Your Desktop Could be a Time Bomb

Making computers — and disposing of them — exacts a harsh environmental cost

In Rhode Island's sooty industrial past, the state was awash in toxic chemicals and metals. Lethal effluent from textile and jewelry manufacture poured into streams, rivers, ponds, and ultimately, Narragansett Bay. The very ground from Woonsocket to Wickford was contaminated.

Although cleaner industries, like education, health-care, and financial services, now dominate the landscape, there's a hitch: the computers, cell phones, and other digital gadgets that we take for granted extract a fierce environmental toll, both in their production and their disposal.

Producing computers requires the mining, processing, and transporting of massive quantities of raw materials — almost two tons of such stuff is required to produce the average desktop PC and monitor, according to a 2004 United Nations' study. The fabrication just of a single two-gram microchip causes more than 50 pounds of waste, some of it toxic.

On the consumer end, disposing of electronic waste is an immense problem. Every year, 100 million computers, monitors, and TVs become obsolete in the US, and this number is growing. Although a lot of this gear winds up in landfills (the US Environmental Protection Agency calls e-waste the leading contributor of lead to municipal waste), most of it is sent to Asia and Africa, effectively transferring the problem to poorer countries.

There's just a small amount of harmful material — like lead — in each discarded computer, and because the e-waste problem is relatively new, there's little evidence specifically linking computer waste, with, for example, kidney damage, mental retardation, or other conditions associated with lead poisoning. Yet environmentalists like Sheila Dormody, head of the Rhode Island office of Clean Water Action, still worry, both about the sheer volume of discarded electronics, as well as the long-term threat that they could pose.

Such concerns are on target. Lead and mercury don't just go away, after all. They accumulate, and can enter the food stream through the ground and the water, creating a chain of toxicity, and a difficult and costly, if not impossible, cleanup.

And besides lead, other marchers in Rhode Island's parade of electronic toxins include thousands of pounds of mercury (which can cause brain and kidney damage, particularly in babies and children); chromium (which can cause asthmatic bronchitis and damage the DNA); and cadmium (which can cause kidney damage and harm bones). Hundreds of thousands of pounds of brominated flame retardants, which are used in computers and in TVs — and which have been linked to fetal damage — have also wound up in Rhode Island's trash.

A Rhode Island law passed in June bans electronic waste from landfills, and mandates that it be recycled or classified as hazardous. While a step in the right direction, the legislation doesn't take effect until 2008. More problematically, it doesn't provide a mechanism to accomplish its goals or specify who will ultimately foot the bill.

Since manufacturers have resisted national legislation, individual states have been left to contend with the growing problem of e-waste. As it stands, only four — California, Maine, Maryland, and Washington — have passed legislation specifying how computer recycling should be accomplished, although more than two-dozen have bills at some stage of development.

Shipping the problem abroad

As consumers, we see computers in their productive prime, as suppliers of information and entertainment. We are not present for their bleak interments, or their difficult births. Despite the vast resources required for their manufacture, computers are closer to razor blades than refrigerators in their life expectancy.

The average computer's working life is three to five years. Cell phones are even worse, lasting only 18 months before being discarded. Televisions fare best, averaging 15 years. The advent of digital TV, however, is expected to produce a tsunami of trashed analog models over the next few years.

In the PC market, the combination of quickly changing technology, low prices for standard desktops, and a lack of standardization among manufacturers leads to brisk turnover. Few computer users upgrade; in many cases, it's not even possible, and most junk the CPU along with its monitor, printer, scanner, speakers, and other peripherals in favor of a new package. When its time is up, the computer rarely goes to a better place. Nationally, only 10 percent of e-waste is recycled, and a meager two percent is reused. Countless other machines, dating back to the advent of the Apple II in the late '70s, are piled up in warehouses, attics, and basements.

Most domestically dumped computers, however, are sent abroad. In *High Tech Trash: Digital Devices, Hidden Toxics and Human Health* (Island Press, 2006) environmental writer Elizabeth Grossman posits that 80 percent of US electronic waste is shipped overseas, primarily to Asia, but also to Africa. The consequences rival the worst horrors of the Industrial Revolution.

The Basel Action Network, a Seattle-based advocacy group, has filmed documentary footage in the Chinese towns of Taizhou and Guiyu, centers of primitive computer recycling. Convoys of trucks arrive, day and night, loaded with computers and other electronics, which they dump into small mountains on the ground. Workers in backyard workshops bash apart CPUs and monitors with hammers, and then attack them with pliers. Metals are immersed in vats of acid, and circuit boards melted down over open flames. The air is thick with toxins, and there is no safety gear or provisions for dealing with the waste. The carcasses of junked machines line rivers, and toxic metals leach into the water supply.

In Guiyu, the subject of the 2002 film *Exporting Harm*, ID tags bearing the names of US school districts, government agencies, banks, and hospitals are visible. What had previously been farmland is now effectively a toxic waste dump. Although people no longer drink the water, it is still used for washing, because of the cost of bottled water. Moreover, fish from polluted rivers are still eaten, and children swim and play in toxic rivers and streams. The e-waste processing industry in such areas has been going strong for a decade, and respiratory, gastric, and skin problems are common. The long-term effects are even grimmer.

The Basel Convention, an international agreement on the disposal of hazardous wastes, is designed to prevent such abuses. The US, however, has not ratified this accord, and it has no explicit prohibitions on the export of dangerous materials. "Oversight of exported used electronics is limited," concluded a US Government Accountability Office report on e-waste. But the US is not alone in exporting its tech junk — there are billions of electronic items worldwide, and e-waste from Europe, Japan, and other wealthy places routinely winds up in poorer countries.

Tiny bites at the landfill

In Rhode Island, a likely first stop for an obsolete computer is the Rhode Island Resource Recovery Corporation (RIRRC) landfill in Johnston. In a best-case scenario, the machine is brought to one of the RIRRC's monthly electronics collections. John Trevor, who manages the program, says the e-waste collections, which are advertised in newspapers and on radio, are increasingly popular — 500,000 pounds were collected in fiscal 2006, nearly double the 2005 amount. (For details on collections, visit www.rirrc.org.).

On a recent Saturday morning, a steady stream of cars loaded with digital junk passes through the landfill gates, headed to the e-waste drop-off. Volunteer Cheryl Long of Smithfield asks drivers what they've got, and has them pop the trunk. Long and an employee of CRT Recycling of Brockton, Massachusetts, then remove the items, passing them to two CRT workers who stand in a 24-foot truck, steadily stacking printers, fax machines, CPUs, and monitors. The collection is far from a moneymaker; the RIRRC pays CRT ten cents a pound to take the stuff away.

Not surprisingly, those dropping off materials at the landfill tend to be environmentally aware. "I've got grandkids," says Betty Gemma of Charleston, who leaves a monitor, "I worry about all that kind of toxic stuff." Joe Campagna of Cumberland brings a TV (paying $5 for the privilege), as well as a stereo, a laptop, and a cell phone. Campagna became attuned to the e-waste problem when he was a college exchange student in Germany 10 years ago, and worked on an electronic waste project. "They have a law there," he recalls, "that you have to recycle electronic scrap."

As commendable as this program is, it reaches only a small fraction of motivated and well-informed Rhode Islanders. Many people simply put their old televisions and computers out at the curb on trash pick-up day.

While municipalities have varying policies on taking such stuff, countless computers, TVs, monitors, and other equipment nonetheless wind up in the landfill's bulging heaps. As Trevor says, "Once the stuff ends up in the waste stream, there's no after-sorting." Of particular concern are monitors and televisions whose screens break en-route, causing some of the otherwise encapsulated lead to escape. Given the health dangers posed when it enters the air, ground, and water, Clean Water Action's Dormody views this as a serious problem. "Our municipal waste facility," she says, "is not designed to be a toxic landfill."

Bleak as this picture is, computer recycling could increase sharply in the next few years. Rhode Island's 2006 law, which takes effect July 1, 2008, prohibits e-waste from going into the landfill, and mandates the separation of electronics from other waste.

The law does not, however, fund these activities, or specify how to accomplish these goals. Despite ample study of computer recycling, the bugaboo invariably remains deciding who is going to foot the bill. In the absence of legislation specifying otherwise, the state, municipalities, and Rhode Island Resource Recovery will be on the hook for paying the cost — pegged at $42 million by Clean Water Action — of collecting and properly recycling 95 percent of Rhode Island's e-waste through 2011.

As it stands, the state Department of Environmental Management will study the issues of disposal and recycling, and determine how the law's goals can best be met. State Representative Art Handy (D-Cranston), one of the sponsors of the e-waste law, says the lack of specification about who will pay "was a compromise to be able to start moving the ball forward."
Ideally, says Handy, computer producers would take the machines back. "Or, we would work out some kind of system where they would pay for them to be recycled or reused."

How about recycling?

Computer recycling is not easy. A computer, unlike a Coke can, can't be crushed, baled and converted back into more aluminum soda cans. There are also very few companies that do the really dirty work of e-waste recycling — smelting lead glass, and extracting metals from shredded circuits boards. Still, although the margins are tight, recyclers can potentially make money on both ends: taking away electronic refuse, and then selling refurbished machines, as well as materials mined from recycled ones.

"What we do is cutting-edge, but it's not clean — it's garbage, technology garbage," says Thomas Hartford, the president and CEO of five-year-old Green-Tech Assets, which occupies 27,000-square-feet of mill space a few hundred yards from Cumberland Town Hall. The company's warehouse is filled not just with computers and monitors, but also cash registers, copiers, fax machines, medical equipment, and telephones. Some of the items can be resold as is, but most will be disassembled and the components sent elsewhere. Viable hard drives are removed from CPUs, erased, and sold. Non-working hard drives are degaussed (essentially microwaved so as to be made unreadable) and then shipped to a processor.

Some items definitely have value, but others, principally televisions, actually cost money to get rid of. The key to making a profit is finding the right buyer and negotiating a good price. Low-grade circuit boards go for 15 cents a pound, while high-grade ones are worth 50. Plastic, of the kind that constitutes computers, printers, and fax machines, is worth 20 cents a pound when baled and sorted.

Green-Tech contracts with companies, including Stop & Shop and Ritz Camera, that wish to get rid of old electronics. The company offers its clients liability protection, both from the theft of data left on old computers, and from claims should the machines themselves wind up somewhere they shouldn't.

Green-Tech performs the initial phase of recycling — collecting, disassembling, sorting, and remarketing materials. It does not smelt glass, nor does it extract precious metals. It sends monitors, circuit boards, and other items to brokers and processors in New Jersey and upstate New York.

Volume is essential to recycling, although recyclers usually need not look far for a supply of junked electronics. This year, Green Tech will process 14 million pounds of e-waste; Hartford says he hopes to do 20 million in 2007. The bigger players in the business, like East Providence's Noranda, a subsidiary of a Canadian mining giant, handle more than 100 million pounds annually.

The electronics-recycling industry remains in an early phase, but it can be expected to become more efficient as it matures, perhaps with the help of new laws like the one in Rhode Island.

The soul of a new machine

Despite the lack of national e-waste legislation, computer manufacturers are beginning to come up with their own solutions. The combination of more stringent European regulations, pressure from environmental groups, and the state laws in place in California, Maine, Washington and Maryland are pushing computer producers to find solutions before solutions are imposed on them.

Hewlett-Packard has historically been the most active in supporting e-waste legislation, and operates its own recycling facilities in California and Tennessee. Dell and Apple recently unveiled programs in which old machines can be returned to them. (Dell, Hewlett, and Apple have programs in this area, although they don't always make it easy or cheap for the consumer to dispose of a computer.)

Ultimately, legislation encouraging the design of longer lasting and less toxic machines seems vital. Not surprisingly, environmental advocates favor laws that put the onus on computer manufacturers to handle e-waste, since there is otherwise little incentive for them to build computers differently.

James Burgett, head of the Alameda County Computer Resource Center, a Berkeley, California-based nonprofit devoted to computer reuse and recycling, decries the prevailing "design to grind" mentality. He says the computer industry, as well as California's recycling law, actively discourage computer reuse, instead encouraging the destruction of barely obsolete machines and the production of new ones.

Burgett advocates a system that would encourage producers, through taxation, to design upgradeable computers. Those making PCs with an easily upgradeable common standard would pay the least, while makers of machines that can only be discarded after a few years would pay the most. Such a system, Burgett contends, would be environmentally friendly, promote innovation, and stimulate employment in the computer industry. It would also make it easy to put revitalized computers in the hands of those who need them.

Such a system would be very contrary to the norm in a culture built on built-in obsolescence. Then again, there's something inherently elegant about the idea of extending the lives of computers, rather than just throwing them away.

As the UN-sponsored volume *Computers and the Environment* put it, "The simplest and most effective way to reduce environmental burden may be to ensure that users need fewer PCs in the first place."

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