[83] *Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste*.

> Canada finds that there is unsufficient clarity as to which recyclable materials would be subject to the ban amendment. Therefore it is premature to consider adoption of a legally binding amendment at this time.[84]

In essence, the Basel ban closes a loophole in the original Basel Convention, under which certain hazardous wastes may be traded for recycling and recovery purposes. The following sections illustrate the legal necessity of the Basel ban, by examining exactly where the Basel Convention fails to control the transfer of dangerous wastes to poor countries.

1. Hazardous Waste Controls of the Basel Convention

The main objectives of the Basel Convention are to minimize the generation of hazardous wastes, to limit the international movements of these wastes and, more broadly, to promote national self-sufficiency in waste management.[85] The Convention's definition of 'hazardous waste' extends to those wastes listed in Annexes I and VIII of the Convention, unless they do not exhibit one of the characteristics listed in Annex III (explosive, flammable, liable to spontaneous combustion, liable to become flammable or give off flammable gases when in contact with water, oxidizing, poisonous, infectious, corrosive, toxic or ecotoxic).[86] Wastes that do not appear in these Annexes but that are defined as hazardous wastes under the domestic legislation of an exporting, importing, or

[84] Third Conference of the Parties to the Basel Convention, *Report of the Third Meeting of the Conference of the Parties to the Basel Convention, Statement made by Canada* (Annex II), UNEP/CHW.3/34 (Geneva, 17 October 1995). At 20.

[85] Basel Convention, *supra note* 11. Preamble.

[86] *Id.,* Article 1, a.

transit country that is a contracting Party to the Basel Convention, are also recognized as hazardous wastes.[87]

Parties to the Convention are obliged to manage and dispose of hazardous wastes in an environmentally sound manner, which implies treating and disposing wastes as close to their origin as possible, as well as preventing and minimizing the generation of wastes and their international movements.[88] Parties are required to adopt domestic legislation aimed at preventing and punishing illegal traffic in hazardous wastes, and are prohibited from shipping hazardous wastes to and from non-Parties, unless such transfers are regulated under special bilateral or regional agreements that do not contravene the provisions of the Basel Convention.[89]

The Basel Convention affirms that in order to protect human health and the environment, hazardous wastes should not be traded freely, like ordinary commercial goods. The Convention establishes a written notification and approval process that is known as the procedure of prior informed consent (PIC), for all cross-border movements of hazardous wastes.[90] The PIC is essentially a human health and environmental protection measure based on the principles of prevention and transparency. Under this system, parties are prohibited from exporting hazardous wastes unless the State of import has consented to

[87] *Ibid.,* Article 1, b.

[88] *Ibid.,* Article 4(2).

[89] *Ibid.,* Article 11.

[90] *Ibid.,* Aritcle 6.

the shipment beforehand, in writing.[91] Furthermore, the State of export cannot approve a hazardous waste transfer unless it has received prior confirmation from the State of import, of the existence of a contract between the exporter and disposer, ensuring the environmentally sound management of the wastes in question.[92]

In addition to imposing a higher level of environmental legal responsibility on exporters, importers, transit-country waste dealers and government authorities, with respect to transfers of hazardous wastes, the Basel Convention establishes specific circumstances under which Parties are authorized to engage in hazardous waste transfers. Under Article 4(9) of the Basel Convention, Parties are obliged to "take appropriate measures to ensure" that hazardous wastes are passed through or exchanged between territories *only* in the following three situations:

- when the exporting country cannot manage the wastes within its own borders, in an environmentally sound manner (Art. 4(9)(a)); or
- when "the wastes in question are required as a raw material for recycling or recovery in the State of import" (Art. 4(9)(b)); or
- under other agreed-upon criteria, so long as they do not contravene the objectives of the Convention (Art. 4(9)(c)).

[91] *Ibid.,* Article 4(1)(c).

[92] *Ibid.,* Article 6(3)(b).

Evidently, the Basel Convention discourages the export of hazardous waste for disposal, limiting such transfers to when a contracting Party is incapable of handling the waste in question in an environmentally sound manner within its own territory. At the same time, there is a clear allowance of hazardous waste transfers between contracting Parties, for the purposes of recycling and recovery. Of course, Article 4(9)(b) is nuanced by the Basel Ban Amendment, and therefore inapplicable between Annex VII and non-Annex VII countries.

In all cases that hazardous waste transfers are permitted, Article 6(3)(b) requires that they be managed in an environmentally sound manner, and that this fact be clearly established before the release of a shipment from the exporting State. Of course, the Basel Convention's restrictions apply only to 'hazardous waste' definitions contained in, or recognized by the treaty. As such, any control over transboundary movements of electronic wastes depends on whether or not they are recognized as hazardous waste under Article 1(a) of the Convention. As we will see in the following passages, the extent to which electronic wastes are controlled under the Basel Convention remains a legally contentious aspect of the treaty that has yet to be resolved.

2. E-Waste as Hazardous and Non-Hazardous Wastes: Basel Annexes VIII and IX

Electrical and electronic wastes listed in Annex VIII (entries A1180, A1150, A2010) of the Basel Convention are considered 'hazardous waste' under Article 1.1(a):

A1150	Precious metal ash from incineration of printed circuit boards [...]
A1180	Waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on list A, mercury switches, glass from cathode-ray tubes and other activated glass and PCB-capacitators, or contaminated with Annex I constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B B110)
A 2010	Glass waste from cathode ray tubes and other activated glasses.[93]

Annex IX (entry B1110) of the Convention makes a further clarification regarding electronic wastes, listing those which are generally not considered hazardous wastes:

B1110	Electrical and electronic assemblies: • Electrical and electronic assemblies consisting of only metals or alloys • Waste electrical and electronic assemblies or scrap not containing components such as accumulators and other batteries included on list A, mercury switches, glass from cathode-ray tubes and other activated glass and PCB-capacitators, or not contaminated with Annex I constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) or from which these have not been removed, to an extent that they do not possess any of the characteristics contained in Annex III (note the related entry on list A A1180) • Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for reuse, and not for recycling or final disposal.[94]

By virtue of Annex IX, electronic wastes that do not possess hazardous materials are not considered hazardous wastes. Since most electronics do contain Annex I constituents

[93] *Ibid.,* Annex VIII.

[94] *Ibid.* Annex IX.

(such as lead, cadmium and mercury), once disposed, they qualify as hazardous waste under Annex VIII and can only be exported or imported following the PIC procedure. Furthermore, in light of the Basel Ban Amendment, these hazardous e-wastes cannot be transferred from Annex VII to non-Annex VII countries. However, the last paragraph of Annex IX introduces an important exemption with respect to electronics that would normally be covered under Annex VIII, in stipulating that when destined for direct reuse, electrical and electronic assemblies and their components do not fall under the 'hazardous waste' definition. As such, it can be understood that when destined for disposal or recycling, electronic wastes constitute hazardous wastes, and are thus subject to international transfer restrictions outlined in the Convention (technically, the PIC procedure). The same category of electronics, when intended for direct reuse, are not recognized as waste, but instead as commodities, and thus, remain exempt from all hazardous waste controls. The broad definition of reuse which is provided by Annex IX suggests that second-hand electronics intended for 'direct reuse' does not only refer to functioning equipment, but may very well include electronics in need of "repair, refurbishment or upgrading."[95]

The exclusion on equipment destined for reuse appears to be compatible with the Basel Convention's prime environmental objective (to reduce the generation of waste), as reuse extends the lifecycle of electronic products. By prolonging the functionality of electronics, reuse benefits resource and energy conservation, and at least temporarily diverts the need for recycling or disposal, operations which can be highly damaging to

[95] *Ibid.,* Annex IX, Footnote 20.

the environment and human health. However, as exemplified by Lagos, Nigeria, where an expansive electronics repair and refurbishment sector has emerged, most electronic equipment that is exported from industrialized countries for the purpose of re-use requires some form of intervention before it can become reusable.[96]

It is essential to point out that while reuse is generally considered to be the most environmentally–friendly management option for second-hand electronics, it may also be a significant source of pollution. This is especially the case when repair or refurbishment are required, as these processes often involve the replacement and disposal of non-functioning components.[97] More importantly, because electronic equipment is not designed for perpetual reuse, the eventual need for recycling or disposal is inevitable, and thus it is perhaps more appropriate to qualify reuse as a management option which at best, delays and reduces the environmental impact of used electronics, but can never entirely eliminate it.

In summary, it seems that Annex IX of the Basel Convention essentially provides an opening for the unrestricted international trade of obsolete – and even broken - electronic products towards developing countries. Post-consumer electronics labeled for reuse effectively escape the Basel Convention's strict controls on hazardous wastes, even

[96] See Puckett, J., Westervelt, S., Gutierrez, R., Takamiya, Y., *The Digital Dump : Exporting Re-Use and Abuse to Africa, supra note* 6.

[97] *Id.*

though they may very well qualify as hazardous wastes from scientific, medical and environmental perspectives.

3. Impact of the Annex IX Reuse Loophole

It is apparent that the reuse exemption was incorporated into the Basel Convention so that hazardous waste controls did not hinder developing countries' access to post-consumer information technology, a second-hand resource which continues to be an essential factor to their economic growth and social advancement. However, the drafting of the exemption ultimately created a *carte blanche* for exporters and importers regarding environmental responsibility and diligence, as no additional provisions were adopted to ensure the mandatory pre-testing, labeling or certification of electronics destined for reuse. As a result, export for re-use, repair and refurbishing has become a portal for abuse, acting as a legitimate guise for the dumping of hazardous electronics in developing countries. For example, the Basel Action Network's investigation of the reuse and repair trade in Nigeria revealed that that an estimated 75% of electronic equipment shipped to the region for the purpose of reuse qualified only as waste, presenting no usability potential whatsoever.[98] A 2008 investigation conducted by Greenpeace International revealed a similar trend of illegal e-waste dumping being carried out in Accra and Korforidua, Ghana.[99]

[98] *Ibid.*

[99] Greepeace Research Laboratories, *Chemical Contamination at E-waste recycling and disposal sites in Accra and Korforidua, Ghana, supra note* 6.

In light of the Annex IX reuse exemption, the Basel Convention's regulation of international transfers of hazardous e-waste appears inconsistent. Hazardous shipments of electronics, if labeled for repair, may escape all reporting, transport, treatment, storage and consent requirements applicable to transboundary movements of hazardous wastes, as second-hand goods are not regulated under the Convention. In this respect, the reuse exemption provides ample opportunity for exporters and importers of e-waste to avoid the excessive legal obligations related to the cross-border transport of hazardous wastes. Due to this aspect of the Convention, its potential to offer a meaningful level of human health and environmental protection against hazardous e-waste trading, appears severely limited.

Further impeding the Convention's effectiveness with respect to mitigating the pollutive effects of the global e-waste trade, is its affirmation that in some countries, discarded electrical assemblies and their components intended for reuse "are not considered wastes."[100] As such, whether or not post-consumer electronics can even be considered wastes under the Convention, let alone hazardous wastes, remains an open question. Definitional uncertainties pertaining to 'waste' are perhaps the Convention's greatest source of contention between the various stakeholders involved in cross-border waste transfers. The Basel Convention defines 'waste' as substances that are intended or required by national law to be disposed of, and 'disposal' is meant to include final disposal, as well as resource recovery, recycling, reclamation, direct re-use or alternative

[100] Basel Convention, *supra note* 11. Annex IX, Footnote 20.

uses. [101] Thus according to the Basel Convention, hazardous materials intended for either disposal or recycling are hazardous 'wastes', with the exception of the Annex IX exemptions. However, as Kreuger has pointed out, "industry […] defines materials, hazardous or not, that are intended for recycling as 'products' or secondary raw materials, that should not be subject to waste regulations."[102] In essence, there is no universal consensus that hazardous recyclables (such as e-wastes) should be governed by environmental policy, and not (liberalized) trade policy. The problem is further exasperated by the general understanding that wastes are in fact 'goods'. In a 1968 ruling, the European Court of Justice (ECJ) defined goods as "products which can be valued in money and which are capable, as such, of forming the subject of commercial transactions."[103] In 1992 the ECJ affirmed that wastes, even those posing an environmental threat, were goods.[104] The presence of a strong global market for end-of-life electronics enhances the challenge of how to impose environmental restrictions against unsafe transfers of this stream of 'wastes/products/goods', without infringing upon economic policies which call for liberalized trade, or hurting economic and technological progress in developing countries where there is a great demand for used electronics. Evidently, obsolete electronics may constitute waste from an advanced economy, first-consumer perspective, but they also take on an entirely new meaning within the international trading regime, as recyclables, raw materials, second-hand goods,

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[101] *Id.,* Art.2(1)(4).

[102] Kreuger, J., "When is Waste not a Waste? The Evolution of the Basel Convention and the International Trade in Hazardous Wastes", Paper presented at the 39th Annual Convention of the ISA, Minneapolis, USA (March, 1998). At 7.

[103] Commission vs. Italy 7/68 [1968] ECR 423.

[104] Commission vs. Belgium C-2/90 [1992] ECR I-4431

donations, and gifts. Even though an electronic product may have been discarded by the initial purchaser, it remains a significant tradable commodity. In fact, the renewal of product lifecycles between the 'first world' and 'third world' is not a new concept. One of the first uses of the term 'globalization' was to describe a production process in which a product went through an initial lifecycle within the developed world, and once obsolete, it began a second lifecycle in the developing world.[105] This brings to light one of the complexities of actually implementing the Basel Convention, which is that socio-economic and resource disparities between advanced and developing economies makes it impossible to reach a global consensus on the definitions of hazardous waste. What is considered waste in one country may be a highly desired, profitable - albeit potentially hazardous - resource in another, and consequently, regulators may be compelled to adjust their national hazardous waste classification lists according to domestic industry needs rather environmental concern.

4. Impact of the Basel Ban

With each Member State retaining sovereignty over its national definition of hazardous wastes, and the Basel Convention itself exempting electronics for reuse from the hazardous waste classification, the effectiveness of the Convention, and the Basel Ban Amendment in particular, remains uncertain. If the ban were legally enforceable, it would still be impossible to prohibit exports of used electronics destined for reuse from Annex VII to non-Annex VII countries, unless, under the domestic legislation of the countries

[105] Levitt, T., "The globalization of markets", (1983) Harvard Business Review.

involved in the transaction, the items in question were classified as hazardous wastes.[106] In this respect, it is important to note that in Canada and the United States – which together undeniably form the world's largest electronics consumption market - assembled electronics are not classified as hazardous waste.[107] Of course, the success of an international movement of hazardous e-waste from these countries or others, depends on the importing country's definition of hazardous waste, and its political will to enforce import bans, a factor which has been observed to fluctuate according to the level of development of a country, its role in the global economy, and the availability of resources within its borders. For instance, China's popularity as a destination for e-waste exports is closely linked to it being a resource-poor country, with a large manufacturing sector, cheap labour conditions and weak rule of law.[108] It serves as an example of how the pressures of industrialization and poverty are able to counteract environmental legislative measures, which in China, includes a national ban on e-waste imports and ratification of the Basel ban Amendment.[109]

With strong economic incentives for developed economies to export e-waste and for developing economies to import it, legislative bans on trade are seen as likely to increase

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[106] Basel Convention, *supra note* 11. Article 1(b) and Annex IX.

[107] Under Canadian and U.S. federal laws governing the disposal of hazardous wastes, electronic devies are not classified as hazardous wastes. See *Resource Conservation and Recovery Act of 1976*, 42 U.S.C. 6962; *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations*, SOR/2005-149.

[108] See Hicks et al., *supra note* 41.

[109] See People's Republic of China, State Environmental Protection Agency (SEPA) Notification on the import of the seventh category of wastes. SEPA Document 19/2000, 2000.

illegal traffic.[110] This suspicion has in fact been recently confirmed by the recently released European Environmental Agency report, which indicates that the number of illegal e-waste shipments from EU states to non-OECD countries is continuously rising, despite the fact that the EU is considered to have domestically implemented the Basel ban through the European Waste Shipment Regulation.[111] According to the EEA report, at least 15 000 tonnes of used television sets were exported from the EU into African countries in 2005 (the last year for which data was available), with an average of one thousand units arriving on a daily basis in either Ghana, Nigeria or Egypt.[112] The report emphasizes that used televisions represent only a fraction of actual e-waste exports, the total quantity of which remains unknown and impossible to estimate accurately, due in part to the difficulty in determining "when a used electrical or electronic item is waste or just second-hand."[113] As such, the differentiation between illegal traffic and the legal trade of electronics remains a complex issue, even under the Basel ban. Furthermore, there is an undeniable tension between the international electronics trade and the Basel ban, as the latter may be seen as prohibiting legitimate recyclers in developing countries from access to the global e-waste recycling market.

It is important to recall here that hazardous e-waste recycling is a lucrative globalized business. The global recycling industry is valued at an estimated US $160 billion and

[110] Boon, J., "Stemming the Tide of Patchwork Policies: The Case of E-Waste" (2005-2006) 15 Transnational Law and Contemporary Problems. 731-756.

[111] EEA, *supra note* 55.

[112] *Id.* At 13.

[113] *Ibid.*

believed to employ roughly 1.5 million individuals.[114] The electronic waste industry in Guiyu alone is valued at US $72 million and considered "a fundamental part of Guiyu's economy and society."[115] The impact that true enforcement of the Basel ban might have on the livelihood of this village and similar ones in China and other developing countries, remains uncertain.

II. International trade vs. the Basel ban?

Although the Basel Convention and the ban amendment are reflective of broad international consensus over the fact that affluent countries should not manage their toxic waste by transferring it to poorer countries, the obvious economic gain derived from recycling e-waste in developing countries is likely to continue to dim the light on toxic pollution concerns, in a pattern similar to that of the global electronics manufacturing industry.[116] With most electronic goods being made in China and other developing nations for reasons of cost efficiency - at the evident expense of human rights and environmental health - it is not all that striking that these products are also being recycled in these regions under similar conditions. Sadly, due to global inequalities, the most pollutive parts of the electronic product lifecycle, namely manufacturing and disposal, have both been transferred to the developing world. And while there is general international acknowledgement that this situation, where developing countries are

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[114] European Conference of Ministers of Transport, *Report of the 116th Round Table on Transport Economics held in Paris on 16-17 December 1999 on Transport of Waste Products*, Comment by Jean-Pierre Lehoux of the Bureau of International Recycling, Brussels. (ECMT, 1999) At 167.

[115] Hicks C., et al., *supra note* 41. At 462.

[116] For a discussion on the migration of polluting industries to the developing world, see Clapp, J., *supra note* 7. Chapter 5.

assuming the ill-effects of products that have been enjoyed by 'first world' consumers, is a clear manifestation of social and environmental injustice, for many governments and other stakeholders, it is less clear that the solution to this problem lies in global ratification of the Basel ban. It has been pointed out that restricting poor nations from the market of recyclable materials would prohibit them from exercising their comparative advantage in the recycling industry and thus pose an obstacle to sustainable development.[117] From this perspective, hazardous waste recycling contributes to resource utilization and income generation in developing countries and a total ban would cause substantial immediate harm, if no other income alternatives were made available to the recycling workforce.

In addition to apprehension over the possibly volatile social and economic repercussions of excluding poor nations from trade in recyclable electronics, there is also concern that this will lead to increased extraction and processing of raw materials, and further hinder the transfer of clean technologies to developing economies.[118] Moreover, it is argued – mainly by the global recycling industry[119] – that the Basel ban is inconsistent with the General Agreement on Tariffs and Trade (GATT).[120] Since the Basel ban prohibits the trade of hazardous wastes between Annex VII countries and all others, it could be seen as

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[117] OECD, *Trade Measures in Multilateral Environmental Agreements* (Paris : OECD, 1999). At 134.

[118] *Ibid*.

[119] For example, see International Chamber of Commerce, *The Basel Convention Export Ban Amendment – A business perspective* (ICC, 8 November 1999).

[120] *General Agreement on Tariffs and Trade*, October 30, 1947, 55 U.N.T.S. 194. [hereinafter GATT]

an infringement of the most-favoured nation (MFN) principle, a fundamental pillar of the multilateral trading system according to which members of the World Trade Organization (WTO) are to extend similar trade advantages with all other WTO members.[121]

In essence, the Basel ban inadvertently allows developed countries to trade recyclable hazardous wastes exclusively between themselves. For this reason, the ban can be seen as providing recycling industries in Annex VII countries with exclusive access to a significant 'waste product' market, which includes the largest quantities of electronic waste. This formation of a closed hazardous waste trading group between Annex VII countries evidently places the Basel ban in conflict with the WTO's MFN principle, an incompatibility which could prove to be problematic for WTO Members that, having ratified the Basel ban amendment, must comply with both multilateral agreements. While the question of whether or not WTO rules even apply to hazardous waste remains unresolved, it is likely that because waste products qualify as moveable items placed in international commerce, they are covered under WTO Agreements.[122] In fact, the WTO panel has already had to render a decision in relation to a waste product, specifically retreaded tyres.[123]

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[121] *Id.,* Article 1.

[122] Hagen, P., Housman, R., "The Basel Convention," in Housman et al. eds., *The Use of Trade Measures in Select Multilateral Environmental Agreements*, No. 10, UNEP Environment and Trade Series, 1995.

[123] WTO Panel Report, Brazil – Measures Affecting Imports of Retreaded Tyres. WT/DS332/R (12 June 2007).

In addition, it is unlikely that a circumvention of the MFN clause such as the Basel ban be tolerated under the general exceptions clause (Article XX GATT), as necessary for environmental protection:

> Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:
> […]
> (b) necessary to protect human, animal, plant or health life
> […]
> (g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production and consumption.
>
> (Article XX GATT)

While it is obvious that the imposition of the Basel ban is linked to the negative human health and environmental effects of hazardous waste recycling as it is normally carried out in developing countries, it is unclear whether the ban, in the form that it is applied – that is strictly from Annex VII countries to non-Annex VII countries - is "necessary to protect human, animal plant or health life." If the environmental justification for the ban is that the recycling industries of non-Annex VII countries are incapable of handling hazardous waste in an environmentally sound manner, then restrictions on international transfers of hazardous waste should apply *between* those countries as well. For the purposes of environmental and human protection, a ban on the importation of all foreign hazardous waste into developing countries, and not only foreign hazardous waste originating from Annex VII countries, would seem a more effective measure.

With respect to Article XX(g) GATT, the Basel ban certainly cannot be justified as a measure "relating to the conservation of exhaustible natural resources," as it restricts industries in non-Annex VII countries from accessing waste recyclables. This limited access to post-consumer (secondary) resources is likely to lead to a decrease in resource conservation activities such as reuse and recycling, and an increased industrial reliance on the extraction of primary resources.

Another difficulty in accepting the Basel ban as an environmental and human health-related exemption to international trading rules, is that it imposes a general export restriction on Annex VII countries, without consideration of those countries' individual capacities to process electronic or other hazardous waste. In effect, the Basel ban does not factor into consideration advancements that have been made through waste treatment technology transfers to many non-Annex VII countries, nor does it account for the fact that there may exist similarities between the waste management systems of some Annex VII and non-Annex VII countries. In doing so, the ban does not appear to meet the criteria set in the chapeau of Article XX GATT, in that it may be interpreted as constituting "arbitrary or unjustifiable discrimination between countries where the same conditions prevail."

There appears to be an assumption under the Basel ban, that Annex VII countries are capable of managing their waste in an environmentally sound manner, and that non-Annex VII countries are not. Realistically however, there exist wide discrepancies in the environmental sophistication of waste management systems in countries belonging to the

same group, and even some similarities between countries in opposite groups.[124] Under the Basel ban, non-Annex VII countries that have started to establish environmentally sound systems for waste management assume a major trade disadvantage, as their industries continue to be barred from accessing waste recyclables, despite their adoption of new, 'greener' waste technologies.

There are other legal ambiguities of the Basel ban, which point to a potentially vast and unjustified curtailment of the international trade in waste recyclables. Firstly, it is unclear whether or not developing countries having improved their environmental performance and recycling capacity will ever be able join the Annex VII list. The Parties to the Convention decided to postpone the consideration of new membership applications to the Annex VII list until the Basel ban came into legal effect,[125] a decision which implies that unless the ban is ratified by a sufficient number of Parties to become legally binding, non-Annex VII countries will not be able to benefit from wider market access even after adopting environmentally sound systems for waste management. .

Secondly, there is uncertainty over how the Basel ban affects developing countries' sovereign right to enter into bilateral and regional agreements, as permitted under Article 11 of the Basel Convention. An Article 11 agreement could allow developing countries that have adopted environmentally sound technologies for waste management to import

[124] For examples of international initiatives that are continuously enhancing developing countries' capacity to manage electronic wastes, see StEP, *Annual Report 2008* (Bonn, United Nations University / StEP, 2008).

[125] Guevara, M., *supra note* 16.

waste recyclables that would otherwise be prohibited under the Basel ban. While there is mention of Article 11 of the Basel Convention in the preamble of the ban amendment:

> […]the Technical Working Group will develop technical guidelines to assist any Party or State that has sovereign right to conclude agreements or arrangements including those under Article 11 concerning the transboundary movement of hazardous wastes.

there are opposing views among Basel Parties as to its interpretation, with the European Union arguing that the ban amendment does not confirm the continued availability of Article 11 agreements.[126] Should it be impossible for non-Annex VII countries to negotiate Article 11 agreements after ratifying the Basel ban, they would lose control over their sovereign right to determine which waste products may be imported onto their territories, despite any enhancement in their capacity to manage waste in an environmentally responsible manner, and regardless of their domestic industries' needs for raw materials.

With so many uncertainties regarding the global economic impact of the Basel ban and to what extent it will restrict international trading in waste recyclables, the amendment remains controversial and unsupported by several nations, most notably some of the largest generators of hazardous waste – Canada, United States, Australia and Japan. With hazardous waste recyclables such as electronic waste, generating much needed revenue in developing countries while relieving developed countries of the costly burden of having to manage the waste domestically, the Basel ban amendment is likely to remain unenforced, unless its many legal ambiguities are addressed.

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[126] *Id.*

III. Assessing the impact of the Basel Convention

It is difficult to determine how successful the Basel Convention has been in fulfilling its objectives to minimize international movements of hazardous wastes, and to promote the environmentally sound management of wastes at their source. While the environmental treaty is certainly credited for having changed callous international business practices of hazardous waste dumping in the third world, and for having propelled governments towards establishing greater transparency, environmental responsibility and accountability in waste management, the Basel Convention is just as generally considered to contain a number of key weaknesses that challenge its effectiveness as a comprehensive global waste management policy.[127]

Firstly, a common criticism of the Basel Convention is the fluctuation it allows in Member States' definitions of hazardous waste.[128] Because national definitions of hazardous waste vary under the Convention, as do Member States' domestic monitoring and reporting systems and waste management strategies, it is difficult to determine the precise legal scope of the Convention and to what degree it is being implemented. This is especially the case with regards to electronic waste products, most of which, in intact forms, continue to escape hazardous waste classification in the majority of countries subject to the Basel Convention.

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[127] See Clapp, J. "Seeping through the Regulatory Cracks", 22(1) SAIS Review of International Affairs (2002) 141 –155. See also Kreuger, J., *supra note* 12; Kummer, K., *supra note* 12.

[128] *Id.*

Secondly, the Convention relies primarily on the principle of state responsibility for monitoring and enforcement, requiring Members to facilitate implementation through the establishment of competent authorities and focal points (Article 5). Members must submit annual reports to the Secretariat that provide quantitative and qualitative data on the flow of transboundary waste shipments in which they were involved, information on any changes in national hazardous waste regulation, and all other information deemed relevant under the Convention (Article 13). In this respect, it has been noted that data submitted to the Secretariat has been of inconsistent quality, with developing countries often lacking the financial resources, technical expertise, testing facilities, adequate administrative systems and national infrastructure necessary to comply with the complex monitoring and reporting obligations of the Basel Convention.[129]

With respect to the illegal traffic of hazardous wastes, there is no way to estimate the exactitude of the Secretariat's figures regarding quantities, routes and frequency of such shipments, as many Contracting Parties lack the capacity to effectively track transboundary movements of wastes carried out in contravention of the Convention.[130] Domestic deficiencies in border control and inspection continue to pose a clear obstacle to the fulfillment of one of the Basel Convention's major objectives, that is reducing illegal waste shipments.

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[129] Kummer, K., *supra note* 12. At 81. See also Rummel-Bulska, I., "Compliance with and enforcement of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal," Proceedings of the Fifth International Conference on Environmental Compliance and Enforcement, Volume 2. 419-432. (INECE, 1998).

[130] Rummel-Bulska, *Id*. At 427.

Thirdly, with regards to enforcement, the legally non-binding supervisory system and complaint mechanism, which was established at the 6th Conference of the Parties in 2002, as part of the Mechanism for Promoting Implementation and Compliance[131] may be too soft a tool to deal with the problematic issue of illegal traffic. The Compliance Committee, composed of 15 independent experts (three from each of the five regional groups of the United Nations) is mandated to assist Parties in the implementation of the Convention. The Committee considers submissions by any Party related to its own compliance difficulties or another Party's failure to comply with the Convention's obligations, as well as submissions by the Secretariat relating to a Party's reporting obligations, and also conducts general reviews as mandated by the Conference of the Parties.[132] Although the establishment of this Committee was an important breakthrough with regards to compliance control, as it finally created an independent supervisory body to conduct substantial reviews of the information transmitted by Contracting Parties to the Secretariat, and to guide Contracting Parties' in the technical application of the Convention, the ultimately negotiable nature of the Committee's decisions means that enforcement of the Convention remains largely voluntary.

A major weakness of the current compliance regime is that non-governmental organizations are altogether excluded from the opportunity to make submissions

[131] See Conference of the Parties to the Basel Convention, 6th Meeting Report. UNEP CHW.6/40 (10 February 2003). At 10.

[132] UNEP, *The Basel Convention Mechanism for Promoting Implementation and Compliance* (Paris: UNEP, March 2006).

regarding breaches of the treaty by Contracting Parties, despite the major role they play in monitoring and researching environmental injustice, particularly in the field of global waste traffic, where their activism alone is attributed to have triggered the adoption of international policy. As the Basel compliance regime exclusively entrusts, to Contracting Parties alone, the power to initiate action against suspected violations of the Convention,[133] there is a very low probability of such action being taken, as Governments may fear retaliatory measures for submitting a complaint against another Member. In fact, in its latest Report, the Compliance Committee brought attention to the lack of specific submissions by Parties and the necessity to create incentives in this regard.[134] To date, the Committee has still not received a specific submission from any Contracting Party.

Alongside these internal weaknesses of the Basel Convention, one external factor in particular gravely affects the treaty's ability to control transboundary movements of hazardous waste, which is that the United States, the world's largest exporter and generator of electronic waste,[135] has not yet ratified the Convention. While the U.S. remains legally unbound by the provisions of the Convention, in theory, its hazardous waste policies should be no less environmentally sound than the Basel Convention, as it

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[133] *Id*. Chapter II, 1(1)(b).

[134] Committee for Administering the Mechanism for Promoting the Implementation and Compliance of the Basel Convention, 6th Session Report, UNEP/CHW/CC/6/7 (18 March 2008). At 3.

[135] Cobbing, M., *Toxic Tech: Not In Our Backyard: Uncovering the Hidden Flows of E-waste (*Amsterdam, Greenpeace International, February 2008).

has entered into bilateral waste agreements[136] with several Basel Parties (Costa Rica, Malaysia, Mexico, Philippines and Canada). By virtue of Article 11 of the Basel Convention, these agreements are:

> […] not supposed to derogate from the environmentally sound management of hazardous waste and other wastes as required by this Convention […] in particular taking into account the interest of developing countries.

In reality however, there exist great discrepancies between the U.S. federal hazardous waste export policy and 'environmentally sound waste management' as called for under the Basel Convention.

The United States' Resource Conservation and Recovery Act (RCRA) actually encourages the export of hazardous wastes, by exempting the federal Environmental Protection Agency from the obligation to ensure that hazardous wastes exported for recycling or recovery will be treated in an environmentally sound manner.[137] This is contrary to Article 6(3)(b) of the Basel Convention, which provides that an export of

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[136] *Agreement between the Government of the United States of America and the Government of Canada concerning the Transboundary Movement of Hazardous Wastes and Other Waste* (October 28, 1986). *Agreement of Cooperation between the United States of America and the United Mexican States Regarding the Transboundary Shipments of Hazardous Wastes and Hazardous Substances* (1986). *Agreement between the Government of America and the Government of Malaysia Concerning the Transboundary Movement of Hazardous Wastes from Malaysia to the United States* (1995). *Agreement on the Transboundary Movement of Hazardous Waste from Costa Rica to the United States* (1997). *Agreement between the Government of the United States of America and the Government of the Republic of the Philippines Concerning the Transboundary Movement of Hazardous Wastes from the Philippines to the United States* (2001).

[137] For a discussion of the U.S. hazardous waste exemptions, See Billinghurst, B.M., "E-Waste: A Comparative Analysis of Current and Contemplated Management Efforts by the European Union and the United States" (2005) 16 Colorado Journal of International Environmental Law and Policy. 399 - 428.

hazardous wastes can only take place if there is confirmation from the State of import that the waste will be managed in an environmentally sound manner. In essence, the recycling exemption allows the U.S. recycling industry to export hazardous waste to any foreign destination, without any requirements as to how that waste is to be handled. This means that Canada, when exporting hazardous wastes to the United States, cannot ensure that if the shipment is subsequently exported from the United States to another country for recycling purposes - which is the fate of approximately 80% of the e-waste the U.S. receives[138] - that it will be managed in an environmentally sound manner. In this sense, exporting hazardous waste to the United States may allow Canada and other Basel Parties to sidestep their obligations under the Basel Convention.

My analysis of the Basel Convention shows that while the treaty aims to minimize international movements of hazardous wastes, this objective has not been achieved with respect to electronic waste. With the classification of e-waste as hazardous waste remaining unclear from a legal perspective, and furthermore, the Basel Convention providing export exemptions on electronic equipment destined for reuse, the treaty does not seem to provide a coherent global e-waste policy. Moreover, there is serious doubt as to the potential of the Basel ban amendment to control electronic waste flows towards developing nations, particularly in light of the EEA and British EPA studies[139] which indicate that even in the European Union, a region which both possesses environmentally

[138] Puckett. J., et al. *The High Tech Trashing of Asia, supra note* 6.

[139] *Supra notes* 32, 55.

sound recycling technologies and where the Basel ban amendment is considered to have been implemented, the illegal traffic of electronic wastes is an ongoing reality.

IV. Beyond the Basel Ban

Aware of the shortcomings of the Basel Convention and the Basel ban amendment to effectively put an end to e-waste trade flows towards developing countries, the international community has recently turned its attention away from the question of trade restrictions and more towards capacity building, placing greater emphasis on providing multistakeholder assistance to emerging economies in their adoption of environmentally sound e-waste management systems, and encouraging developed countries to switch to clean technology in electronic product design.

Building the capacity of developing countries to manage wastes in an environmentally sound manner is in fact one of the objectives of Agenda 21,[140] the multilaterally agreed upon global plan of action for sustainable development which was adopted at the 1992 United Nations Conference on Environment and Development (Earth Summit). According to Agenda 21, a country's capacity refers to its "human, scientific, technological, organizational, institutional and resource capabilities."[141] The process of capacity building can be seen as enhancing a country's developmental scope and outlook by strengthening its ability to understand "environmental potentials and limits and […]

[140] Agenda 21 : Programme of Action for Sustainable Development, U.N. GAOR, 46th Sess., Agenda Item 21, UN Doc. A/Conf.151/26 (1992).

[141] *Id.,* Chapter 37, para.1.

needs as perceived by the people"[142] and providing access to the necessary tools and resources for it to govern accordingly, towards sustainability. Agenda 21 specifically points out developing countries' lack of capacity in the realm of environmentally sound technologies:

> […] There is a need for favourable access to and transfer of environmentally sound technologies, in particular to developing countries, through supportive measures that promote technology cooperation and that should enable transfer of necessary technological know-how as well as building up of economic, technical, and managerial capabilities for the efficient use and further development of transferred technology.[…]
>
> (Agenda 21, Chapter 34)

The incapacity of developing countries with respect to the environmentally sound management of electronic wastes was the central concern of the 8th Conference of the Parties to the Basel Convention (COP 8) held in Nairobi, where the first-ever World Forum on E-waste took place. The outcome of this meeting was the Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic Waste[143] and COP Decision VIII/2: Creating Innovative Solutions Through the Basel Convention for the Environmentally Sound Management of Electrical and Electronic Wastes.[144]

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[142] *Ibid.*

[143] Conference of the Parties to the Basel Convention, Eighth meeting (COP-8), Nairobi ministerial declaration on the Environmentally Sound Management of Electrical and Electronic Wastes, UNEP/CHW.8/CRP.24, Nairobi, 1 December 2006.

[144] Conference of the Parties to the Basel Convention, Eighth meeting (COP-8), Decision VIII/2: Creating innovative solutions through the Basel Convention for the environmentally sound management of electrical and electronic wastes, Nairobi, 1 December 2006.

The Nairobi Ministerial Declaration outlines the following guiding principles for global e-waste management: worldwide promotion of e-waste awareness, transfer of technologies for environmentally sound waste management from developed to developing countries, and the promotion of *green design*, which implies phasing out the use of toxic substances in the manufacturing of electronics, and adopting product stewardship and producer responsibility policies for managing electronics at their end-of-life. In its preamble, the Declaration addresses the issue of international e-waste trading in an objective manner, acknowledging the human and environmental health risks associated with international e-waste traffic towards countries that do not have the capacity for environmentally sound waste management, while also highlighting the socio-economic opportunities that are created through proper e-waste recycling and recovery.

Decision VIII/2 mandates a Working Group to monitor global developments in e-waste management, to draft technical guidelines on the environmentally sound management of e-wastes, and further urges Contracting Parties to increase their financial support and practical engagement towards fulfilling the objectives of the Nairobi Declaration, in particular through the development of pilot projects on environmentally sound collection, reuse, recycling and refurbishment operations in developing countries. The Decision also urges Parties to ensure that electronics donated internationally are not end-of-life, and to strengthen efforts in combating illegal traffic.

In essence, the approach to global e-waste management undertaken at COP-8 removed the controversial Basel ban from the center of international political attention. This shift

in governance strategies, from the tightening of legal restrictions on trade to the elaboration of global multistakeholder partnerships in e-waste management, is not surprising considering the deadlock that had been reached on various aspects of the Basel ban, such as its compatibility with the international waste recyclables trading regime, the number of ratifications required for the ban to enter into force, the availability of Article 11 bilateral agreements to Contracting Parties having ratified the ban, and possibilities to amend the seemingly rudimentary and over-generalized system of country classification as Annex VII or non-Annex VII. Nevertheless, the main objective of the Basel ban - that is the safeguarding of developing countries from richer countries' hazardous wastes - remains a primary goal of the Basel Convention regime.

As I discussed earlier on, the protection of the developing world population from advanced economies' hazardous wastes is primordial to the effective recognition of a range of internationally recognized fundamental human rights, such as the right to health and to a healthy environment. Additionally, limitations on the transboundary movements of e-waste can also be viewed as being an essential, inherent component to the realization of the overarching principles of environmentally sound waste management, which are national self sufficiency and waste minimization.[145] The inability of a country to manage hazardous wastes self-sufficiently implies that the consumption habits of its domestic population remain uncontrolled, causing an externalization of harm to human and environmental health.

[145] See Basel Convention, *supra note* 11. Preamble.

While it is true that there is a lucrative global market for recyclable and reusable hazardous wastes, we cannot assert that economic growth resulting from the trade of hazardous wastes to developing countries balances out its detrimental effects, as the scope of risk that is posed to human health and the environment through the waste trade are novel and continuously emerging. With recent academic research findings suggesting that leaded electronic waste exported from the United States is used as a source material for lead-contaminated jewelry purchased in the United States,[146] it is slowly becoming clear that the damaging health effects of the hazardous e-waste trade, which have thus far been mainly associated with recycling workers in developing countries, present a far more expansive human risk, as they may be subsequently transferred to all those who use products which have been manufactured from recuperated e-waste components. In this respect, the continuation of e-waste export to countries that lack the capacity for environmentally sound recycling and recovery constitutes a potential health risk to the entire global consumer market, as well as to other stakeholders such as production-chain workers who manipulate the secondary raw materials extracted from e-waste in the in-between phases of the product lifecycle. As such, the restriction of e-waste trading to countries with proper capacity and waste technology is a necessary step in preventing cyclical patterns of damage to human health and the environment. However, the restriction of trade alone cannot eliminate the toxic environmental effects of e-waste recycling in developing countries, nor can it help control the growing quantities of e-

[146] Weidenhamer, J.D., Clement, M.L., "Leaded electronic waste is a possible source material for lead- contaminated jewelry" (2007) 69 Chemosphere. 1111-1115; Weidenhammer, J.D., Clement, M.L., "Evidence of recycling of lead battery waste into highly leaded jewelry" (2007) 69 Chemosphere. 1670-1672.

waste that is continually being generated worldwide. The strength of the Nairobi Declaration on e-wastes is that it brings to light the ultimately secondary importance of trade restrictions, as compared to waste reduction and clean production policies, in the achievement of global goals to limit transboundary movements of hazardous waste.

1. Green Production & Lifecycle Thinking

As long as toxic substances are being used in international manufacturing processes, the global community will have to address the controversial issue of where they these toxics should be recycled or disposed, once the product in question has reached its end-of-life. If e-waste recycling industries are to follow in the steps of manufacturing, and other labour-intensive industries, it is very likely they will continue to migrate towards developing countries, for reasons of cost-effectiveness. Unless multilaterally agreed upon restrictions on transboundary movements of hazardous waste are combined with the adoption of domestic measures in all stakeholder countries, aimed at eliminating the toxic characteristics of electronic products, minimizing national e-waste generation and establishing mandatory and environmentally sound recycling schemes, there is slight hope for e-wastes to escape the common trend of many other waste commodities traded in the global market, which is to navigate towards cheaper labour and lower environmental standards. While there is firm recognition amongst developing countries that prohibiting toxic waste imports is necessary for the protection of human health and the environment, the main problem is that these governments do not have the necessary legal framework, human resources, technical capacity or infrastructure to effectively monitor and enforce import bans on hazardous wastes which they have adopted through

the Basel Convention or regional treaties such as the Bamako[147] and Waigani[148] Conventions. International capacity building efforts that address these issues play an essential role in preventing the continuation and aggravation of toxic harm to developing world communities, but these measures alone are ineffective in reducing the dramatically increasing global flows of e-waste. In essence, the source of the e-waste problem is not international trade, it is the use of hazardous substances in the manufacturing of electronic commodities and the rapid rate at which these goods are consumed. Any attempts, through the Basel Convention or otherwise, to mitigate the harmful effects of e-waste by controlling trade flows and processing methods, do not offer a solution to the core environmental dilemma presented by the global prevalence of electronics, which concerns the materials used and quantities consumed. The key to global e-waste management lies first and foremost in ecological intervention at the product design level, specifically the elimination of the use of hazardous substances in production processes. In fact, without environmental management at this point of the electronic product lifecycle, the materialization of hazardous waste reduction goals embedded in the Basel Convention and various regional environmental treaties would remain theoretical, as the global consumption of electronics is a continuously rising phenomenon and is expected to remain so.[149]

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[147] Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes Within Africa 30 ILM 773 (1991).

[148] Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region (1995).

[149] See Décision Études Conseil, *supra note* 1.

A salient feature of the Nairobi Declaration on E-Wastes is that it places particular emphasis on the importance of adopting a lifecycle approach to e-waste management. This strategy essentially implies that stakeholders, in their decision-making, pay attention to the environmental burdens of electronics throughout the entire physical existence of the latter – from raw material to waste - and not strictly to those environmental burdens directly related to the production or consumption phase in which they are involved:

> [Life cycle thinking] embodies a view of products as sources of environmental problems. It also implies that organizations are not only responsible for environmental damage due to their own physical activities, but also for a broader range of environmental interventions throughout the product chain.[150]

As such, lifecycle thinking creates new linkages between actors involved in the separate phases of a product system, allowing for the conceptualization of new forms of stakeholder responsibility and accountability with regards to pollution prevention. In particular, the lifecycle approach centers on the principle of extended producer responsibility, an environmental policy principle that can be broadly defined as:

> the concept that manufacturers and importers of products bear a degree of responsibility for the environmental impacts of their products throughout the products' life-cycles, including upstream impacts inherent in the selection of materials for the products, impacts from manufacturers' production process itself, and downstream impacts from the use and disposal of the products. Producers accept their responsibility when they design their products to minimize the life-cycle environmental impacts and when they accept legal, physical or economic responsibility for the environmental impacts that cannot be eliminated by design.[151]

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[150] Heiskanen, E., "The Institutional Logic of Lifecycle Thinking", Journal of Cleaner Production 10 (2002). 427-437. At 431.

[151] Davis, Gary (1994) cited in Sander, K., Schilling, S., Tojo, N., Rossem, C., Vernon, J., George, C., *The Producer Responsibility Principle of the WEEE Directive* (Hamburg : Okopol, 2007).

EPR is widely recognized as a principle which underlies different types of preventive environmental policies.[152] In essence, the EPR principle extends manufacturers' responsibility for a product beyond the production process, throughout the wider product cycle. It is considered an extension of the polluter pays principle, outlined in Principle 3 of the Rio Declaration, according to which the polluter should bear the cost of pollution. In practice, EPR is implemented through policy instruments which may be administrative (e.g. collection or take-back of products, fulfillment of reuse and recycling targets and environmental standards), economic (e.g. product taxes, subsidies, advance disposal fee systems, tradable recycling credits), or informative (e.g. marking and labelling of product components, provision of information to consumers and recyclers about substances used and requirements for environmental disposal, consultation with local government on collection systems).[153] EPR-based policies fulfill their ultimate objectives of waste minimization and environmental design through the assignation of four different types of responsibilities to product manufacturers : the assumption of financial responsibility for treatment required at end-of-life, physical responsibility for collection at end-of-life, information responsibility with respect to environmental disposal, and liability in case of pollution proven to be caused by improper disposal.[154]

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[152] Lindhqvist, T., "Extended Producer Responsibility", in Lindhqvist, T., ed., *Extended Producer Responsibility as a Strategy to Promote Cleaner Products*, edited by T. (Lund: Department of Industrial Environmental Economics, Lund University, 1992).

[153] Lindhqvist, T., *Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems* (Lund: International Institute for Industrial Environmental Economics, Lund University, 2000) At 3.

[154] *Id.* At 2.

By viewing producers as waste-generating firms and encouraging them to take on greater responsibility for the overall environmental impact of their products, EPR-based policies cast waste minimization as one of the major goals of industrial production. The notion of taking into consideration the effects of the waste phase of a product before it is even materialized represents a fundamental shift from traditional approaches to waste management under which wastes are dealt with only after they are generated. In this sense, the EPR principle effectively extends the main focus of environmental policy and regulation from the traditionally limited scope of by-products, to include products as well. Another change brought upon by the adoption of EPR-based policies is that the financial and physical responsibility for waste management that has traditionally belonged to local governments, is transferred, either entirely or in part, to the private sector. By extending waste management responsibilities to producers, EPR policies create economic incentives for industry to move towards waste minimization. And being a waste minimization strategy firmly anchored in environmental design rather than the reduction of industrial production, the EPR approach cannot be criticized to have an innately negative impact on trade growth. On the contrary, EPR can be seen as a way to materialize sustainable development goals, as it allows trade within the constraints necessary to protect human and environmental health. However, that is not to say that EPR initiatives cannot be poorly designed or cannot fail to meet their objectives. The first legislative EPR initiative, which took place in Germany and covered packaging wastes,[155] was heavily criticized for not taking into consideration limits in national recycling

[155] Ordinance on the Avoidance of Packaging Waste (Verpackungsverordung), 1991.

capacity, and consequently resulting in increased waste exports to Asia.[156] The more recent EU-wide EPR legislation for end-of-life vehicles (EOLV Directive) has drawn concerns that its implementation is too costly for the automotive industry, without presenting any profitability potential or providing design-for-remanufacturing incentives.[157] Adoption of the directive has also been linked to an increase in illegal car dismantling activities and second-hand export to developing countries.[158] As discussed hereon, similar concerns have also been manifested with regard to EPR legislation pertaining to end-of-life electronics. In fact, the environmental and financial costs and benefits of EPR implementation in the electronics sector have not been evident or uniform. While the EPR principle certainly presents great potential for reducing the environmental harms of electronic products, identifying the elements necessary for an EPR programme to fulfill its objectives of cleaner production and waste reduction remains a significant challenge.

2. Extended producer responsibility and E-Waste

Many countries have developed environmental policies based on the principle of extended producer responsibility to deal with domestic e-waste generation. However, government intervention in this regard has been remarkably varied. Stringent regional and national legal norms have been adopted in the European Union, Japan, Switzerland

[156] Salzman, J., "Sustainable Consumption and the Law", 27 ENTL 1243 (1997). At 1277.

[157] See De Brito, M.P., Van der Laan, E., Irion, B.D., *Extended Producer Responsibility in the Aviation Sector*, ERIM Report Series Research in Management (Rotterdam: ERIM, April 2007).

[158] Konz, R. J., "End of Life Vehicle Directive: The Road to Responsible Disposal", (2009) 18 Minnesota Journal of International Law. At 446.

and even certain newly-industrializing countries such as China, on mandatory e-waste recycling and on the restriction of the use of hazardous substances in new electronic products. In contrast, e-waste management initiatives in Canada and the United States have been mainly voluntary and industry-led, or regulated strictly at the provincial or State level, with an absence of environmental e-waste legislation at the federal level.

The distinct national approaches to e-waste management and to the interpretation and application of the principle of extended producer responsibility provide an interesting point of analysis, through which we may better understand the role of government regulation in minimizing the environmental life-cycle impacts of electronic products. Important questions arise in the discussion of EPR implementation within the electronics sector: Are legislative EPR policies more successful than voluntary initiatives at fully engaging producers and rendering them proficient in waste management? How do stakeholder responsibility and accountability differ between EPR programs? What are the financial and environmental side effects of a poorly designed EPR program? Should EPR programs be implemented at a local, national or international level? How do EPR programs affect the illegal traffic of e-wastes?

In the following section, I attempt to answer these questions by providing a qualitative overview of EPR policies that have emerged in response to the e-waste crisis, specifically from the European Union, Japan, Canada, the United States and China. My goal is to comparatively assess the main environmental, economic and social effects of existing e-waste management strategies, in order to comprehend their respective implications for the

international e-waste trading regime, for human and environmental health and for the global development of green technologies.

Part Three: The Product Policy Approach to E-Waste Management

I. European Union Law: WEEE and RoHS Directives

The EU has coupled its Basel Convention commitments with two directives adopted in 2002, tackling the e-waste problem at different points of the electronic product lifecycle. The Waste Electrical and Electronic Equipment (WEEE) Directive and Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive, which both entered into force in 2003, resulted from a resolution of the European Parliament adopted in 1996, requesting the European Commission to propose directives based on the principle of producer responsibility, for the management of certain priority waste streams.[159] The main objective of the WEEE directive is to prevent the generation of e-waste, and to hold producers responsible for the recycling, reprocessing and safe disposal of electronic equipment falling under any of the ten (10) product categories found in Annex IA of the Directive (large household appliances, small household appliances, information technology and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments; and automatic dispensers).[160] The RoHS Directive compliments the WEEE directive, by creating environmental obligations for producers with regards to the design and manufacturing

[159] UNCTAD, *Trade and Environment Review 2006* (Geneva: UNCTAD, 2006). At 64.

[160] WEEE directive, *supra note* 19. Article 1.

phases of electronic products. In particular, the RoHS directive bans the use of six (6) hazardous substances (lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated biphenyl ethers (PBDE)) in all product categories described in Annex 1A of the WEEE directive, with the exception of medical devices and monitoring and control instruments (Categories 8 and 9). The exception for the latter was made due to uncertainties regarding the long-term effect and reliability of lead-free solder, and the potentially devastating impact of the failure of these types of products in their application.[161] As I will discuss further on, the EU's RoHS directive has greatly transformed the global electronics industry, as all foreign manufacturers who export EEE into the EU, or who manufacture components for EEE that is destined for sale in the EU, have also been significantly affected by the restrictions. Before examining the producer responsibility principle as set forth in the RoHS Directive, I would like to address how the principle has been applied within the WEEE Directive, which is the policy dealing with already existing amounts of e-waste.

1. Producer Responsibility in the WEEE Directive

The WEEE directive imposes responsibility for the environmentally sound management of e-waste on producers of EEE. The definition of 'producer' under the WEEE Directive covers manufacturers and brand-owners of electrical and electronic equipment (EEE), and persons who, on a professional basis, import or export EEE into a Member State, irrespective of the selling technique used, including distance communication (telephone

[161] Goodman, P., *Review of Directive 2002/95/EC (RoHS) Categories 8 and 9 - Final Report* (Surrey: ERA, 2006).

and web-based sales).[162] Producer identification is an essential aspect to the responsibility regime. Article 11(2) of the WEEE directive requires that for new products (i.e. put on the market after 13 August 2005) the producer be clearly identifiable by a mark on the appliance. The WEEE logo (found under Annex IV of the WEEE directive) must also appear on all electronic equipment placed on the market after 13 August 2005.[163]

In general, producer responsibility is suggested to begin from collection facilities onwards, and not directly from the end-users of EEE.[164] As such, the WEEE Directive obligates producers to finance the collection, recycling, recovery and environmentally sound disposal of waste. The nature and scope of responsibility depends on whether the product in question is new waste (placed on the market after 13 August 2005) or historical waste (placed on the market before 13 August 2005), and whether it qualifies as 'WEEE from private households', a term that also includes WEEE from commercial, industrial, institutional and other sources that is similar in nature and quantity to private household WEEE.[165]

Two forms of producer responsibility appear in the WEEE directive: collective and individual. For new products, (i.e. put on the market after 13 August 2005), each producer is responsible "for financing the operations […] relating to the waste from his

[162] WEEE directive, *supra note* 19. Article 3(i).

[163] *Id.,* Article 10(3).

[164] *Ibid.*, Preamble, Recital 20.

[165] *Ibid.,* Article 3(k).

own products", for WEEE from private households as well as WEEE from users other than private households.[166] An additional producer responsibility in relation to WEEE from private households, is the provision of a financial guarantee for every new product on the market, that is meant to ensure end-of-life treatment. Essentially, with the placement of every new product on the market, producers are obliged to provide a recycling insurance, blocked bank account or participate in some form of WEEE management scheme, to show that the end-of-life management of the new product will be financed. There is no requirement of a financial guarantee for WEEE from users other than private households. As for products put on the market before 13 August 2005, they are referred to under the WEEE directive as historical waste, and in the case of WEEE from private households, the responsibility for financing their end-of-life management is assumed collectively, by all producers "existing on the market when the respective costs occur […] in proportion to their respective share of the market by type of equipment."[167] This is done through a collective scheme. In the case of WEEE from users other than private households, producers are jointly responsible for financing the costs of management, alongside users.[168]

Producer responsibility under the WEEE directive also extends to information regarding end-of-life treatment of electronics. For each new type of EEE, producers are required to provide manuals or electronic media detailing all relevant reuse and treatment

[166] *Ibid.,* Articles 8(2), 9.

[167] *Ibid.,* Article 8(3).

[168] *Ibid.,* Articles 8(1) and 9.

information that may be required by recycling facilities, including disclosure of EEE components and materials, and location of dangerous substances.[169]

2. Government Role in WEEE Management

The WEEE directive grants Member States an important regulatory and facilitating role in WEEE management. Member States are obliged to set up WEEE collection and financing systems under which customers and distributors may return e-waste at least free of charge.[170] Member States are expected to keep a registry of producers of EEE and collect information on the annual quantities of electronic products placed on the market, collected, recycled, and exported.[171] They are also obliged to encourage design and production of electronics "which take into account and facilitate dismantling and recovery, in particular, the reuse and recycling of WEEE, their components and materials."[172]

3. Consumer Information in the WEEE Directive

The Directive points out the fundamental importance of the separate collection of WEEE to its environmentally sound management, by noting that Member States play a crucial role in setting up public collection points, actively engaging consumers to return WEEE and adopting measures to minimize disposal of WEEE into municipal waste streams.[173]

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[169] *Ibid.,* Article 11(1).

[170] *Ibid.,* Article 5(2).

[171] *Ibid.,* Article 12(1).

[172] *Ibid.,* Article 4.

[173] *Ibid.,* Preamble, para.15, 16 and Article 5.

The legislation also provides Member States with an initial separate collection target rate of 4kg per inhabitant per year of WEEE from private households, which is supposed to have been reached by 31 December 2006.[174] A recent proposal for a revised WEEE directive, presented by the European Commission in December 2008, provides a new WEEE collection target rate of 65% of the average amount of EEE placed on the market in the two preceding years. The change was proposed following concerns that the 4kg per inhabitant rate did not reflect the economies of individual Member States, leading to "sub-optimal targets for some countries and too ambitious targets for others."[175]

As mentioned earlier, the WEEE directive provides consumers with a right to return WEEE free of charge.[176] In this regard, Article 10 obliges Member States to provide users with information pertaining to: the safe disposal of WEEE, the availability of return and collection systems, the consumer role in environmentally-sound e-waste management and the potential environmental and human health effects of hazardous substances contained in electronic equipment. As well, under Article 10 Member States are expected to adopt measures to encourage consumer participation in WEEE collection. However, paragraph 4 of Article 10 allows Member States to transfer all or some of their responsibilities with respect to consumer information onto producers or distributors. In a report on the

[174] *Ibid.,* Article 5(5).

[175] Commission of the European Communities, *Proposal for a Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) (Recast).* (Brussels: CEC, 12 December 2008). At 3.

[176] WEEE directive, *supra note* 19. Article 5(2) a.

implementation of the WEEE directive, it was noted that most Member States have in fact assigned these consumer information responsibilities to producers.[177]

4. WEEE Directive Criticisms and Problems of Implementation

Comparing the roles of various stakeholders as outlined in the WEEE directive, it is evident that the deepest economic engagement in e-waste management is expected from the producers of EEE. This shift in waste management responsibility under the WEEE Directive, from being mainly governmental to fully committing the private sector, provides important economic incentives to producers to design environmentally sound products that are easy to manage at end-of-life. However, even though the EU legislative initiative has certainly provided a starting point for the creation of an environmentally sound electronics market, it has also been met with criticism, mainly for having been adopted without the input of small manufacturers, for not implementing higher recycling targets and for possibly encouraging illegal export by not legally obliging producers to use their recuperated recycled materials.[178]

In essence, Article 6 of the WEEE Directive, which addresses treatment systems, requires that e-waste be handled by producers or third parties acting on their behalf, using the "best available treatment, recycling and recovery techniques" without elaborating on the subsequent use of treated WEEE. The proper treatment of e-waste remains an

[177] See Sander K., et al., *supra note* 150. At X.

[178] B.Billinghurst, *supre note* 136. At 410.

outstanding issue within the EU, as only 33% of WEEE is considered to be officially collected and treated in conformity with the WEEE Directive, with 54% receiving substandard treatment within the EU or through export, and the remaining 13% going to landfills.[179] Along with the problems of continued illegal export and substandard domestic treatment of WEEE, a general lack of enforcement of the Directive and the operational issues that are discussed hereon, regarding implementation of the principle of producer responsibility, have emerged as major challenges to the effectiveness of the EU WEEE regime.

Producer Definition

Perhaps the most prominent unresolved issue with the implementation of the WEEE Directive is the lack of clarity over the definitional scope of 'producer'. Specifically, Article 3(i)(iii) of the Directive leaves open to interpretation whether it refers to importers and exporters in the context of intra-EU trade, or solely in the context of trade with countries outside the EU. In most EU Member States (22), in the absence of a manufacturer, the first importer of EEE into the national State (e.g. wholesaler, distributor, retailer) is considered to be the producer.[180] Under this approach, the producer changes each time an EEE product crosses national borders, for example, from a wholesaler in one EU Member State to a retailer in another EU Member State. Consequently, there may be many producers identified for one product. This could pose a

[179] Csorba, O., "The WEEE Directive", Presentation given at IEEP & IES Environmental Policy Forum on the Revision of the WEEE Directive – New Rules for Old Electronics. Brussels, 29 January 2009.

[180] See Sander K., et al., *supra note* 150. At II.

problem with respect to certain producer responsibility obligations, as multiple producers may be subjected to financial guarantees (Article 8) and marking requirements (Article 11) for the same product. Aside the excessive costs and administrative burden this implies, there is also the question of whether identifying wholesalers and distributors as producers is meaningful to achieving production-related environmental goals, given their lack of implication in this phase of the product lifecycle. It remains unclear how these actors are supposed to fulfill the WEEE Directive's producer responsibility obligations relating to product design and environmental performance.

Collection Responsibilities

Another problematic aspect of the current WEEE Directive is that although producers are deemed responsible for the treatment of WEEE from collection points onwards, the physical and financial responsibilities for collection of WEEE from private households to collection points are not specifically allocated to producers. In some Member States, these responsibilities are entirely assumed by local municipalities, in others it is also shared by EEE producers and distributors.[181] Arrangements where the costs of WEEE collection are allocated to the general public, and not just to users and producers of EEE, seem to deviate from the polluter pays principle that is explicitly referred to in paragraph 1 of the preamble of WEEE Directive and according to which those who cause environmental pollution should assume the costs to prevent, eliminate and compensate

[181] *Ibid.,* At IV. Only in Denmark, Germany and Romania, physical and financial collection responsibilities for WEEE from private households are accorded exclusively to municipalities.

such damage.[182] The implication of municipalities in WEEE collection has also been identified as a potential disincentive to the development of individual-producer collection systems, as small-scale producers may not have access to the same infrastructure, government subsidies and other financial resources as municipalities do, to manage collection sites.[183]

Individual Financial Responsibility

Article 8(2) of the WEEE Directive is clear in its requirement that for WEEE generated by private households, producers take on individual financial responsibility for waste management related to their own products put on the market after 13 August 2005. This obligation has not been unanimously transposed by Member States into domestic law. A review of legislative texts revealed that in at least 11 Member States[184] producers were not explicitly assigned individual financial responsibility with respect to new products.[185] In some of these cases individual financial responsibility is presented as an option, otherwise only a general collective financial responsibility can be derived from the ambiguous language that is used. The legislation of Ireland in particular contradicts the

[182] See Rio Declaration, *supra note* 64. Principle 16 (Polluter Pays Principle).

[183] Sander K. et al., *supra note* 150. At III.

[184] These include Austria, Belgium, Germany, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Spain and Sweden.

[185] Sander K. et al., *supra note* 150. At V.

WEEE Directive on this point, as it exempts producers belonging to a "approved body" from having to assume any financial responsibility with respect to WEEE.[186]

In addition to national legislative texts where individual financial responsibility for new WEEE is not clear, there are at least eight (8) Member States whose legislation transposing the WEEE Directive does not address this producer obligation.[187] Evidently, holding producers collectively financially responsible for waste management related to their new products does not present the same environmental design and clean production incentives as does the allocation of individual financial responsibility. These type of WEEE management strategies are in fact disadvantageous to producers with greater environmental performance and even hinder the expansion of green technologies, thus undermining the very purpose of the WEEE Directive.

Administrative Burdens from a Lack of Harmonization

For producers, practical implementation of the WEEE Directive has proven to be an administrative challenge, as a lack of harmonization between the national registers of Member States has introduced varying requirements which unnecessarily complicate their reporting duties. Variations between Member States' transposition of the WEEE Directive are not only limited to form, but are also substantial, extending to their definitions of 'producer' and other key terms of the Directive such as 'WEEE from

[186] Waste Management (Electrical and Electronic Equipment) Regulations, S.I. No. 20 of 2005, Ireland. Article 53I(4)(d).

[187] Bulgaria, Denmark, Finland, France, Greece, Latvia, Slovenia and the UK. See Sander, K., et al., *supra note* 150. At V.

private households' and 'put on the market'. Additionally, the lack of harmonization with respect to the registration requirements of distance-sellers and other foreign entities has presented a situation where some producers may not be registered in any Member State, and are consequently excluded from having to assume WEEE management responsibilities altogether.

5. The new WEEE proposal

In December 2008, a new WEEE proposal was tabled by the European Commission, to address practical problems that had emerged in the first years of implementation of the WEEE Directive. The proposal for a revised WEEE Directive aims to remove unnecessary administrative obstacles and reduce implementation costs for market actors and regulators, to set higher recycling and reuse targets and improve effectiveness of the Directive through strengthened monitoring and enforcement. Changes proposed by the EC include a harmonized system of producer registration and reporting featuring inter-operational national registers, clarification on the scope of products covered by the WEEE Directive through a future comitology[188] decision that would categorize appliances as household (business to consumer) or non-household (business to business), set minimum standards for inspection and introduce monitoring requirements for WEEE destined for shipment. The most substantial change introduced by the new proposal relates to the extension of producers' financial responsibilities in the collection of WEEE. While reaffirming that producers must finance collection from collection facilities,

[188] Comitology refers to the procedure by which the European Commission implements legislation on the Community level, notably through the assistance of an appointed Committee. See EU Treaty, Art. 202.

recycling, recovery and disposal of WEEE, the new proposal identifies this as a minimum standard for responsibility, stating that:

> Member States should encourage producer to take full ownership of the WEEE collection in particular by financing the collection of WEEE throughout the whole waste chain, including from private households, in order to avoid leakage of separately collected WEEE to sub-optimal treatment and illegal exports, to create a level playing field by harmonizing producer financing across the EU, to shift payment for the collection of this waste from general tax payer to the consumers of EEEs in line with the polluter pays principle.[189]

Additionally, Article 12 of the WEEE Proposal stipulates that "Member States, where appropriate, shall encourage producers to finance all the cost occurring for collection facilities for WEEE from private households." It can be said that by calling on producers to assume greater responsibility for the lifecycle treatment of their own products, specifically, by financing collection from households, the new WEEE proposal strengthens the linkage between the production and post-consumption phases of the consumer electronics market and reflects a truer coherence with the polluter pays principle. At the same time, the social and environmental benefits of holding producers financially responsible for WEEE collection and treatment throughout the whole product-waste chain largely depends on what persons, natural or legal, can be identified as producers, and even more so, on producers' access to post-consumption electronics. In this respect, there seems to be a loophole in both the current and proposed versions of the WEEE Directive, as certain market actors who participate in the collection and treatment of post-consumer EEE to make a profit from the resale of recovered precious metals, do not fall under the scope of the legislation. As such, these actors are not obliged to respect

[189] CEC, *supra note* 174. Recital 19.

the treatment standards set out in the WEEE Directive, nor do they have to fulfill collection and recycling targets, registration requirements, or reporting obligations on volumes collected and treated. Since the WEEE proposal does not obligate consumers to discard their used EEE through the official post-consumption channels that are set forth and regulated by the Directive, there is no way to guarantee that producers will have access to all the EEE they have placed on the market, once it has been consumed. In fact, even though both the current Directive and the new proposal hold producers responsible for financing operations from at least collection points, there is no obligation on municipalities to transfer all collected WEEE back to producers or third parties acting on their behalf, for subsequent treatment. In practice however, holding producers responsible for financing WEEE collection from households may prove to be an ineffective measure to ensure the proper treatment of WEEE if there is not a concomitant obligation on consumers, businesses and municipalities to return WEEE to producers or to entities acting on their behalf, for subsequent treatment. The current and proposed WEEE regimes do not account for the fact that an unknown amount of WEEE is recycled outside the producer-funded systems.

It is essential for a prospective WEEE regime to ensure that businesses, consumers and municipalities do not transfer discarded electronics to unregulated market actors. Unless all actors that collect and treat WEEE are included under the scope of the WEEE Directive, the problems of illegal shipment and substandard treatment cannot be effectively controlled. Nevertheless, the proposed legislation is an important starting point for an internalization of the costs of the electronics industry. Requiring that

producers assume financial responsibility for collection from private households in addition to fulfilling collection, recycling and reuse targets, as well as financing treatment from collection facilities, may provide the necessary incentive for them to ensure that unscrupulous market actors do not get hold of WEEE.

Operational issues aside, the EU legislative measures on e-waste and the restriction of hazardous substances in electronics form a new era of governance and accountability, in which the EU is clearly acting as an agency for the social and environmental control of the global market economy, even influencing private firms and policies beyond its borders. In comparison to other countries' efforts, which are examined herewith, the EU still stands ahead in terms of controlling regional levels of e-waste and mitigating environmental harms.

II. China Laws: RoHS and WEEE Laws

Following the European RoHS Directive, China came out with its own RoHS legislation that came into force on 1 March 2007.[190] Although both laws address the same six toxic substances, the China RoHS policy is significantly different from the EU RoHS Directive, mainly because it does not prohibit the use of these hazardous substances in EEE production, it simply requires that producers and importers indicate the names and content levels of the toxic substances contained in a product, and provide information to

[190] Administrative Measure on the Control of Pollution Caused By Electronic Information Products, Order No. 39, State Council of the People's Republic of China, 28 February 2006. [hereinafter China RoHS]

users on the 'environment-friendly use-period' and recyclability of the product.[191] The scope of the laws is also different, with the China RoHS covering a generally broader scope of products than the European RoHS, including automotive electronics, radar systems, medical equipment, all types of electronic components, as well as packaging and certain raw materials. At the same time, while toys, home appliances, tools and dispensers are all included under the scope of the EU RoHS Directive, only certain components of these types of products, when sold separately, are subject to China RoHS compliance.[192] It is important to note that products destined for export are not covered by the China RoHS.[193] As such, the primary foreign actors affected by the legislation are those who import electronic goods into China and those who manufacture in China, for the Chinese consumer market.

A major point of difference between the Chinese and European laws is that under the EU RoHS Directive, only the company placing the product on the market is responsible for compliance, where as the China RoHS binds producers, importers, retailers and all other actors involved in production, sale and import of EEE.[194] Their responsibilities, as laid out by the China RoHS policy, include labeling restrictions, information disclosure requirements and pre-market compliance testing and certification.[195] The EU policy does not create similar obligations. Another major difference between the laws is that while

[191] *Id.,* Article 13.

[192] See Ministry of Information Industry, *Electronic Information Products Classification and Explanations, Ministry of Information Industry* (Beijing: MII, 16 March 2006).

[193] China RoHS, *supra note* 189. Article 2.

[194] *Id.,* Articles 3(3), 3(4).

[195] *Ibid.,* Articles 11, 13, 19.

the long-term goal of the China RoHS may be to limit and eventually restrict the use of hazardous substances, it appears that the short-term policy objective remains establishing transparency throughout the production chain, with respect to the presence of toxic substances.

In March 2009, China complemented its RoHS legislation with the adoption of its first WEEE legislation, which is expected to take effect on 1 January 2011. The China WEEE[196] - which is also based on the principle of extended producer responsibility - takes a significantly different approach from the European WEEE Directive. Essentially, the Chinese national legislation attempts to control the recovery (collection) and disposal of WEEE products, the scope of which is to be defined in a forthcoming catalogue.[197] Article 2 of the China WEEE defines the term disposal as including disassembly, extraction of substances, alteration of physical or chemical properties, reduction or elimination of hazardous substances, and landfilling. As such, the law attempts to regulate all treatment possibilities for post-consumer WEEE. However, the reconditioning and maintenance of products and the subsequent use of these products are activities that do not fall within the regulatory scope.

[196] Regulations for the Administration of the Recovery and Disposal of Waste Electric and Electronic Products, Order No. 551, State Council of the People's Republic of China, 25 February 2009. [hereinafter China WEEE]

[197] Art.1, 3, China WEEE.

The China WEEE implements a management system based on recovery through multiple channels and centralized disposal.[198] It establishes a system of certification for disposing enterprises and prohibits all other individuals and entities from engaging in WEEE treatment.[199] The major objective of the China WEEE, which is to regulate disposing enterprises, is reflective of the main pollution concern related to WEEE in China: dangerous recycling carried out by the informal sector. The permit system introduced by the new legislation appears to be a strategy to formalize the largely illegal WEEE handling sector, and to ensure that all future WEEE disposal conforms to environmental and labour safety standards. The legislation stresses that all actors involved in WEEE recovery, storage, transport, or disposal are subject to national laws regarding environmental protection and environmental hygiene administration.[200] Greater transparency and information sharing in WEEE management are also called upon, as responsibilities of qualified disposing enterprises include the establishment of a WEEE monitoring system and an information data management system.[201] The new legislation also creates economic incentives for proper WEEE disposal, providing an "asset write-off" to government agencies, social organizations, enterprises and institutions that deliver WEEE to disposing enterprises, and entitling the latter to preferential tax treatment.[202]

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[198] *Id.,* Article 5.

[199] *Ibid.*, Articles 6, 22.

[200] *Ibid.,* Article 19.

[201] *Ibid.,* Articles 16,17.

[202] *Ibid.,* Articles 13, 18.

While the China WEEE is clear in mandating only qualified disposal enterprises to engage in WEEE disposal, it is less straightforward with respect to the allocation of responsibility for the recovery (collection) of post-consumer electronics. Enforcing what may be viewed as a soft version of the extended producer responsibility (EPR) principle, the China WEEE "encourages" manufacturers to collect WEEE independently or through their distributors, repair organs, or other entities that engage in WEEE recovery, without however, legally obliging them to do so.[203] In fact EEE manufacturers' and importers' legal responsibilities under the China WEEE appear to be fairly minimal, their obligations being restricted to the application of environmentally-sound designs, information disclosure regarding toxic components and product recyclability, and contribution to a government-administered special fund for WEEE disposal.[204] Rules for the collection, administration and use of the fund have yet to be established.

The China WEEE does not appear to specifically appoint WEEE recovery to any entity. Article 11 requires retailers, distributors and other sellers of EEE to provide WEEE collection-points, without going into further detail. Besides encouraging manufacturers and importers to recover WEEE, the law requires those who engage in recovery to provide "convenient and efficient recovery services to users of electric and electronic products"[205] but provides no further insight into the matter. This approach contrasts sharply with the European WEEE approach, where producers are deemed responsible for

[203] *Ibid.,* Article 11.

[204] *Ibid.,* Articles 7, 10.

[205] *Ibid.,* Article 12.

the collection and treatment of their own new products. Failure of the China WEEE legislation to incorporate a similar strategy may gravely hinder effectiveness of the newly adopted law, in particular because there seems to be no incentive for manufacturers or importers to assume individual responsibility with regards to waste from their own products. Furthermore, it remains unclear how the assumption of individual responsibility by a manufacturer would affect the latter's exemption from, or contribution and access to, the special fund for WEEE disposal. The fund itself raises many governance issues, particularly with respect to transparency, misuse and corruption. Surely the existence of a fund might ensure part of the financing that is needed for a modern, nation-wide, WEEE disposal infrastructure, but there remains a great deal of uncertainty as to the relationship of the fund with other EEE market actors.

With regard to measures for non-compliance, the China WEEE implements various monetary fines on disposing enterprises who fail to meet their obligations. Similarly, EEE manufacturers and importers may be imposed a fine for not fulfilling their information disclosure requirements. However, the law provides no punitive measures with respect to non-compliance of obligations related to WEEE recovery. As such, there seem to be no financial or other consequences for manufacturers and importers of EEE that choose not to engage in WEEE recovery. Making only vague references to the WEEE recovery responsibilities of manufacturers, importers and other EEE sellers, the China WEEE law does not substantially address what has emerged as one of the major challenges of WEEE management in China, that is for manufacturers and importers, or legitimate recyclers to

obtain WEEE before it is recuperated by the large and unregulated informal recovery sector.[206]

The China WEEE law does not oblige consumers to return WEEE to producers, sellers or qualified disposing enterprises. At the same time, the law does not restrict individuals or businesses from engaging in WEEE collection, nor does it establish a certification system for WEEE collection. This uncontrolled WEEE recovery system that is open to various unregulated actors is evidently disadvantageous to manufacturers, importers and recyclers that are subject to the WEEE law, as the extensive costs they must assume for environmentally sound WEEE processing render them uncompetitive with informal sector actors who operate outside environmental and labour norms, and are thus able to offer consumers a higher price for WEEE. It is interesting to note that in both the EU and China, one of the main challenges faced by EEE manufacturers, distributors and other sellers, is that they must compete with other actors to obtain WEEE. Both regions need to strengthen their efforts vis-a-vis the creation of incentives for consumers to discard their used electronics through regulated channels.

In summary, it can be said that the new China WEEE legislation mainly attempts to regulate the WEEE recycling sector, by banning all unauthorized WEEE disposal operations. Given the extent of the problem of illegal and substandard WEEE processing in China, this approach to WEEE management, in which improving the environmental

[206] See Hicks C., et al., *supra note* 41. At 468.

performance of WEEE recyclers is prioritized, can be understood. However, the legislation contains major gaps with respect to WEEE recovery, ultimately failing to provide an accountable, coherent system for the collection of WEEE.

The new law encourages multistakeholder partnership and long-term cooperation for WEEE recovery and disposal,[207] without including all relevant actors in such processes. In particular, consumers seem to be completely disregarded by the China WEEE law. This exclusion of consumer participation in e-waste management creates an obstacle to the establishment of an environmentally-sound national WEEE processing system, as it does not account for the fact that consumers significantly impact the WEEE industry as well as human health and the environment, in how they choose to discard their used electronics. Unfortunately in China, there is a general lack of environmental awareness among consumers regarding the potential harms of WEEE and a profit-making attitude towards used electronics,[208] factors that are likely to continue hindering the development of environmentally-sound e-waste treatment systems despite the new WEEE legal framework. In this respect, Chinese regulators may benefit from applying the European WEEE approach, notably, by adopting measures to strengthen consumer participation and awareness. Since the Chinese WEEE legislative framework has yet to define its product scope, and evidently does not provide many of the features of the EU WEEE Directive, such as 'at least free of charge' collection, obligatory manufacturer take-back schemes, recovery and recycling targets, or even WEEE labeling requirements, it is currently

[207] See China WEEE, *supra note* 195. Article 14.

[208] See Hicks, C. et al. *supra note* 40. At 468.

impossible to assess how the China WEEE legislation will impact the electronics industry, and whether it will have any effect whatsoever on Chinese consumers.

III. Other Asian Policies on WEEE and RoHS

Comparing regional approaches to e-waste management, the lack of harmonization experienced in the EU affects Asia as well. The longest standing e-waste regime in Asia is that of Japan, where an obligatory manufacturer take-back scheme for a limited range of electronic products was established by the Home Appliances Recycling Law (HARL)[209] in 2001. Since 1998, the Japanese electronics industry has actively and voluntary promoted lead-free manufacturing and the phasing out of other toxic substances.[210] In 2006, Japan passed RoHS legislation[211] which addresses the same six hazardous substances as the EU Directive. Unlike the EU Directive however, the Japan RoHS does not ban manufacturers or importers from selling EEE containing the hazardous substances, instead, it imposes different labeling and information disclosure requirements for products that exceed the allowable limits of those hazardous substances. In this respect it is closer to the China RoHS. Still, the Chinese and Japanese approaches are vastly different, with the Japan RoHS covering only eight consumer electronics, namely, televisions, computers, refrigerators, air conditioners, copiers, washers, dryers and microwaves. The Japanese RoHS experience to date has shown that even information

[209] Law for Recycling of Specified Kinds of Home Appliances,Ordinance of the Ministry of Economy, Trade and Industry, Japan, 2001. [hereinafter HARL]

[210] See UNCTAD, *supra note* 158.

[211] The marking for presence of the specific chemical substances for electrical and electronic equipment, JIS C 0950 (J-Moss), Ordinance of the Ministry of Economy, Trade and Industry, Japan, 2006.

sharing regarding toxic substances in EEE can be problematic for producers, as information on hazardous materials is often lost at the component-manufacturing phase, and there is overall "low reliability of information in the supply chain."[212]

The South Korean approach to e-waste management stands out among other Asian policies, by setting recycling targets and take-back schemes for EEE, similar to the European WEEE Directive.[213] With Thailand having recently developed voluntary RoHS standards, and Taiwan also expected to adopt its own legislation in the near future, Asian nations are showing a growing trend towards the cleaner production of electronics and greater recognition of the need to address e-waste through product design policy. In contrast, the United States and Canada have adopted no national WEEE or RoHS legislation. The approach to e-waste management in both the United States and Canada have been mainly industry-driven, albeit with an increasing number of local municipalities coming out with mandatory recycling or substance-banning legislation.

IV. State-level E-waste Laws in the U.S.

The common approach to e-waste management in many U.S. jurisdictions is still the end-of-life fee, whereby consumers who wish to dispose their products are charged a fee by

[212] Bengtsson, M., Hayashi, S., Totoki, Y., *Enhanced Information Exchange on Hazardous Substances in Electronics : Connecting the Production and End-of-life Phases* (Institute for Global Environmental Strategies, February 2009).

[213] Act for Resource Recycling of Electrical and Electronic Products and Automobiles, Ministry of Environment, Republic of Korea, February 2006.

collectors who treat the waste either by themselves or by subsequently exporting it.[214] This approach imposes no obligations on the manufacturers of toxic e-wastes, and the probability of an item being recycled becomes entirely dependent on consumer "attitudes, costs and convenience."[215] As such, e-waste recycling is rendered unpredictable and its accessibility is presumably limited to individuals and businesses with adequate financial resources and a certain level of environmental awareness. Offering no long-term vision or coherent collection and treatment infrastructure, this essentially constitutes a laissez-faire model to e-waste management which leaves many toxic e-wastes uncontrolled, and their final destinations unknown. Several U.S. States have adopted a more progressive approach to WEEE management, having imposed landfill bans on e-wastes, mandatory producer take-back schemes and in the case of California, even RoHS legislation. Still, at the time of writing, an estimated 46.1% of the United States population remain uncovered by State-level e-waste regulation.[216]

The first State to pass RoHS legislation was California. The Electronic Waste Recycling Act[217] (EWRA) obliges manufacturers to reduce hazardous substances in certain electronic products and imposes an electronic waste recycling fee at point-of-purchase, which is subsequently allocated to qualified recycling entities. The California law is

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[214] Kutz, J., "You've Got Waste: The Exponentially Escalating Problem of Hazardous e-Waste" (2006) 17 Villanova Environmental Law Journal, 307 – 330.

[215] *Id.*

[216] See National Electronics Recycling Infrastructure Clearinghouse, "Overview of States with Laws", web resource available at http://www.electronicsrecycling.org/public/UserDocuments/US%20Map%20of%20E%20Waste%20Laws%205_15_09.pdf (Last Access 20 October 2009).

[217] Electronic Waste Recycling Act (2003 Cal. ALS 526).

similar to the EU RoHS Directive, except it bans the use of only four of the six substances (lead, cadmium, mercury and hexavalent chromium) and applies to a narrower range of goods. It is important to note that the legal restriction on hazardous substances also applies to purchases made by telephone or internet, through out-of-state retailers.[218]

The California e-waste legislation is based on the advanced recycling fee approach (ARF), as opposed to the principle of extended producer responsibility. Regulation takes place at the retail level, where recycling fees are paid by the consumer at point-of-purchase. Local governments are then responsible for collecting and handling e-wastes at end-of-life. Manufacturers are affected by the State-level legislative initiatives in that they now have to restrict using hazardous substances in certain electronics and provide consumers, businesses and government authorities with information regarding the environmental impact of their products. However, they are not obliged to participate in product recycling, or to contribute financial or other resources in this regard. This type of legislative framework clearly limits industry participation in e-waste management. Ultimately, producers are less inclined to invest in the research and development of WEEE treatment technologies, as no economic incentives are attached to engagement in the post-use phase of electronics.

California's e-waste legislation certainly transfers a higher degree of environmental responsibility to retailers, consumers and municipalities with respect to e-waste

[218] *Id.,* Article 2, definitions. (Section 42463 (o)(p)).

management, and to EEE producers in the phasing out of hazardous substances in manufacturing. It must be pointed out though, that the advanced recycling fee approach does not seem to engage producers to the same extent as an EPR-based system would. The other 18 States and one municipality (New York City) in the United States to have adopted e-waste laws to date, have all opted for EPR-based schemes.[219]

While the adoption of e-waste legislation is necessary to protect human and environmental health and to establish sustainable patterns of production and consumption, the prospective proliferation of diverging WEEE and RoHS State-level legislations throughout the United States will undoubtedly complicate compliance for manufacturers, creating extensive financial and administrative burdens similar to the situation in the EU. Additionally, given that the U.S. is not a Party to the Basel Convention, and that its export restrictions on hazardous wastes do not apply to WEEE other than cathode ray tubes,[220] it is relevant to ask how State-level policies imposing mandatory recycling of used electronics will impact the common current practice of WEEE export. With no federal legislation in place to prohibit U.S. recycling companies from exporting WEEE, there is serious doubt as to whether the introduction of mandatory recycling laws in individual States will lead to the environmentally sound treatment of e-wastes, or whether the diversion of these wastes from U.S. landfills is merely likely to aggravate the problem of WEEE export to nations where processing is cheaper. An important legislative measure to have been adopted in California to address this problem

[219] See NERIC, *supra note* 215.

[220] See RCRA, *supra note* 106.

is the restriction of electronic waste export to foreign countries.[221] The export restriction sets in place a procedure for notification and approval, similar to the Basel Convention. Like the Basel Convention, electronic components exported for reuse or recycling are excluded from the scope of the restriction.[222] This important initiative undertaken by the State of California to conform its e-waste management framework to current international law, is regrettably undermined by the ease of waste collectors and recyclers to transfer shipments to neighboring States that have less restrictive e-waste regulation. Fortunately however, the U.S. may soon be establishing federal regulatory controls to control this problem, through nation-wide RoHS and WEEE legislation. In May 2009, two legislative proposals were made to the House of Representatives, namely the *Environmental Design of Electrical Equipment (EDEE) Act*[223] (hereinafter U.S. RoHS bill) and an Amendment to the *Solid Waste Disposal Act* to restrict certain exports of electronic waste (hereinafter U.S. WEEE bill).[224]

The U.S. RoHS bill regulates the same six substances as the EU RoHS Directive and sets similar maximum allowable concentrations for these substances. However, restrictions set by the U.S. RoHS bill are not nearly as far-reaching as those adopted by the EU, as they apply strictly to 'electro-industry products' which are defined as

> any product or equipment that is directly used to facilitate the transmission,

[221] California Public Resources Code, section 42476.5.

[222] *Id.*, Section 42476.6.

[223] H.R.2420: Environmental Design of Electrical Equipment (EDEE) Act. [hereinafter U.S. RoHS bill]

[224] H.R. 2595: Amendment to the *Solid Waste Disposal Act.*[hereinafter U.S. WEEE bill]

> distribution, or control of electricity, or that uses electrical power for arc welding, lighting, signaling protection and communication, or medical imaging, or electrical motors and generators.[225]

As such, major categories of WEEE controlled under the EU RoHS Directive, such as IT equipment, toys, and sports and leisure equipment are excluded from the U.S. RoHS bill.

Unlike the EU WEEE Directive, the U.S. WEEE bill does not attempt to establish producer responsibility in WEEE management, and establishes no financing obligations with respect to e-waste collection or treatment. The objective of the bill is to prohibit the export of restricted e-waste to non-OECD countries. Again, the scope of products regulated is narrower than the EU product scope:

> used personal computers, servers, monitors, televisions, other video display products, printers, copiers, facsimile machines, video cassette recorders, digital video disc players, video game systems, digital audio players, personal digital assistants, telephones, image scanners, and other used electronic products the [EPA] determines to be similar.[226]

The U.S. WEEE bill adopts the same approach as the Basel Convention, in allowing for the export of used electronic equipment or parts for use, reuse, repair or refurbishment.[227] However, the U.S. bill does not regulate these exports to the same degree as the Basel Convention. The proposed legislation does set in place certain control measures to prevent disguised WEEE exports, notably by requiring that the export not be prohibited by the importing country, that it be made by an original equipment manufacturer, the

[225] U.S. RoHS bill, *supra note* 222. Section 4(f)1.
[226] U.S. WEEE bill, *supra note* 223. Section 1.
[227] *Id.*

latter's contractual agent or "an entity that meets an independent standard as identified by the Administrator"[228] and that the exporter fulfill detailed notification and record keeping obligations. However, a major weakness of the proposed bill is that U.S. exporters are not obliged to provide contractual proof of the receiving facility's consent to the shipment or of its capacity to handle the projected shipment in an environmentally sound manner. As a result of these important omissions, the proposed U.S. WEEE bill appears to legitimize accountability-free export of used and broken electronics. By setting a standard lower than the Basel Convention, it is unlikely that the proposed U.S. bill, if adopted, will contribute significantly to mitigating harmful e-waste trade flows to developing nations.

V. Canadian Laws on E-Waste

The Canadian approach to e-waste management has primarily focused on producer responsibility for products at end-of-life. At the national level, the Canadian Council of Ministers of the Environment (CCME) has established guidelines in the form of *Canada-wide Principles for Electronics Product Stewardship* and a list of *Recommended E-Waste Products*[229] in order to assist provincial jurisdictions in developing e-waste programs. However, provincial engagement in e-waste management has been highly varied and inconsistent.

To date, only five (5) Canadian provinces have adopted e-waste legislation, namely Alberta, Ontario, Saskatechewan, Nova Scotia and British Columbia. The province of

[228] *Ibid*.

[229] CCME, *supra note* 20.

Alberta has put in place an e-waste regime in which a multistakeholder non-profit association (the Alberta Recycling Management Authority) collects fees from manufacturers, wholesalers, distributors and retailers, arranges drop-off and collection points within the province and redistributes collected funds to authorized recyclers. The Saskatchewan e-waste program is also based on advanced collection fees from manufacturers, and also mandates administration of the collection and treatment fund to a non-profit corporation established by industry actors. Anyone wishing to sell covered electronics in the province is legally required to be part of a product management system. In the province of Ontario, WEEE management has been delegated to Ontario Electronics Stewardship (OES), a not-for-profit-organization established by manufacturers, retailers and other industry stakeholders. The Ontario WEEE program is unique, in that manufacturers, importers, distributors, retailers and other sellers of EEE only assume legal responsibilities (which include registration, reporting on EEE quantities supplied to Ontario and financing end-of-life) once they have been notified by OES that they qualify as stewards. Compliance is retroactive to the commencement of the program. Another interesting feature of the Ontario program is that it is set to operate in phases. Currently, phase 2 of the program is being developed with consultation from stakeholders, and is expected to expand the current scope of products (televisions, computers, computer accessories and faxes) to include IT equipment and audiovisual equipment.

E-waste systems in the provinces of British Columbia and Nova Scotia resemble that of Ontario's in that they also operate in phases and essentially require producers to develop product stewardship plans. In Manitoba, e-waste legislation that was introduced in 2007

is still pending. In Prince Edward Island, North West Territories, Nunavut, Yukon and Newfoundland/Labrador, there are currently no laws regulating the disposal or recycling of e-wastes.

The province of Quebec had been in a stakeholder consultation phase since 2003 and in November of 2009, finally released a draft bill that imposes an extended producer responsibility regime for a range of hazardous products, including certain electronics.[230] The Draft Regulation respecting the recovery and reclamation of products by enterprises[231] extends product recovery and reclamation obligations to producers, manufacturers, importers or other enterprises that market or introduce a designated electronic product into Quebec. Companies can exempt themselves from having to implement a recovery and reclamation program only if they are members of an organization whose function is to implement or contribute financially to a recovery and reclamation system for discarded products, under agreement with the provincial government-run *Société québécoise de récupération et de recyclage*. The proposed legislation requires that recovery and reclamation programs provide for and monitor the management of designated electronic products according to best practices and standards, establish collection points, include consumer environmental awareness campaigns and contribute to research and development in treatment technologies. In addition, companies are required to meet the specified target collection rates in the time frames prescribed, at the risk of having to pay a fine to the Minister, and must also fulfill regular reporting

[230] Other products included under the scope of the draft regulation are batteries, mercury lamps, paint and paint containers, and oils, coolants, antifreeze, and their filters and containers.

[231] *Supra note* 21.

duties. Considering the substantial administrative costs related to establishing a recovery and reclamation system that would comply with the proposed regulation, it is likely that most companies, at least small-scale businesses, will opt for the exemption and mandate their responsibilities to a provincially-approved industry-led or multistakeholder organization, as is the case in other Canadian provinces.

Regrettably, no Canadian province has taken the legal initiative to restrict toxic substances from electronic products. The focus remains entirely on waste collection and recycling, with little attention on the reduction of toxic e-waste generation or the promotion of clean production.

VI. Observations on the International WEEE/RoHS Law Landscape

There are interesting observations to be drawn from the international comparison of legislative measures that aim to control e-waste pollution, provided above. Firstly, almost all legal initiatives targeting e-waste are based on the principle of extended producer responsibility, and as such call upon manufacturers and other producers of EEE to participate, at least financially, in electronic product lifecycle management. WEEE regimes commonly founded on the EPR principle may diverge significantly, as a result of the scope of actors that are legally defined as producers and the degree of responsibility that is accorded to them with regards to financing and developing end-of-life management schemes for their products. Since e-waste management schemes need to be adapted to the industrial, social, political and environmental context of the particular

geographic region they are meant to govern, some legal variation between them is inevitable. However, certain elements appear to be fundamental to successful e-waste governance and need to be applied in all regions where EPR programs have been established.

1. Information Sharing & Participation

The first area where legislative improvement is needed on a global scale, is environmental information sharing with regard to electronics use, disposal, collection and treatment. As previously explained, one of the common challenges to e-waste management in all regions where EEE is consumed, is that manufacturers and producers must compete with other market actors, including well-organized and expansive informal sectors, to collect end-of-life electronics. It was also pointed out earlier that the success of environmentally sound WEEE recycling companies, in developed and developing countries alike, relies on their ability to secure constant material flows for processing, a factor which itself depends heavily on consumer behaviour, on the collection capacities of the informal sector and on other circumstances beyond the control of recycling companies and individual electronics manufacturers.

To solve the problem of e-waste being taken out of official, environmentally-safe treatment streams, users, collectors and individual recyclers must be well-informed of their individual responsibilities in the WEEE chain, and of the consequences related to disposing or handling e-waste irresponsibly at the phase of the product cycle in which

they are involved. E-waste policies should present all stakeholders in the WEEE chain with incentives to direct e-wastes towards proper end-of-life treatment. Initiatives in this regard should cover informal sector workers as well, as their integration into environmentally-safe treatment streams is necessary for environmental protection and for the sustainable economic and social development of their communities. In practice, this could mean that developing countries create a system which utilizes the collection and manual sorting expertise of their informal sectors, and mandates subsequent treatment to authorized environmentally-safe recycling companies. Introducing this dimension to WEEE policies would in effect interlock the interests of original manufacturers and informal sector workers, actors who currently qualify as distant and opposing forces in the WEEE chain. A pilot project in this regard has recently been launched in China[232] and its outcome will be highly relevant to India, Latin American countries, and other regions where informal sector participation in WEEE management is omnipresent.

At all phases of the electronic product use, disposal and recovery chain, the dissemination of information plays a key role in achieving sustainable governance. But placing information responsibilities entirely on producers, as do many European countries' WEEE regimes, may be an insufficient policy measure. Surely, the adoption and expansion of producer responsibility regimes provide the electronics industry with the economic motivation to develop new corporate strategies aimed at raising e-waste awareness amongst consumers and diverting e-waste flows from unregulated collection

[232] See Solving the E-waste Problem (StEP) Initiative, *Best Of Two Worlds* Research Project. Overview available at: http://www.step-initiative.org/projects/project.php?id=72 (Last Access: 20 October 2009).

and treatment, but this task should not be left to the private sector alone. In an information-based global society, the proper use and disuse of technologies should be seen as an essential element of contemporary citizenship, and constitute a priority area for public governance. Environmental education and awareness about electronics use should not be strictly provided to consumers and businesses, it should be made available to individuals of all socio-economic levels and to all generations. In this respect, emergent, community-based, public-private partnerships may be a highly effective means to further sustainable EEE production and consumption goals, instead of relying exclusively on manufacturers' to educate users about their own products. Considering that electronics consumption is inescapable and deeply embedded in daily human life, public education systems should be designed to teach responsible e-consumerism, which in most basic terms can be defined as purchasing electronic products that have been produced and will be recycled in accordance with international environmental and human rights norms. Municipalities could adopt e-consumer councils, which would be transdisciplinary, multistakeholder advisory boards responsible for holding social forums on emerging e-waste issues and for informing the public of sustainably-developed electronic products and services. These types of initiatives are important for all countries, irrespective of their level of economic development.

2. Multistakeholder Coordination: Mapping the Responsibilities of Non-producers

A second WEEE issue that merits greater global attention relates to the need for deeper recognition of the financial interest and environmental role of e-waste brokers, recyclers and other non-producer actors involved in the WEEE chain. The current legislative

frameworks of several countries that I have examined do not acknowledge the highly competitive market that exists for WEEE, nor do they provide effective mechanisms for producers to access WEEE before it enters unregulated recycling channels. This holds true for both developed and developing nations. In this respect, it is in the best interest of consumers and manufacturers that comprehensive regulatory frameworks for the monitoring of recycling industries be established. Incentives for environmentally sound recycling should be created and mechanisms for greater transparency and corporate responsibility in the recycling sector should be introduced worldwide.

3. Global Adoption of RoHS

My analysis of national RoHS initiatives shows three distinct policy models emerging: no action being taken in this regard, the development of voluntary compliance codes or standards, and the adoption of national legislation either prohibiting the use of hazardous substances or creating stricter labeling and information requirements for electronics in which hazardous substances are present. Of these three national approaches, taking no action is clearly the least progressive for a nation, as its domestic industries will not remain competitive in the global market. Furthermore, nations who choose not to adopt RoHS policies slow down the global standardization of green design and clean production, reinforcing instead unsustainable patterns of electronics manufacturing that are known to raise the hazards and costs of recycling processes, and to be harmful to human and environmental health. As such, the adoption of national RoHS measures should be treated as an essential dimension of sustainable e-waste governance. However, discordance between national or regional RoHS policies, in terms of the scope of

products or substances covered by them, may present significant financial and technical challenges to EEE producers and other actors in the supply chain. In particular, it may be especially difficult for small and medium sized enterprises (SME's) to comply with various RoHS regulations, as they may not have the resources and expertise of global manufacturers to access reliable and affordable replacement materials, or even to access information on new environmental standards. SME's in Asia who are typically contracted out by international brand-owners to manufacture electronic components may find their market access blocked by the emerging RoHS requirements of international markets.

To address these potentially trade-disrupting implications of new RoHS regulations, governments, international brand-owners and industry associations should provide capacity building programmes, information seminars, and other forms of technical and financial cooperation to assist EEE supply chain actors in meeting domestic and foreign environmental requirements. Ultimately, the harmonization of RoHS requirements through the development of global standards may be the most cost-efficient way to assist the electronics industry in its transition to clean production.

CONCLUSION

The continually escalating use of electronics containing both toxic substances and precious metals has brought upon a global human and environmental health crisis. In the absence of effective regulation, e-waste trading towards developing countries has evolved into a lucrative transnational business, offering employment opportunities and satisfying

the overwhelming demand for secondary raw materials that exists in manufacturing-oriented developing economies. At the same time, the conditions in which e-waste processing has commonly taken place in these countries, has gravely deteriorated the local environment and substantially affected human health.

Aware of the risks posed by increasing quantities of e-waste, the international community has attempted to ban e-waste imports into developing countries, through the Basel Convention ban amendment, which currently remains unenforced, due to a lack of sufficient ratifications. Debate over the Basel ban's possible curtailment of international trade in recyclables, and especially its implications for legitimate recycling operations in developing economies, has shifted international political attention away from the question of ratification and towards assisting developing economies in adopting environmentally-sound e-waste management systems. In addition, it has become evident, in particular through the pioneering legislative efforts of the European Union, that the promotion of sustainable e-waste management and capacity-building in developing countries must be coupled with worldwide action aimed at minimizing e-waste generation, holding producers responsible for the end-of-life management of their products and phasing out the use of toxic substances in electronic product design. As shown by this thesis however, legislative action in this regard has been highly varied. Only the EU, Japan, California, South Korea and China have enacted RoHS legislation geared at making electronic waste and its recycling less harmful to human and environmental health. In addition, some countries have either ratified the Basel ban amendment, or adopted their own policies prohibiting the export or import of electronic

wastes. Meanwhile, existing loopholes in U.S. and Canadian federal export policies continue to allow the transfer of e-waste into developing countries, against provisions of the Basel Convention. Not only has their lack of regulation decreased transparency and accountability in international e-waste flows, it has also aggravated transboundary pollution and contributed to the proliferation of indecent e-waste recycling jobs in developing countries. Furthermore, a pattern of cyclical contamination has emerged, whereby toxic substances derived from improperly treated e-waste exports have re-infiltrated the global market in the form of new products.[233]

My examination of national responses to the WEEE crisis revealed that the principle of extended producer responsibility has provided the basis for e-waste regimes in most countries. Increasingly, producers and other EEE sellers are being held responsible for the collection and treatment of their products, either individually or collectively. Together, EPR and RoHS measures are pushing environmental and public health to the forefront of manufacturers' concerns, even determining what products succeed in the international market.

Reflecting the growing importance of environmental performance and corporate social responsibility for the electronics industry, global computer manufacturer Dell recently published its *Electronics Disposition Policy*, through which the company bans all export of e-waste (defined by the company as all non-working parts or devices) to developing

[233] *Supra note* 145.

countries. To ensure that the recycling companies with which it contracts do not infringe its global policy for responsible electronics disposal, Dell has put in place a monitoring system to audit individual recyclers and to monitor WEEE treatment at the sub-contracting level as well. Dell is the first EEE manufacturer to develop a policy that actually imposes a standard higher than the Basel Convention, by strictly limiting the exemption on exports to *functioning* electronics. It is very likely that Dell's policy will provide competitive pressure on other global EEE manufacturers to adopt similar or even stricter environmental policies in the near future. However, industry-led voluntary initiatives are not sufficient measures in themselves to control WEEE pollution, as only an environmental legislative framework can influence reluctant companies to assume lifecycle responsibility for their products. Additionally, adjustment policies, financial assistance and capacity-building may be necessary for small and medium scale manufacturers to reach the same levels of environmental performance as global producers.

Even State-level EPR programs and RoHS requirements on their own, are not an adequate solution to the problems of e-waste generation and treatment, as patchwork policies create substantial financial and technical obstacles for producers wishing to seek compliance for multiple markets. Furthermore, because these policies are most likely to have been developed without consultation from international stakeholders, they may be insensitive to their external effects and their implications for global trade and development. Ultimately, there is a need to develop infrastructure at a global scale, with the collaboration of all relevant stakeholders. In this regard, new supranational public-

private partnership initiatives such as the United Nations' Solve the E-Waste Problem (StEP) and the Secretariat of the Basel Convention's Partnership for Action on Computing Equipment (PACE), which draw upon international multidisciplinary scientific knowledge, technical expertise and financial resources, are invaluable global platforms for information exchange and discussion, for research and development, and for providing insight into how, as an international community, we can achieve sustainability in our use, disuse and disposal of electronics.

These types of global initiatives help us to recall that shifting to producer responsibility is only a part of the e-waste solution. With "pervasive computing"[234] pushing the ecosystem to its outer limits, in terms of natural resource extraction and toxic waste accumulation, a simple re-organization of the channels through which we manage electronic waste is not sufficient to protect environmental and human health. Above all, what is required is deeper understanding of the meaning and scope of sustainable production and consumption (SCP), a concept recognized by the international community as an overarching link between the challenges of environmental protection and global development:

> The major cause of the continued deterioration of the global environment are the unsustainable patterns of consumption and production, particularly in industrialised countries, which is a matter of grave concern, aggravating poverty and imbalances.
>
> Developed countries should take the lead in achieving sustainable consumption patterns…
>
> (Agenda 21 (Chap. 4.3), Earth Summit, Rio 1992)

[234] Hilty, L.M., *supra note* 23.

> To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.
>
> (Principle 8, Rio Declaration)

While there is no legal definition of SCP, its objective is understood as the de-association of economic growth and environmental degradation through the optimization of resource use during all phases of product lifecycles, and maintenance of "energy, material and pollution intensity of all production and consumption functions within the carrying and assimilating capacities of natural ecosystems."[235]

To date, environmental policies regarding e-wastes have mainly focused on waste management and clean production. Sustainable consumption has mostly been viewed as an extension of sustainable production, as the choice to consume responsibly, and rarely has it been legally addressed in any other context. The right to consume is a complex realm to legislate, as it remains intimately linked with personal freedom, living standards, lifestyles and cultural values, which fluctuate enormously within and between societies. Nevertheless, it is becoming crucial to address the boundaries of consumption, as contemporary living standards and consumer behaviour patterns are not always reflective of an environmentally acceptable quality of life. With consumers' choice of electronics impacting so profoundly on the quality of life of neighboring populations and future generations, as well as affecting resource extraction and preservation, the global

[235] UNEP, *The Marrakech Process: Towards a 10-Year Framework of Programmes on Sustainable Consumption and Production* (Paris: UNEP, 2009).

community needs to build an environmental framework for consumption. This does not necessarily imply restricting consumer rights, instead, it can be conceptualized as the right of the consumer to safe goods and post-consumption services, in conditions which allow the reduction of environmental hazards, an optimization of the use of resources and full respect of international human and labour rights. Governments play a crucial role in this respect, as they are uniquely responsible for designating the social and environmental limits of private sector activities.

In the world of electronic commodities, greater consumer demand, along with the use of toxic substances and harmful recycling flows, have brought upon an environmental crisis that cannot be solved entirely through trade restrictions and clean production, but requires in-depth analysis of the cultural and functional role of electronic commodities in modern daily life. The scarcity of geochemical resources and rising toxic pollution are new challenges faced by global businesses and consumers, environmental realities that force us to reconsider our current industrial models. While it is certain that technologies have propelled human development, they have also significantly shifted our relationship with the environment and transformed human reality into a network of information-oriented societies interlinked through complex production and consumption processes. The new human habitat is a globalized urbanism, and even though its roots and success are deeply tied in the exploitation of natural resources and labour, and in the proliferation of chemical production and consumption, the contemporary technological lifestyle must somehow be re-harmonized with nature, otherwise its collective effects on a global scale are deemed to be catastrophic.

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