

## Safe Recycling of E-Waste Is a Priority

by Eric Williams

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Finally, it has arrived: your new desktop computer with a 3Ghz processor and a screaming-fast video card that will realistically render the digital sweat on virtual enemies in your favorite video game.

Now, what happens with your old computer?

Most likely, it will end up with other electronics products, heaped in landfills or exported to another country for recycling. Either option raises concerns about the environmental impact of such electronic waste.

One issue is the possible health risk posed by toxic substances contained in computers and other electronics. For instance, solder in circuit boards and glass in cathode-ray tubes contain lead, a well-known neurotoxin.

Are toxic substances in electronics really a health threat? Many environmental organizations believe so. Greenpeace published a report *Missed Call: Iphone's Hazardous Chemicals*, claiming that the Iphone is a toxic and environmentally irresponsible product.

The Greenpeace argument runs like this: "Substance A is toxic" and "Product B contains substance A" thus "B is a toxic product." This argument is appealing in its simplicity.

But apply the same logic to other products and virtually everything around us is toxic (including peanut butter, which contains the carcinogen aflatoxin).

Understanding the real toxic risk of a product is more complex, including characterizing how toxic substances move in the environment and end up inside us.

For some substances, such as lead, leakage out of landfills in the U.S. seems unlikely. For many other substances, the potential risk is unclear, nor is it clear which products are leading to exposure.

There is a much more obvious environmental problem: Old computers and other electronics are often exported to developing countries, where they are reused or processed to recover parts and valuable materials such as copper and gold. That recycling is often done by a "backyard" industry using primitive methods that damage the environment.

For example, to extract copper from electronics, wires are pulled, piled up and burned in the open to remove the plastic casings. This burning generates toxic emissions, including dioxins that are potent carcinogens.

Here we face a recurring dilemma with managing environmental issues in a globalized economy: People in rich countries can purchase goods and services cheaply in part because they are produced at great environmental and/or social cost to other countries.

So is that just somebody else's problem? Not if you want a bona fide sustainable solution to dealing with e-waste, because a sustainable solution must be global solution. So what is truly a "green" and sustainable computer?

Some argue that a green computer is one with no toxic materials. This is not the whole story, partly because improper recycling generates toxic substances in addition to any originally contained in the computer.

Others argue for a blanket ban on exports. This misses important sustainability issues. A

sustainable product system should address how to best meet environmental, economic and social objectives.

Many of the computers people are using in the developing world are purchased used. Used markets provide inexpensive access to information technology, which is important for economic development and education in developing countries. The reuse and recycling industry also provides jobs both abroad and domestically.

So are there ways to improve health and safety in recycling, enabling reuse of old electronics and providing jobs while ensuring environmental safety?

Several engineering colleagues at ASU are working with me to look for answers. One thing we know: Sustainable solutions – ones that protect the environment, promote economic development, and provide social benefits – are the first priority.

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