

## Electronic Waste: Finding Sustainable Solutions that Work Better for Consumers

### A Consumers Union White Paper

*Electronics equipment has been characterized as one of the fastest growing categories of municipal solid waste. Experts project the total number of obsolete computers now exceeds 300 million.*<sup>1</sup> As many as 100,000 cell phones are replaced annually, but less than 1% is recycled.<sup>2</sup> In total, the EPA estimates that about 2 million tons of used electronics equipment is thrown away each year.<sup>3</sup> Faced with a limited and fragmented recycling and reuse infrastructure, many consumers are storing old equipment in their homes or discarding it with their regular trash.

This high level of product turnover has, in turn, precipitated more toxic inputs to the waste stream, which, if not contained, can come back to the public as air, food, and water contaminants. The EPA has identified electronic waste as the largest single source of lead contamination in municipal solid waste.<sup>4</sup> In addition, manufacturing new equipment consumes an enormous amount of natural resources —as much as 3,330 lbs. of water for one desktop computer, for example.<sup>5</sup> *Finding workable solutions is increasingly urgent.*

The two main contributors to this problem are **product obsolescence** and **limited reuse/recycling options for consumers**. Still-functioning equipment is rendered obsolete by a range of factors including changes in software, telecommunications systems, product incompatibilities, and product designs that limit repairs and upgrades. At the end of a product's life cycle, consumer awareness of recycling options is low, and the infrastructure for reuse and

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<sup>1</sup> United States. Environmental Protection Agency, "Recycling Old Computers," October 15, 2002. August 31, 2004 <<http://www.epa.gov/region02/r3/compute.htm>> 1; ---, ---, "Market Trends," October 15, 2002. August 25, 2004 <<http://www.epa.gov/epaoswer/hazwaste/recycle/ecycling/trends.htm>> 1.

<sup>2</sup> Most, Eric, *Calling All Cell Phones: Collection, Reuse, and Recycling Programs in the US*. (INFORM, Inc., 2003) 1.

<sup>3</sup> United States. Environmental Protection Agency, "Electronics" June 10, 2004. December 1, 2004 <<http://www.epa.gov/epaoswer/non-hw/recycle/jtr/comm/electron.htm>> 1.

<sup>4</sup> Shapiro, Andrew, D. Ogunseit, et al., "The devil that we know: Lead (Pb) replacement policies under conditions of scientific uncertainty." California State University, Northridge Alumni (CSUN) Presentation. <http://www.industrial-ecology.uci.edu>, Downloaded January 4, 2005.

<sup>5</sup> United Nations University, "UN study shows environmental consequences from ongoing boom in personal computer sales." Public Release March 7, 2004. [EurekaAlert.org](http://www.eurekaalert.org). 2004. (American Association for the Advancement of Science.) August 18, 2004 <[http://www.eurekaalert.org/pub\\_releases/2004-03/tca-uss030204.php](http://www.eurekaalert.org/pub_releases/2004-03/tca-uss030204.php)> 1.

recycling is highly fragmented, inconsistent, inconvenient, and often costly for consumers. Industry standards, government regulations, and consumer education are needed to reduce the volume and toxicity of electronic waste, improve consumer options for recycling and eliminate barriers to longer product life expectancy.

The introduction of new technology has been a complex process and there has been little effort to map the cascade of purchasing decisions that drive the flow of electronic waste and to characterize the factors that impact these decisions. Limited available data suggest that at current levels of product penetration and turnover rates, consumers in a typical household could expect to replace between 3 and 4 electronic products each year. Understanding the reasons for the high level of turnover in this product sector can help identify needed changes in the way products are designed, distributed and maintained to reduce the volume of waste generated in the first place.

Besides general consumer desire for new products and features, factors that can drive product turnover include: product designs that limit product upgrade and repair, limited information, tools and technical support available to help consumers extend product life expectancy, and artificial barriers to extended product utility imposed by product manufacturers and telecommunication service providers at the product-service interface. For example, Consumers Union readers report higher repair rates for computers than for most products and some parts, such as batteries, are impossible or costly for consumers to replace. Batteries for some mobile devices can cost up to one-half the price of a new product, leading many consumers to abandon equipment that would otherwise remain fully functional. The use of software locks by nearly all wireless service providers on cell phones requires consumers to replace their phones when changing carriers, even phones that are technologically compatible with the new network. Consumers Union recommends changes in government policies and business practices to remove obstacles to equipment upgrades and repairs, to eliminate artificial drivers of product turnover, and to eliminate toxics and increase the use of recycled materials and components in new products.

At the end of the life cycle, efforts to keep this equipment out of landfills and the environment require consumers to return retired units for recycling and reuse. However, the success of these programs depends on their meeting consumer needs and expectations. More than

30 different national programs and hundreds of regional and local programs provide services that support reuse and recycling of discarded equipment. But these programs are highly fragmented, inconsistent, inconvenient and often costly for consumers.

Consumers Union's analysis of these programs outlines the factors that are critical to consumer participation. Among them are: cost and convenience of the collection program, and information and transparency about the fate of collected equipment and about the costs and fate of equipment that is discarded in the solid waste stream. Fate of equipment is a key consumer issue and one that currently lacks the type of transparency that is needed to gain the level of consumer confidence needed to support participation. Development of a national recycling system based on the principles of Extended Producer Responsibility, programs to certify the fate of equipment returned for recycling, and better information, tools and technical support for consumers are recommended to extend product life and increase the amount of equipment returned for reuse and recycling.

**APPENDIX A**  
**Recommendations for Future Research**

1. Assess the financial impact of the California and Maine computer recycling laws on the consumer, on product design and marketing patterns, and on amount of e-waste that's generated, reused or recycled.
2. Evaluate factors that would make replacing batteries easier and more affordable for consumers.
3. Survey consumers about their reasons for replacing electronic equipment and assess the extent to which they are willing or able to upgrade equipment. Identify information, training, and tools that consumers need to facilitate repairs and upgrades.
4. Identify barriers to developing a more robust market for used equipment, and evaluate the impact that product upgrades and used equipment markets could have in reducing electronic waste.
5. Analyze the amount of electronic waste stored in homes, the hidden costs of such storage, and consumer attitudes about the relative value of reuse and recycling versus storage.
6. Weigh the benefits of a deposit system for electronic products against the possible negative impact on low-income consumers.
7. Develop a detailed analysis of the impacts of changes in telecommunications provider platforms and in computer software on the functionality of existing equipment.