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Global perspectives on e-waste

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Abstract

Electronic waste, or e-waste, is an emerging problem as well as a business opportunity of increasing significance, given the volumes of e-waste being generated and the content of both toxic and valuable materials in them. The fraction including iron, copper, aluminium, gold and other metals in e-waste is over 60%, while pollutants comprise 2.70%. Given the high toxicity of these pollutants especially when burned or recycled in uncontrolled environments, the Basel Convention has identified e-waste as hazardous, and developed a framework for controls on transboundary movement of such waste. The Basel Ban, an amendment to the Basel Convention that has not yet come into force, would go one step further by prohibiting the export of e-waste from developed to industrializing countries.

Section 1 of this paper gives readers an overview on the e-waste topic—how e-waste is defined, what it is composed of and which methods can be applied to estimate the quantity of e-waste generated. Considering only PCs in use, by one estimate, at least 100 million PCs became obsolete in 2004. Not surprisingly, waste electrical and electronic equipment (WEEE) today already constitutes 8% of municipal waste and is one of the fastest growing waste fractions.

Section 2 provides insight into the legislation and initiatives intended to help manage these growing quantities of e-waste. Extended Producer Responsibility (EPR) is being propagated as a new

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paradigm in waste management. The European Union's WEEE Directive, which came into force in August of 2004, makes it incumbent on manufacturers and importers in EU states to take back their products from consumers and ensure environmentally sound disposal.

WEEE management in industrializing countries has its own characteristics and problems, and therefore this paper identifies some problems specific to such countries. The risky process of extracting copper from printed wiring boards is discussed as an example to illustrate the hazards of the e-waste recycling industry in India.

The WEEE Knowledge Partnership programme funded by seco (Swiss State Secretariat for Economic Affairs) and implemented by Empa has developed a methodology to assess the prevailing situation, in order to better understand the opportunities and risks in pilot urban areas of three countries—Beijing-China, Delhi-India and Johannesburg-South Africa. The three countries are compared using an assessment indicator system which takes into account the structural framework, the recycling system and its various impacts. Three key points have emerged from the assessments so far: a) e-waste recycling has developed in all countries as a market based activity, b) in China and India it is based on small to medium-sized enterprises (SME) in the informal sector, whereas in South Africa it is in the formal sector, and c) each country is trying to overcome shortcomings in the current system by developing strategies for improvement.

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1. Introduction

The use of electronic devices has proliferated in recent decades, and proportionately, the quantity of electronic devices, such as PCs, mobile telephones and entertainment electronics that are disposed of, is growing rapidly throughout the world. In 1994, it was estimated that approximately 20 million PCs (about 7 million tons) became obsolete. By 2004, this figure was to increase to over 100 million PCs. Cumulatively, about 500 million PCs reached the end of their service lives between 1994 and 2003. 500 million PCs contain approximately 2,872,000 t of plastics, 718,000 t of lead, 1363 t of cadmium and 287 t of mercury (Puckett and Smith, 2002). This fast growing waste stream is accelerating because the global market for PCs is far from saturation and the average lifespan of a PC is decreasing rapidly — for instance for CPUs from 4–6 years in 1997 to 2 years in 2005 (Culver, 2005).

PCs comprise only a fraction of all e-waste. It is estimated that in 2005 approximately 130 million mobile phones will be retired. Similar quantities of electronic waste are expected for all kinds of portable electronic devices such as PDAs, MP3 players, computer games and peripherals (O'Connell, 2002).

In 1991, Larry Summers, then Chief Economist of the World Bank (and now President of Harvard University), spoke of the economic sense of exporting first world waste to developing countries (Summers, 1991). He argued that

- the countries with the lowest wages would lose the least productivity from “increased morbidity and mortality” since the cost to be recouped would be minimal;

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