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Silicon Swirl: Tackling the Growing Global Mountain of Electronic Trash

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How many cell phones or computers have you owned in your lifetime? Three? Four? More? You're not alone. The growing global appetite for electronic goods continues unabated, and with it grows the mountain of discarded electronic items: last year, about two million tons of such products ended up in American landfills, a figure projected to grow. In Europe, the waste category of discarded electronic items has been growing at least twice as fast as any other category of waste item. With it grows the increasing risk that toxic metals, such as lead and mercury, contained within such discarded products will leach into the water table and pollute drinking water for millions of people.

Widespread electronics recycling efforts currently under way seek to combat this problem. While such efforts may be well intended, the results of such efforts often remain counterproductive in many cases. Over half of the approximately 400 thousand tons of discarded electronic products in the United States intended for recycling end up overseas in China, India and elsewhere, where poorly trained workers often claw open these products by their bare hands to retrieve valuable metals like copper in the crudest manner possible. In doing so, these workers expose themselves to toxic elements contained within these products and pollute the environment in the process. "We're preserving our own environment but contaminating the rest of the world," said Jim Puckett of environmental group Basel Action Network in an interview with CNN.

The growing global environmental threat from such toxic substances drove the European Union last year to enact the Reduction of Hazardous Substances (RoHS) directive, which called for reductions in certain chemicals and metals, including lead and mercury, commonly found in electronic items. Each EU member state decides for itself how to enforce this directive, the results of which are inconsistent RoHS standards, in some cases, among EU countries. For

example, some countries permit certain medical devices to contain lead solder, since this type of solder is more reliable than current alternatives. Given the risk of death from a malfunctioning medical device, some countries consider the presence of lead in certain medical products the lesser of two evils. Electronics manufacturers not in compliance with a particular country's RoHS regulations risk having their products refused entry to the country, a lesson Apple Computer learned the hard way recently with multiple products, including its iSight, iPod shuffle external battery pack and eMac all-in-one desktop computer.

As a preeminent electronics manufacturer, Apple's difficulties underscore the often-greater compliance problems with RoHS that many smaller, less well funded tech companies have experienced. Compliance costs can be high: among other factors, companies often incur greater energy costs during the production process, substitute materials can cost more and electronics manufacturers who typically rely on an extensive number of suppliers, like Dell, must ensure that their many vendors comply with the extensive and detailed new rules.

Compounding the problem, certain EU member nations have continued to modify their existing RoHS laws. In an interview with the publication *Electronic News,* Markus Terho, director of environmental affairs at Nokia, noted that "technological implementation has been straightforward; the burden has been, and still is, that the legal requirements keep changing." In some instances, manufacturers must only make small adjustments to be in compliance with RoHS, such as using tin solder instead of lead solder. In other instances, however, compliance requires redesign of the products themselves, requiring not insubstantial reengineering costs. "We have tens of thousands of engineers implementing changes. How much this extra work costs, we have not calculated," Terho said.

Europe's environmental dicta, in practical terms, amount to something approaching a global standard due to the fact that the European electronics market remains a hugely important market for many manufacturers. Approximately 20 percent of U.S. electronics manufacturers' output was shipped to Europe last year. In most cases, discontinuing sales to Europe due to a desire not to comply with the new rules would likely have a greater negative financial impact on businesses than the cost of complying with the rules. Manufacturing two lines of the same product (one line that would meet Europe's stricter environmental standards and the other that would not) makes little economic sense for some companies, given that additional redesign and RoHS-mandated inventory-tracking costs would be borne regardless. Those companies that do manufacture two different lines of products (one RoHS compliant and the other not) have occasionally been found to be in violation of RoHS standards after cross-contaminating, noncompliant products

have mistakenly ended up in countries with RoHS rules on the books, creating further headaches for electronics manufacturers subject to penalties as a result.

Companies hesitant to comply with Europe's standards risk losing more than just business with European customers, given that other countries are adopting similar standards or are becoming increasingly interested in doing so. Japan has instituted its own stringent set of green manufacturing standards, as has China, which, despite a ban on the importation of electronic trash, continues to grapple with the influx of such trash imported under the guise that such products will be reused rather than recycled in the crudest forms possible.

The increasingly ineluctable tide of greener manufacturing requirements means that those companies that remain proactive in seeking to comply with such standards will likely benefit more in the long run than those companies that avoid or flout such standards for short-term gains in the form of forgone compliance costs. While enforcement remains spotty, countries are becoming increasingly vigilant in ensuring that companies comply with the stricter rules, given the growing mountain of discarded items and the accompanying growing threat from the toxic elements contained therein.

So far, a relatively small proportion of these costs have been borne by consumers. Given the intensely competitive nature of the electronics industry, companies appear more willing to suffer some margin loss from these compliance costs than to pass on such costs en masse to the consumer. If anything, these compliance costs will likely only slow the rate at which prices for electronic products have fallen in recent years. "Competitive pricing pressure is just too intense," said Dan Shea, chief technology officer of contract manufacturer Celestica in an interview with *BusinessWeek* magazine.

Increasingly, many technology companies are jumping on the green bandwagon to trumpet their environmental activism and vigilance. While some of these companies sometimes make dubious claims about how environmentally conscious they are, other companies have made genuine efforts not just to comply with existing environmental standards but to stay ahead of the legislative curve by being even greener than necessary. Prior to RoHS's implementation, California tech firm Aeluros issued a press release for a new set of products that stated the following: "By providing green products well in advance of the RoHS implementation requirement of July 1, 2006, we have allowed customers to design their optical modules and subsystems to be green today, and to avoid the need for costly requalification efforts later," said Nader Gamini, Aeluros vice president of manufacturing.

RoHS, therefore, incentivized not just compliance but a willingness on the part of some manufacturers to exceed such announced standards, in part because of favorable publicity prospects from being more green than legally necessary. While many other manufacturers have room for improvement in this regard, most have not flouted the standards. Chris Smith, head of Britain's National Weights and Measures Laboratory and overseer of the country's RoHS enforcement, noted that while he sees many violations of RoHS standards, "the degrees of failure are small or questionable . . . . No high-profile RoHS cases have occurred . . . because companies have been cooperative in addressing problems, often with the highest-level executives getting involved," with executive involvement in these matters likely being in part a result of the prospects for negative publicity accruing to companies found to have been in violation of the standards.

While the business community would and should benefit from a future unified global green standard, RoHS remains a very good start and has demonstrated that electronics manufacturers can meet or exceed RoHS requirements without becoming unprofitable as a result. RoHS has reduced pollution levels from discarded electronic items both in Europe and beyond and has made recycling of such products safer for those who toil with little or no protection from toxic elements contained within, something for which the EU deserves substantial credit.