

e-gad!

Americans discard more than 100 million computers, cellphones and other electronic devices each year. As e-waste piles up, so does concern about this growing threat to the environment

BY ELIZABETH ROYTE

PHOTOGRAPHS BY CHRIS JORDAN

ELECTRONIC WASTE is accumulating faster than anyone knows what to do with it, almost three times faster than ordinary household trash. Researchers at Carnegie Mellon University estimate that at least 60 million PCs have already been buried in U.S. landfills, and according to the National Safety Council, nearly 250 million computers will become obsolete between 2004 and 2009, or 136,000 a day. Where will all these gizmos go, and what impact will they have when they get there?

Before I started studying garbage for my book *Garbage Land: On the Secret Trail of Trash*, I had no clue that the computer on my desk was such a riot of precious-but-pernicious materials. A cathode ray tube (CRT) monitor contains two to eight pounds of lead; e-waste, including CRT televisions, is one of the largest sources of this toxic heavy metal in municipal dumps. Printed circuit boards are dotted with antimony, silver, chromium, zinc, tin and copper. My computer, if crushed in a landfill, might leach metals into soil and water. Burned in a trash incinerator, it would emit noxious fumes, including dioxins and furans. Though scrubbers and screens would catch much of those emissions, scientists consider even minute quantities of them, once airborne, to be dangerous. Prolonged exposure to some of the metals in electronic devices has been shown to cause abnormal brain development in children, and nerve damage, endocrine disruption and organ damage in adults.

The processes that give birth to computers and other electronic devices are also cause for concern. A 2004 United Nations University study found that it takes about 1.8 tons of raw materials—including fossil fuels, water and metal ores—to manufacture a desktop PC and monitor. Mining,

the source of the semiprecious metals in electronics, is the nation's largest industrial polluter; 14 of the 15 largest Superfund sites, designated by the Environmental Protection Agency as containing hazardous waste that poses a threat to people or the environment, are metal mines.

And we are a nation that has environmental laws. To supply the demand for new copper, gold, silver and palladium—stuff that fuels our 'lectronic lifestyles—African and Asian nations are tearing up their lands. Some gorilla populations in the Democratic Republic of Congo have been cut nearly in half as the forest has been cleared to mine coltan, a metallic ore comprising niobium and tantalum that is a vital component in cellphones. (A couple of leading cellphone companies have said they are trying to avoid using coltan from Congo.) Americans discard about 100 million cellphones a year, and though entrepreneurs refurbish and sell many overseas, and many cellphones in the United States are donated to charities, tens of millions of cellphones nonetheless end up in the trash.

AN A COMPUTER BE RECYCLED? I had a chance to find out when my network router quit connecting me to the Ethernet. I relegated this mysterious black box, the size of a hardcover book, to my basement until a local recycling group organized an e-waste drop-off.

I arrived at the collection site, in Brooklyn, to find several folding tables shaded by white tents. They were laden with unwanted monitors, scanners, TVs, cellphones, keyboards, printers, mice and cables, many of which had absolutely nothing wrong with them beyond a bit of dust and, in the case of the computers, a processing speed that only yesterday seemed dazzling. Passersby pawed through the electronics casbah,

free to take what they wanted. Per Scholas, a nonprofit computer recycler that supplies schools and other nonprofits with hand-me-downs, was allowed the leftovers. But its representative could only look on stoically as the good stuff—which he could refurbish and sell—disappeared. The bad stuff, like my router, was headed his way. So was I.

After climbing through a dim stairwell in Per Scholas' rehabbed brick factory building in the South Bronx, I walked through a low defile of shrink-wrapped computer monitors stacked upon wooden pallets. Angel Feliciano, the company's vice president for recycling services, led me into a large open room, where technicians wiped computer hard drives clean. He told me that the reconditioned Pentium III-outfitted computers, collected from corporations and institutions that paid Per Scholas \$10 a machine to haul them away, would be resold, at low cost, to "technology-deprived families." According to Feliciano, Per Scholas' efforts keep some 200,000 tons of electronic waste from landfills and incinerators each year.

Feliciano then took me to see the darker side of the computer recycling revolution, where monitors were being smashed, one by one, to smithereens. The broken-down (or merely out-of-date) Dells, Apples and Gateways trundled up a conveyor belt and into a shredding machine. Hidden inside the machine's carapace, magnets, eddy currents and trommel screens separated the shards and spat them into yard-high cardboard boxes: ferrous metals here, nonferrous there, plastic on one side, glass on the other. Feliciano said the metals went to a local company that resold them to smelters for separation and reuse; the plastic went to a company that pelletized it for resale. Disposing of the glass, which contains lead, presented the biggest headache.

"Glass is a liability, not a commodity," Feliciano told me. "We save it up until we've got a truckload, then we pay \$650 a ton to a smelter who'll haul it away." Lately, the glass had been landing at the Doe Run Company, in south-central Missouri. The company recovers lead from glass through a process that begins with smelting and refining. One result is pure lead, made into 60-pound ingots, says Lou Magdits, Doe Run's raw-materials director. The company also salvages lead from car batteries, ammunition and wheel weights. And where does it all go? "Into car batteries, ammunition, wheel weights and new CRTs," says Magdits. (Doe Run operates a lead, copper and zinc plant in La Oroya, Peru. In 1999, that nation's Ministry of Health determined that 99 percent of the children in the area suffered from lead poisoning. The company, which bought the smelter from the Peruvian government in 1997, has entered into an agreement with the Health Ministry to reduce blood-lead levels in 2,000 of the most affected children and says that improved safety measures have decreased blood-lead levels in workers by 31 percent.)

Per Scholas seemed to be handling my e-waste responsibly. But 60 to 80 percent of e-waste collected for recycling is shipped overseas, mostly to China, India and Pakistan, according to the Silicon Valley Toxics Coalition (SVTC), an ad-

vocacy group. Perhaps half of those computers are cleaned up and resold. But the remainder are smashed up by laborers, many of whom scratch for precious metals in pools of toxic muck. Investigators from SVTC and the Basel Action Network—formed after the 1992 Basel Convention, an international treaty that limits trade in toxic waste, which the United States declines to sign—videotaped men, women and children in the Chinese village of Guiyu extracting copper yokes from monitors with chisels and hammers. Squatting on the ground, they liberated chips and tossed them into plastic buckets. Black smoke rose from burning piles of wire. The workers, who wore no protective gear, reportedly swirled a mixture of hydrochloric and nitric acid—caustic, highly poisonous chemicals—in open vats, trying to extract gold from components. Afterward, they dumped the computer carcasses and the black sludge into fields and streams. Tests on the soil and water showed levels of lead, chromium and barium that were hundreds of times higher than those allowed by U.S. and European environmental health standards. The accumulating chemicals have contributed to high rates of birth defects, infant mortality, blood diseases and severe respiratory problems, according to Chinese media.

Why is it so difficult to recycle computers properly? For starters, it is dangerous, labor-intensive and expensive, and markets for the materials aren't always large or reliable. The incentives are for new production and the disposal or export of old components. Some computer manufacturers reportedly lobby to make "gray market" refurbishing illegal in developing nations where they sell new models. At the state level, governments spend bond money on incinerators and landfills, but most recycling centers have to balance the books on their own. Federal mining subsidies further skew computer economics. "If we were paying what we should for virgin resources, e-waste recycling would be much more economical, and local governments perhaps could break even on e-waste recycling," says Eve Martinez, a recycling activist in New York City.

As public awareness of the hazards of e-waste has risen, some computer manufacturers have begun take-back programs in which consumers wipe their hard drives clean and return the units to manufacturers. But the cost and the inconvenience to consumers discourage widespread participation. Computer retailers aren't wild about the idea, either. When I asked staffers at one of the largest computer merchants in New York City about taking back my gently used notebook computer, they said they didn't do it, didn't know anything about it and had never before been asked about it.

Still, some states are forging ahead with e-waste reforms. Massachusetts bans televisions and computers from landfills. ElectroniCycle, a company based in Gardner, Massachusetts, processes the state's e-waste, recovering ten million pounds of components a year. Technicians refurbish 5 to 10 percent of the computers for resale; send another 5 to 10 percent to specialty repair houses; and smash the rest into 50 types of scrap, including plastic, copper, barium glass, and leaded and mixed glass. Reusable integrated circuits and memory cards

are gleaned, while circuit boards are sent elsewhere for recovery of gold, palladium, silver and copper. In California, which bans e-waste from landfills and also from being shipped overseas, retailers that sell hazardous electronic equipment are now required to pay the state an “advanced recovery fee” (collected from consumers) of between \$6 and \$10 per device to cover recycling. Almost half the states have active or pending e-waste take-back legislation. Maine recently passed a law that will require manufacturers of computer monitors, video display devices and televisions to finance a system for environmentally responsible recycling.

IN 2001, more than a dozen social justice and environmental groups formed the Computer TakeBack Campaign, which calls for manufacturers of anything with a circuit board to make “extended producer responsibility” (EPR) part of their credo. EPR would shift collection and recycling costs from taxpayers and government to companies, theoretically giving them an incentive to make computers and other gadgets that last longer, are made of reusable or recyclable materials, contain fewer toxics, and are shipped in less packaging. In Europe, EPR is gaining support. The European Union has adopted a directive requiring producers of electronics to recover and recycle e-waste. In Switzerland, the cost of recycling is built into the purchase price of new equipment; consumers return e-waste to retailers, who pass it on to licensed recyclers.

But in the United States, electronics recycling is in an awkward in-between stage, neither fully regulated nor completely understood by a tech-obsessed public that wants to do right by its e-waste. Still, there have been some recent improvements: spurred by U.S. advocacy groups and European nations that restrict the use of certain materials, computer manufacturers have reduced or eliminated some toxins in their products and made their computers easier to take apart. The Electronic Industries Alliance promotes recycling but opposes regulations that would make manufacturers alone bear the costs. The Consumer Electronics Retailers Coalition, which also promotes recycling, opposes systems, like that in California, in which retailers collect fees to cover recycling programs.

Speaking in 2002 at an industry trade show called Waste Expo, a Sony executive suggested dumping e-waste into open-pit hard-rock mines. One pit would hold 72 billion PCs—enough to make it worthwhile to mine the waste for copper, gold, iron, glass and plastics. Eyebrows were raised. Wouldn't deep pits of toxics-laced computers add insult to ecosystems that were already injured? Would miners extract

the valuable metals using cyanide and arsenic, then walk away from what remained? The idea, mercifully, sank. Visionaries imagine a day when electronic devices are shipped back to their makers, who design all components with safe reuse in mind. Until then, maybe shoving the stuff in the basement or attic isn't such a bad idea after all. ●

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