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# THE STORY OF ELECTRONICS: Annotated Script

# THE STORY OF STUFF PROJECT

By Annie Leonard

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The other day, I couldn't find my computer charger. My computer is my lifeline to my work, my friends, my music.

So I looked everywhere, even in that drawer where this lives. I know you have one too, a tangle of old chargers, the sad remains of electronics past.



How did I end up with so many of these things? It's not like I'm always after the latest gadget. My old devices broke or became so obsolete I couldn't use them anymore. And not one of these old chargers fits my computer. Augh. This isn't just bad luck. It's bad design.<sup>1</sup> I call it "designed for the dump."

"Designed for the dump" sounds crazy, right? But when you're trying to sell lots of stuff, it makes perfect sense. It's a key strategy of the companies that make our electronics.<sup>2</sup> In fact it's a key part of our whole unsustainable materials economy.

Designed for the dump means making stuff to be thrown away quickly. Today's electronics are hard to upgrade, easy to break, and impractical to repair. My DVD player broke and I took it to a shop to get fixed. The repair guy wanted \$50 just to look at it! A new one at Target costs \$39.<sup>3</sup>

In the 1960s, Gordon Moore, the giant brain and semiconductor pioneer, predicted that electronics

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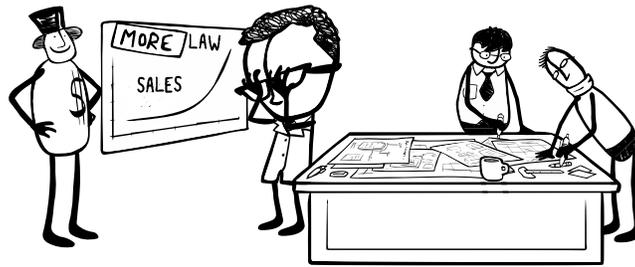
1. It may seem crazy, but many of these products are actually designed to break after a certain amount of time. This concept is known as "planned obsolescence" or "designed for the dump". Planned obsolescence is designing and producing products with limited lifespans – so that they stop functioning or become undesirable within a specific time period. And it isn't just electronics, products may be designed for obsolescence either through function, like a paper coffee cup or a machine with breakable parts, or through "desirability," like a piece of clothing made for this year's fashion and then replaced by something totally different next year.
2. For many years, designers and consumers have advocated for electronic products that are truly modular, so that consumers can simply swap one "obsolete" part for a newer part without having to discard an entire product. While there has been some progress in this regard, such as hard drives and disk drives that are easier to replace, electronics companies have been wary of the "modular model" since they prefer to sell new, whole units. Likewise, many have advocated for a "thin client" model of information delivery,

- where consumers access data on the Internet – or "the cloud" – using quite simple hardware and software, but again, the large computer companies often see this model as a threat to their commodity sales. For more information, see <http://www.geek.com/articles/chips/fully-modular-computers-20040312/> and <http://www.computerweekly.com/Articles/2008/09/01/232086/Thin-client-computing-smartens-up.htm>
3. And it's not just DVD players—it's this way with all sorts of electronic gadgets. Think about that printer cartridge replacement that costs more than a new printer, the iPod battery that you can't replace, the cell phone charger that snaps. The list of electronics that are prohibitively expensive to upgrade or just plain impossible to repair goes on and on.
  4. Moore's Law is named after Intel co-founder Gordon Moore. In 1965, he stated that the number of transistors that can be placed on a computer chip will double every year. This translates into increases in processor speed, more memory, and other performance

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designers could double processor speed every 18 months. So far he's been right. This is called Moore's Law.<sup>4</sup> But somehow the bosses of these genius designers got it all twisted up. They seem to think Moore's Law means every 18 months we have to throw out our old electronics and buy more.



Problem is, the 18 months that we use these things are just a blip in their entire lifecycle. And that's where these dump designers aren't just causing a pain in our wallets. They're creating a global toxic emergency!

See, electronics start where most stuff starts, in mines<sup>5</sup> and factories. Many of our gadgets are made from more than 1,000 different materials, shipped from around the world to assembly plants.<sup>6</sup>

There, workers turn them into products, using loads of toxic chemicals, like PVC, mercury, solvents and flame retardants.<sup>7</sup>

Today this usually happens in far off places that are hard to monitor.<sup>8</sup> But it used to happen near my home, in Silicon Valley, which thanks to the electronics industry is one of the most poisoned communities in the U.S.<sup>9</sup>

IBM's own data revealed that its workers making computer chips had 40% more miscarriages and were significantly more likely to die from blood, brain and kidney cancer.<sup>10</sup> The same thing is starting to

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improvements. In 1975, Moore revised it to doubling every 2 years. Over time, the concept was shortened from 2 years to 18 months by others at Intel. This trend has continued for over 40 years. To learn more check out: [ftp://download.intel.com/museum/Moores\\_Law/Video-transcripts/Excepts\\_A\\_Conversation\\_with\\_Gordon\\_Moore.pdf](ftp://download.intel.com/museum/Moores_Law/Video-transcripts/Excepts_A_Conversation_with_Gordon_Moore.pdf)

5. Most of our electronics contain precious metals and minerals, some of which are referred to as "conflict minerals". A particularly egregious example is coltan—or columbite-tantalite—a metallic ore that gets refined into tantalum, as well as tin, tungsten, and gold, all used in consumer electronics such as cell phones, DVD players, computers, and games consoles. The extraction and export of these four minerals from Africa have helped fuel environmental and social disruption, brutal violence and war in the Congo. See: [http://www.nytimes.com/2010/06/27/opinion/27kristof.html?\\_r=2](http://www.nytimes.com/2010/06/27/opinion/27kristof.html?_r=2) and [http://www.youtube.com/enoughproject#p/a/u/0/5Ycjh\\_jMObQ](http://www.youtube.com/enoughproject#p/a/u/0/5Ycjh_jMObQ)
6. Over 1,000 materials, including solvents, brominated flame retardants, PVC, heavy metals, plastics and gases, are used to make electronic products and their components—semiconductor chips, circuit boards, and disk drives. A clunky CRT monitor can contain between four and eight pounds of lead alone (see Footnote 15). Big screen CRT TVs contain even more than that. Flat panel TVs and monitors contain less lead, but use lamps with mercury, which is very toxic in very small quantities. An EPA commissioned study noted that "approximately 70 percent of the heavy metals in municipal solid waste landfills are estimated to come from electronics discards. Heavy metals such as lead and mercury are highly toxic substances

that can cause well documented adverse health effects, particularly to children and developing fetuses." <http://www.epa.gov/oig/reports/2004/20040901-2004-P-00028.pdf>

These toxicants are released during the production, use, and disposal of electronic products, with the greatest impact at end-of-life, particularly when they are exported to developing nations. Harmful chemicals released from incinerators and leached from landfills can contaminate air and groundwater. The burning of plastics at the waste stage releases dioxins and furans, known developmental and reproductive toxins that persist in the environment and concentrate up the food-chain. Some of the worst end-of-life toxic impacts occur when e-waste is exported to developing nations, where crude, unsafe "processing" methods result in significant exposures. The plastics are burned in uncontrolled outdoor waste piles, emitting dioxin into residential areas; circuit boards are "cooked" to melt the lead solder, emitting toxic lead fumes; and acids are used to extract precious metals. <http://www.ban.org/E-Waste/technotrashfinalcomp.pdf>

During the use phase, electronics can off-gas brominated flame retardants (BFRs), a group of toxic chemicals added to plastic casings. To read specifically on BFRs, see Footnote 14.

The production phase of electronics is the most chemically intensive, particularly in the manufacture of semiconductors and other components, which use very toxic solvents such as methylene

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happen all around the world.<sup>11</sup> Turns out the high tech industry isn't as clean as its image.

So, after its toxic trip around the globe, the gadget lands in my hands. I love it for a year or so and then it starts drifting further from its place of honor on my desk or in my pocket. Maybe it spends a little time in my garage before being tossed out.<sup>12</sup>

And that brings us to disposal, which we think of as the end of its life. But really it's just moved on to become part of the mountains of e-waste we make every year.<sup>13</sup>

Remember how these devices were packed with toxic chemicals? Well there's a simple rule of production: toxics in, toxics out. Computers, cell phones, TVs, all this stuff, is just waiting to release all their toxics when we throw them away. Some of them are slowly releasing this stuff even while we're using them.<sup>14</sup> You know those fat, old TVs that people are chucking for high-def flat screens? They each have about 5 pounds of lead in them.<sup>15</sup> Lead! As in lead poisoning!<sup>16</sup>

So almost all this e-waste either goes from my garage to a landfill or it gets shipped overseas to the garage workshop of some guy in Guiyu, China whose job it is to recycle it.<sup>17</sup>

I've visited a bunch of these so-called recycling operations. Workers, without protective gear, sit on the ground, smashing open electronics to recover the valuable metals inside and chucking or burning the parts no one will pay them for. So while I'm on to my next gadget, my last gadget is off poisoning families

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chloride, toluene, glycol ethers, xylene and trichloroethylene (TCE), which have been linked to elevated rates of cancers, including blood cancers, brain cancers, reproductive problems and birth defects among electronics workers and their offspring. <http://www.ehjournal.net/content/5/1/30>

7. See Footnote 6 and [http://www.electronicstakeback.com/problem/toxics\\_problem.htm](http://www.electronicstakeback.com/problem/toxics_problem.htm)
8. Most electronics are manufactured in Asia, not by the companies whose brand names you know and go on the products, but by many contract manufacturing firms, sometimes called Electronics Manufacturing Services. Some of the largest of these include Foxconn, Flextronics, Quanta, Sanmina-SCI, Solectron, Celestica, and Jabil Circuit. There are also thousands of component manufacturers that make the individual components that get assembled into the final products. It's practically impossible for any brand name company to provide any significant oversight of the workplace or environmental conditions in this complex supply chain. Many companies in the electronics industry support a voluntary code of conduct for workplace and environmental conditions, created by a group called the Electronics Industry Citizenship Coalition, or [EICC](#). But working conditions at contract giant Foxconn's plant in Shenzhen, China, are so bad that 13 employees committed suicide in 2010 alone; mostly by jumping from the windows of the plant or dormitories. The company's response was to install "anti-suicide nets" around the plant.

<http://www.dailytech.com/Report+Only+Escape+From+Hellish+Apple+iPhone+Factory+Was+Suicide/article18428.htm>  
[http://www.law.stanford.edu/publications/stanford\\_lawyer/issues/79/pdfs/sl79\\_kinks.pdf](http://www.law.stanford.edu/publications/stanford_lawyer/issues/79/pdfs/sl79_kinks.pdf)  
[http://ehstoday.com/mag/ehs\\_imp\\_70124/](http://ehstoday.com/mag/ehs_imp_70124/)

<http://www.nytimes.com/2010/06/07/business/global/07suicide.html>  
<http://www.todayonline.com/World/EDC101013-0000091/New-allegations-against-Foxconn>

9. When the semiconductor industry emerged in the 1970's in Silicon Valley, it was touted as a new, clean industry. But over time, it came to light that these companies were using very toxic chemicals, like the solvent TCE, to produce computer chips. These chemicals were sometimes dumped, or leaked out of underground storage tanks, into the groundwater. The polluted water led to exposure of the surrounding communities and resulted in miscarriages and birth defects. Now, most of these companies have moved their production offshore to developing nations, leaving behind polluted "Superfund" sites that will cost millions to clean up. Silicon Valley is home to 29 toxic EPA "Superfund" sites – the highest concentration in the country. The Silicon Valley Toxics Coalition (SVTC) has a map of the sites at [http://www.svtc.org/site/PageServer?pagename=svtc\\_silicon\\_valley\\_toxic\\_tour](http://www.svtc.org/site/PageServer?pagename=svtc_silicon_valley_toxic_tour).
10. For decades IBM kept its own Corporate Mortality File (CMF), a concealed database tracking cause of death of all its employees. IBM workers were unaware of the CMF or what was in it until a lawsuit by IBM workers led to its release in 2000. Dr. Richard Clapp, from the Boston University School of Public Health, analyzed the data, and concluded that IBM workers involved in manufacturing (where they were exposed to solvents and other chemicals) have an increased risk of dying of cancer, especially cancers of the brain, blood, and kidneys.

Over 300 IBM workers in the US, who were exposed to toxic chemicals at work, sued IBM and its chemical suppliers alleging their chemical exposures caused cancers, birth defects in offspring, and other chronic diseases. All but two of these claims were settled prior

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in Guiyu or India or Nigeria.

Each year we make 25 million tonnes of e-waste which gets dumped, burned or recycled.<sup>18</sup> And that recycling is anything but green. So are the geniuses who design these electronics actually... evil geniuses? I don't think so, because the problems they're creating are well hidden even from them.

You see, the companies they work for keep these human and environmental costs out of sight and off their accounting books. It's all about externalizing the true costs of production.<sup>19</sup> Instead of companies paying to make their facilities safe the workers pay with their health. Instead of them paying to redesign using less toxics villagers pay by losing their clean drinking water. Externalizing costs allows companies to keep designing for the dump – they get the profits and everyone else pays.



When we go along with it, it's like we're looking at this toxic mess and saying to companies "you made it, but we'll deal with it." I've got a better idea. How about "you made it, you deal with it"? Doesn't that make more sense?

Imagine that instead of all this toxic e-waste piling up in our garages and the streets of Guiyu, we sent it to the garages of the CEOs who made it. You can bet that they'd be on the phone to their designers demanding they stop designing for the dump.

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to trial under confidentiality orders that were insisted upon by IBM and the chemical companies.

Two claims went to trial by IBM workers sick with cancer. Despite the fact that the trial was about fraudulent concealment claims, the judge did not allow the jury to hear any mention of IBM's Corporate Mortality File, let alone Dr. Clapp's analysis of its contents. The trial ended with no finding at all on the cause of the two workers' cancers. To read Dr. Clapp's report see: "Mortality among US employees of a large computer manufacturing company: 1969–2001", Dr. Richard Clapp, 19 Oct 2006, <http://www.ehjournal.net/content/5/1/30>

Also see: [http://www.nyupress.org/product\\_info.php?products\\_id=3002](http://www.nyupress.org/product_info.php?products_id=3002) and <http://www.salon.com/technology/feature/2001/07/30/almaden1>

11. Attending a recent meeting on occupational health and safety issues in Asia, science writer Elizabeth Grossman described the following scene:

*Women from China who have worked at a plant assembling cell phones -- producing as many as 300 to 400 an hour -- report that miscarriages and menstrual problems are common among their*

*colleagues. We hear the same from Indonesian and Korean women. Similar stories come from the Philippines. Men who work in factories assembling automotive electronics and DVD players report co-workers who have died of cancer - lung cancer and brain tumors. Two young Indonesian women who work in electronics factories ask me if chemicals related to their work or perhaps to the "instant food" they all eat may have caused their co-workers' breast cancers. Occupational health advocates working on behalf of Samsung workers in Korea have now documented 96 cases of cancer -- about a third of these fatal -- among employees of the company's semiconductor plants. Many of these are young people.*

To read the full article see [http://scienceblogs.com/thepumhandle/2010/08/apha\\_ohs\\_section\\_awards\\_honor.php](http://scienceblogs.com/thepumhandle/2010/08/apha_ohs_section_awards_honor.php)

12. Consumers typically use cell phones for an average of 18 months before disposing of them, a much shorter period than the lifecycle of older phones. See <http://www.enviroliteracy.org/article.php/1119.html>

And the situation isn't much different with computers. According to the EPA, laptops are used for only 2 to 3 years by the initial purchasers. See page 22 of <http://www.epa.gov/wastes/conserve/materials/recycling/docs/app-2.pdf>

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Making companies deal with their e-waste is called Extended Producer Responsibility or Product Takeback.<sup>20</sup> If all these old gadgets were their problem, it would be cheaper for them to just design longer lasting, less toxic, and more recyclable products in the first place. They could even make them modular, so that when one part broke, they could just send us a new piece, instead of taking back the whole broken mess.<sup>21</sup>

Already takeback laws are popping up all over Europe and Asia.<sup>22</sup> In the U.S. many cities and states are passing similar laws – these need to be protected and strengthened.<sup>23</sup>

It's time to get these brainiacs working on our side. With takeback laws and citizen action to demand greener products, we are starting a race to the top, where designers compete to make long-lasting, toxic-free products. So, let's have a green Moore's law. How about: the use of toxic chemicals will be cut in half every 18 months? The number of workers poisoned will decline at an even faster rate?

We need to give these designers a challenge they can rise to and do what they do best – innovate. Already, some of them are realizing they're too smart to be dump designers and are figuring out how to make computers without PVC or toxic flame retardants.<sup>24</sup> Good job guys.

But we can do even more.

When we take our e-waste to recyclers, we can make sure they don't export it to developing countries.<sup>25</sup> And when we do need to buy new gadgets, we can choose greener products.<sup>26</sup>

But the truth is: we are never going to just shop our way out of this problem because the choices available to us at the store are limited by choices of designers and policymakers outside of the store. That's why we

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13. In the US alone, we chuck over 400 million electronic gadgets in a single year and that number is continuing to grow. See [http://www.electronicstakeback.com/problem/problem\\_index2.htm](http://www.electronicstakeback.com/problem/problem_index2.htm)
14. Brominated flame retardants (BFRs) are in a considerable percentage of electronics. A 2005 report released by Health Care Without Harm called Brominated Flame Retardants: Rising Levels of Concern, has this to say:

*Whereas flame resistant products save lives and prevent property damage, there are increasing concerns about the environmental and health effects of flame retardants such as BFRs. Overall, the available literature on BFR toxicology is incomplete. Based on the available data, however, we know that BFRs are associated with several health effects in animal studies, including neurobehavioral toxicity, thyroid hormone disruption, and possibly cancer. Additionally, there are data gaps but some evidence that BFRs can cause developmental effects, endocrine disruption, immunotoxicity, reproductive, and long-term effects, including second-generation effects.* [http://www.noharm.org/lib/downloads/bfrs/BFRs\\_Rising\\_Concern.pdf](http://www.noharm.org/lib/downloads/bfrs/BFRs_Rising_Concern.pdf)

We are exposed to BFRs in many ways. We ingest it via meat and dairy products, where it's been absorbed into the food chain and is found widely in the environment and animal tissues. Also, many

studies have found BFRs in samples of household dust and indoor air, suggesting that some of the BFRs found in our bodies comes from inhaling it in dust. Because BFRs are used in multiple products, such as electronics, furniture and textiles, some studies have not attributed each product's contribution to the totals found.

- One dust study in Indonesia found that BFR levels were higher in living rooms with computers than in living rooms without computers: <http://www.terrapub.co.jp/onlineproceedings/ec/02/pdf/ERA15.pdf>
- Another study was able to associate the high levels of one type of BFR (deca-BDE) in dust collected in certain homes with the same BFR found in televisions in those homes: <http://pubs.acs.org/doi/abs/10.1021/es702964a>
- And in the lab, electronics have been determined to emit flame retardants, with emissions increasing as much as 500 times as the temperature increased: <http://bit.ly/cZHSIG>

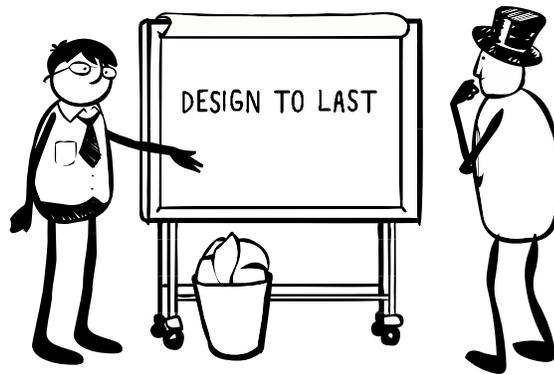
To read more about BFRs in dust see the following papers by EWG and SVTC: <http://www.ewg.org/reports/inthedust> and [http://www.svtc.org/site/PageServer?pagename=svtc\\_bfrs\\_in\\_electronics](http://www.svtc.org/site/PageServer?pagename=svtc_bfrs_in_electronics)

15. Old style TVs and computers contain a large glass Cathode Ray Tube (CRT). The glass contains lead, both to shield against radiation

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need to join with others to demand stronger laws on toxic chemicals and on banning e-waste exports.<sup>27</sup>

There are billions of people out there who want access to the incredible web of information and entertainment electronics offer. But it's the access they want, not all that toxic garbage. So let's get our brains working on sending that old design for the dump mentality to the dump where it belongs and instead building an electronics industry and a global society that's designed to last.



- and to improve the optical quality of the picture, and it does a lot of other nasty things too (see Footnote 16). Also, it's not just old TVs and computers, lead is present in solder used in many electronic products. To learn more check out: <http://computer.howstuffworks.com/question678.htm>
16. Lead exposure can cause many health effects, particularly damage to the nervous system. Kids are especially vulnerable to lead exposures, which can cause brain damage and death at high levels. Studies link lead exposure in children to lower IQs, higher incidents of ADHD, hearing and balance problems. [http://www.atsdr.cdc.gov/csem/lead/pbphysiologic\\_effects2.html](http://www.atsdr.cdc.gov/csem/lead/pbphysiologic_effects2.html)
  17. E-waste is growing two to three times faster than other types of municipal waste. While most e-waste in the US still goes into the trash, the amount going to recyclers is increasing. However, 50 to 80 per cent of the e-waste that is collected by recyclers is shipped overseas to developing countries in Asia and Africa where our outdated electronics are creating a global toxic emergency. Once exported, e-waste is typically smashed and burned in backyard operations with little to no health and safety precautions. The burning and dismantling of toxic electronic products under these conditions has led to widespread air and water pollution from toxic metals, dioxins, and other serious health hazards. Scientists have documented high levels of these pollutants in the local environments, and they have also found them in test samples from children and other residents of these communities. For example, health researchers showed that children living in Guiyu had significantly higher blood lead levels than those living in another community that was not polluted from e-waste. <http://www.ban.org/E-Waste/technotrashfinalcomp.pdf>  
<http://www.ban.org/Library/TheDigitalDump.pdf>  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1913570>  
<http://www.mitpressjournals.org/doi/abs/10.1162/glep.2004.4.4.76>  
<http://www.gao.gov/new.items/d081044.pdf>  
<http://ngm.nationalgeographic.com/geopedia/E-Waste>  
<http://www.svtc.org/site/PageServer?pagename=citizensatrisk>
  18. 25 million metric tonnes per year or, in US measurement, roughly 27 tons. <http://www.greenpeace.org/international/Global/international/planet-2/report/2010/2/toxic-transformers-briefing.pdf>
  19. Externalized costs, also known as "hidden costs," are any kind of loss or damage such as illness, environmental degradation, or economic disruption caused by industries engaged in natural resource extraction, production, distribution, and disposal, but not paid for by those industries. Externalized costs are most often borne by workers, community members and the environment, rather than by industries and corporations.
  20. Extended Producer Responsibility (EPR, also called "Producer Takeback") is a product and waste management system in which manufacturers – not the consumer or government – take responsibility for the collection and environmentally safe management of their product when it is no longer useful or is discarded. When manufacturers take responsibility for the recycling of their own products they no longer pass the cost of disposal on to the government and taxpayer, but build it into the price of the product (internalizing the cost). This gives them a financial incentive to use environmentally safer materials in the production process; design the product to be more recyclable; create safer recycling systems; and to keep waste costs down. [http://www.electronicstakeback.com/legislation/about\\_epr.htm](http://www.electronicstakeback.com/legislation/about_epr.htm)  
[http://www.electronicstakeback.com/legislation/about\\_epr.htm](http://www.electronicstakeback.com/legislation/about_epr.htm)  
<http://www.miller-mccune.com/business-economics/the-smoldering-trash-revolt-7306>
  21. There are two ways in which modularity would be really helpful – for repairs and for upgrades. There has been some headway made in this arena, but we still have a long way to go. Electronics manufacturer [ASUS developed a prototype for a modular computer a few years ago](#), that was like a shelf onto which you stack modules (hard drive, battery, card reader, etc) the size of CDs. But the parts – motherboards, CPU's, energy supplies - that would need to be upgraded to keep up with technology – like new software, faster processors, energy savings – were not designed to be simple to replace for average computer user (making it a computer-geek-only option).  
Currently, the release of a new operating system is what prompts many PC users to purchase their next computer, since the existing design of these electronics makes it easier to replace an entire computer rather than upgrading it. Adopting modular design elements that make it easy to upgrade a computer in order to keep up with advancing technology would exponentially prolong its lifespan and keep these electronics out of the dump and on our desks.
  22. Europe has led the way with the passage of the Waste Electrical and Electronic Directive in 2003, which established the first major takeback requirements throughout Europe. Other countries have

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followed suit, including Japan and China. [http://ec.europa.eu/environment/waste/weee/index\\_en.htm](http://ec.europa.eu/environment/waste/weee/index_en.htm)

23. Twenty-three states have already passed e-waste legislation and New York City passed an e-waste law but it was recently pre-empted by a statewide law in New York. To see an updated list of states with e-waste legislation, check out: [http://www.electronicstakeback.com/legislation/state\\_legislation.htm](http://www.electronicstakeback.com/legislation/state_legislation.htm) and <http://www.electronicstakeback.com/index.htm>
24. Some leading companies have been working with their suppliers to find safer alternatives to bromine and chlorine. High volume uses of bromine and chlorine in flame retardants and plastic resins like polyvinyl chloride (PVC) gained worldwide attention when scientific studies documented their link to the formation of dioxin, one of the most toxic chemicals around. Dioxins and other harmful chemicals are released into the environment during the burning and smelting of electronic waste. Even the most sophisticated incineration facilities generate low levels of dioxin, but the most significant dioxin contribution occurs in developing countries whose facilities are not designed to handle toxic materials.

Apple has phased out the use of brominated and chlorinated flame retardants, in addition to PVC, mercury, arsenic, and lead. All new models of Nokia mobile phones are free of PVC, brominated and chlorinated compounds and antimony trioxide. New Sony Ericsson products are 99.9% free from all halogenated flame retardants. For more resources, see Footnote 26.

25. To ensure that your e-waste is recycled responsibly and not exported overseas, make sure that your recycler is a certified E-Steward. E-Stewards are recyclers who voluntarily adhere to the highest standards in the recycling industry: not to export e-waste to developing nations, not to send it to prison recycling, not to landfill/incinerate it. This program was developed by the non-profit Basel Action Network (BAN) as a voluntary pledge program – but it has recently been expanded into a rigorous certification program, with independent, accredited auditors. To find an E-Steward in your area go to: <http://e-stewards.org/>.
26. Two good sources to use are the Greenpeace Guide to Greener Electronics, and the ETBC Recycling report card, which grades companies on their efforts to take back and recycle their old products. <http://www.electronicstakeback.com/reportcard.htm> <http://www.greenpeace.org/international/en/campaigns/toxics/electronics/Guide-to-Greener-Electronics/>
27. On the road to cleaner, greener electronics legislation Europe has taken an important step with the passage of the REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) law. REACH puts the burden on the chemical producers and users to provide and share data about chemical hazards. <http://www.chemsec.org/get-informed/eu-chemicals/reach>

There was additional progress made with the passage of the Restriction on Hazardous Substances (ROHS) in Europe, which limits the use of six substances in electronic products sold into the EU. But the follow up legislation to expand the list of restricted substances was less successful due to industry opposition. [http://www.chemsec.org/images/stories/publications/ChemSec\\_publications/100602\\_RoHS\\_vote\\_Press\\_Release.pdf](http://www.chemsec.org/images/stories/publications/ChemSec_publications/100602_RoHS_vote_Press_Release.pdf)

But the US is lagging behind, as there is very inadequate oversight, required testing, or disclosure of toxic chemicals in electronics or

most other products in the US. Under our current laws, chemical companies can introduce and sell chemicals in the marketplace, and it's up to the EPA to "prove" when the chemicals are unsafe and shouldn't be sold. This puts all the burden of testing and research on the government, instead of the companies selling the chemicals. It also means that it's hard for manufacturers to find out the hazardous traits of chemicals they use in products.

We need to adopt a more sensible approach to toxic chemical policy, where companies have to prove their chemicals are safe before they put them into products that go into our homes and schools. Some members of Congress are trying to change that by reforming the Toxic Substances Control Act (TSCA) – our primary federal law on toxics.

See <http://www.nytimes.com/gwire/2010/04/15/15greenwire-sen-lautenberg-introduces-chemicals-reform-bil-25266.html> and <http://healthreport.saferchemicals.org/>.

Other signs of hope include a new bill to outlaw the export of hazardous e-waste that has been introduced in the US Congress, H.R. 6252, The Responsible Electronics Recycling Act. For more information, see [http://www.electronicstakeback.com/legislation/summary\\_HR6252.htm](http://www.electronicstakeback.com/legislation/summary_HR6252.htm)

And at the state level, California is establishing Green Chemicals program, <http://coeh.berkeley.edu/greenchemistry/>

