Responsible E-Waste Management

New technologies influence the way we live, work, and interact with each other. Over the past few decades, rapid technological advancement has not only evolved our communication abilities and increased our rate of productivity, but it has also resulted in a vast increase in electronic goods discarded into our waste stream. Recent data shows that electronic waste, commonly known as "E-waste" is the fastest growing municipal waste stream in the United States.[i] "E-waste" includes electronic items we use and dispose of often, such as computer equipment, hard-copy devices, televisions, and mobile devices. According to Allen Hershkowitz, senior scientist and authority on waste management at the National Resources Defense Council, Americans throw out about 130,000 computers daily.[ii]

Table 1: Electronic products disposed of as E-waste by American consumers, businesses and institutions[iii]


Computers and Equipment
Desktop central processing units (CPUs), laptops, cathode ray tube (CRT) monitors, flat-panel monitors, keyboards and mice

Televisions
Monochrome, CRTs, flat-panel, and projection

Hard-Copy Devices
Printers, fax machines, scanners, digital copiers, and multi-function devices

Mobile Devices
Cell phones, personal digital assistants (PDAs), smartphones, and pagers

Figure 1 illustrates the vast, rapid increase of electronic devices disposed of in the U.S. between the years 2000 and 2010. The weight of electronics discarded in the year 2000 increased by over 1 million tons in the year 2010.

Figure 1: Amount of consumer electronics present in U.S. Municipal Solid Waste (MSW) stream[iv]
(Measured in thousands of tons)
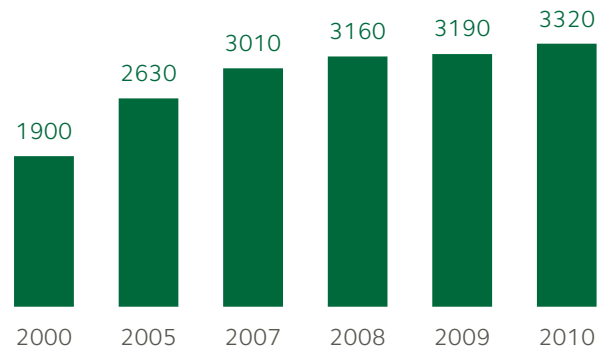
It is becoming more and more important for consumers and companies to properly recycle electronic waste and help prevent environmental impacts, promote positive social stewardship and take advantage of financial benefits associated with recycling these materials.

Why Recycle E-waste?
Financial benefits from recycling E-waste

Recycling E-waste can benefit companies financially. Companies could participate in commercial "take-back" programs offered by businesses that recycle broken or damaged electronic goods at no cost to the companies. The Electronics Take Back Coalition publishes an Electronics Company Recycling Report Card listing electronics companies that offer no-cost take-back programs.

Companies can also earn tax deductions by donating gently used electronic goods to registered not-for-profit organizations.

Companies could benefit from increased customer loyalty if they gain a reputation for recycling E-waste. A survey by Landor Associates (2012) found that 77% of consumers say it is important for companies to be socially responsible.[v] Companies that recycle E-waste appropriately and communicate their progress to customers in Corporate Social Responsibility reports demonstrate their commitment to protecting human and environmental health, which could result in an increase in business.

Improper disposal of E-waste affects human and environmental health

Items classified as E-waste may contain hazardous metals and chemicals, so companies should refrain from disposing of the items in landfills and incinerators. Recent data shows that over 80% of

discarded electronics are placed in landfills or incinerators.[vi] Many electronic goods contain toxins including lead, cadmium, and mercury that leach into our soil, atmosphere, and groundwater. Table 2 lists toxic chemicals and metals present in E-waste and their respective, deleterious impacts on human health.

Table 2: Toxic substances found in E-waste and their impacts on human health[vii]

TOXIC SUBSTANCE	HUMAN HEALTH IMPACT
Beryllium (Used in springs, relay connections, computer motherboards)	Increased risk of developing lung cancer
Brominated flame retardants (Used in circuit boards and plastic casings)	Can impact brain function, cause thyroid problems
Cadmium (Used in laptop batteries, wire insulation, coating for CRTs, semiconductors, as a plastic stabilizer)	Can lead to kidney damage, development of lung cancer and/or respiratory illnesses
Lead (Used in electrical solder on circuit boards, cathode ray tube (CRTs), stabilizers in PVC formulations)	Can impact brain development in children, cause kidney damage, respiratory illnesses
Mercury (Used in lights to illuminate flat screen displays, computer batteries)	Can impact brain development in children, harm, central nervous system cause kidney damage
PVC (Used to insulate wires and cables)	Incineration can cause lung disorders

E-waste recycling recovers natural resources and protects the environment

E-waste recyclers disassemble electronic goods to retrieve precious metals and re-usable parts. Key benefits of recycling EE-waste items include:

Resource Recovery
- Through recycling, 95% of a computer's useful materials can be retrieved.[viii]
- For every million cell phones recycled, 35,000 pounds of copper, 772 pounds of silver, 75 pounds of gold, and 33 pounds of palladium can be recovered.[ix]
- 1 metric ton of electronic scrap from personal computers contains more gold than that recovered from 17 tons of gold ore.[x]

Beneficial Re-use
- More than 70% of equipment collected by recyclers is re-manufactured or reprocessed into commodities and new products, including steel, aluminum, copper, lead, circuit boards, plastics, and glass.[xi]

Recycling materials from end-of-life electronic goods conserves natural resources used to manufacture the goods, and consequently, reduces greenhouse gasses emitted from resource extraction and disposal of the goods in landfills.

Potential fines for violating E-waste legislation

Many states have passed laws mandating E-waste recycling. As a result, companies and individuals may risk fines from violating state legislation if they do not recycle their E-waste. See Table 3 for a list of states that have enacted E-waste legislation.

Twenty-three states maintain laws that "extend producer responsibility" (EPR) to manufacturers for recycling E-waste. In other words, state governments hold manufacturers of electronic goods accountable for collection and recycling of used electronics from companies and individual consumers.

Seventeen states have enacted statewide bans on disposal of electronic waste in landfills and/or incinerators. Various citywide legislative bodies have also enacted disposal bans, even if their respective states have not done so. Please check local legislation in addition to state legislation.

Table 3: States that have enacted e-waste legislation[xii]

LANDFILL AND/OR INCINERATION BAN		EPR POLICY	
California	New Jersey	Connecticut	North Carolina
Connecticut	New York	Hawaii	Oklahoma
Illinois	North Carolina	Illinois	Oregon
Indiana	Oregon	Indiana	Pennsylvania
Maine	Pennsylvania	Maine	Rhode Island
Massachusetts	Rhode Island	Maryland	South Carolina
Minnesota	South Carolina	Massachusetts	Texas
New Hampshire	Vermont	Michigan	Vermont
	Wisconsin	Minnesota	Virginia
		Missouri	Washington
		New Jersey	West Virginia
		New York	Wisconsin

**Note: instead of the "EPR" model, California maintains a "customer-pays" model in which consumers pay a small fee for electronic items purchased. This money is deposited into the state's recycling fund used to reimburse recyclers.

The Waste Electrical and Electronic Equipment (WEEE) and The Restriction of Hazardous Substances (RoHS) directives outline rules for the manufacturing and disposal of electronics and related equipment in the European Union. U.S. companies selling electrical and electronic goods in the European Union must understand these new requirements and develop a compliance strategy that will allow them to remain competitive in the global market.

Growing awareness about the health and environmental hazards posed by E-waste supplemented by legislation governing E-waste disposal has increased recycling rates in the U.S. over time. Figure 2 illustrates the incremental rise in recycling rate between the year 2000 and 2010. Though some progress has been made, over 80% of consumer electronics are still placed in the landfill.
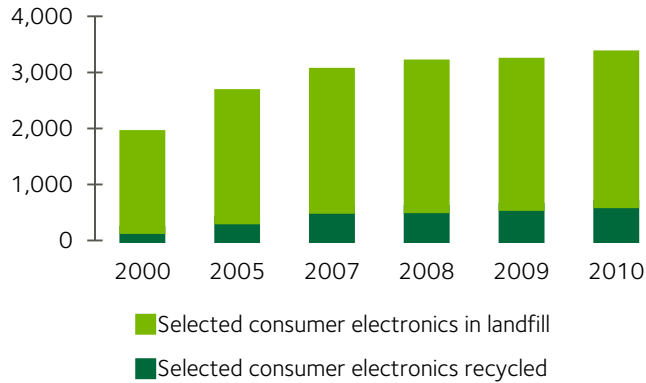
Human and environmental health risks associated with exporting E-waste to developing countries

In contrast to industrialized countries, developing countries often lack infrastructure and resources to operate and monitor responsible E-waste recycling operations. As of 2010, U.S. recyclers sent 70-80% of E-waste to developing countries in Africa and Asia.[xiv] These countries may not have the capacity to recover materials or fix the items. Thus, the imported electronic goods are dismantled, discarded into local dumps and/or incinerated, potentially jeopardizing both human and environmental health[xv]. Employees involved in operations in these countries often experience poor working conditions, few labor protections, and minimal health and safety protections compared to industrialized countries. The Basel Action Network (BAN) works to eliminate exports of hazardous electronic waste to developing countries and lists an array of responsible recyclers on its E-Stewards website.

Security risks from improper data destruction

Improper disposal of E-waste can pose a risk of security breaches to companies. The latest survey conducted by Arrow Electronics has shown data security to be the common, principal concern for businesses with regards to IT asset disposition[xvi]. Utilize disk-cleaning tools before donating used computers to charity, or send your computers to an IT recovery company to wipe the data before donation. Before sending computers or cell phones carrying sensitive data to a recycler, always inquire if the recycler can guarantee secure destruction of used electronic goods.

How to begin?
Extend your current electronics' lifespan

- Add memory to computers.
- Perform a "clean install" of operating systems every three years to keep computers running quickly.
- Old computers generally run best with old software, so avoid upgrading to latest software unless you need to do so.
- Defragment hard drives monthly. Most computers have built-in utilities that can be set to defragment the hard drives regularly.
- Keep computers out of direct sunlight. If they overheat, their internal components could be irreparably damaged.

- Reboot computer as needed. As you open and close applications, fragments of memory can build and slow down a computer. A reboot cleans out these fragments.
- Dust around your computer can trap heat inside the machine, causing cooling fan to run longer. Clean the fan on the power supply and blow out the dust from inside the computer to prevent the computer from wearing out.[xvii]

Make conscious purchasing decisions when you need to purchase electronic devices

Companies should factor in E-waste disposal before purchasing a piece of technology.

"The biggest mistake a company can make in asset disposal is to look at it as a stand alone program... [Asset disposal] should be viewed as a strategic life cycle decision that can add value to the company."
Bob Houghton, President and CEO of Redemtech, an IT asset disposition company

The Environmental Protection Agency (EPA) lists programs available that help purchasers evaluate, compare and select electronic products based on environmental attributes such as:

- Energy use
- Lifespan
- Level of toxic materials
- Ease of recyclability

Greenpeace publishes a list of companies that purchase "conflict-free" minerals each year. Minerals found in electronic products are often mined in the Democratic Republic of Congo or adjoining countries, where laborers in unregulated mining sites experience human rights abuses perpetuated by armed forces that control operations.[xviii]

Electronics companies that purchase "conflict-free" minerals earn prominent media coverage. Because 77% of consumers indicate it is important for companies to be socially responsible, companies that purchase their electronic goods from these socially responsible electronics providers could benefit from publicizing their commitment to practicing social responsibility.

Utilize take-back programs and recycling programs to earn potential resale revenue and recycle without additional cost

WM Sustainability Services provides consulting services to assist companies in their E-waste reuse and recycling efforts. WM can:

- Test and/or remarket your electronic products and components for reuse and reselling
- Provide marketing services for 100 commodities and components to certified end markets and end users
- Certify data destruction
  - WM can verify the complete destruction of all sensitive or proprietary files, applications and other data from computers, servers, phones, PDAs, and other storage devices
  - Once recycling is complete, you will receive a Certificate of Recycling verifying the destruction of this proprietary information
- Provide your business with Electronics Recycling Kits through the eScrapTracker[TM] program[xix] to recycle:
  - Phones
  - Computers
  - Players (i.e, Game, CD, DVD, VCR, and speakers)

- LCD & Plasma flat screens as well as analog TVs and CRTs
- Digital Cameras and Navigation Devices
- Printers & Scanners
- Keyboards & Mice
- Power Cords & Cables
- Network & Phone Equipment
- Recycle batteries through WM's BatteryTracker™ program.[xx]

WM evidences its strong commitment to social and environmental responsibility by:

- Educating companies about how to prevent hazardous E-waste from entering municipal incinerators or landfills;
- Preventing the exportation of hazardous E-waste to developing countries;
- Providing for the visible tracking of E-waste throughout the product recycling chain;
- Assisting companies in developing and publicizing social/environmentally-sound initiatives in corporate social responsibility reports.

Conclusion

The global rate of E-waste production is growing. A 2010 United Nations report stated that the current amount of E-waste will increase by as much as 500% in some countries over the next decade as countries prosper and consumers purchase more and more electronic goods.[xxi] Companies worldwide must take action and commit to reusing and recycling their electronic goods responsibly to save money and to protect human and environmental health.

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