**Testimony of
Hewlett-Packard Company
Before the
House Committee on Science and Technology
For the Hearing on
"Electronic Waste: Can the Nation Manage Modern Refuse
in the Digital Age"**

April 30, 2008

On behalf of Hewlett-Packard Company (HP), I am pleased to provide this testimony on the recycling of used electronics. My name is Renee St. Denis, and I am Director, Americas Product Take Back, based in Roseville, California. HP is a technology solutions provider to consumers, businesses and institutions globally. The company's offerings span IT infrastructure, global services, business and home computing, and imaging and printing. More information about HP is available at www.hp.com.

HP applauds Chairman Gordon and Ranking Member Hall for convening this hearing to discuss electronic waste and appreciates this opportunity for HP to testify on this important issue. Today's hearing is a valuable first step in informing Members of the House and the public on the emerging challenge of managing and recycling used electronics in the United States. HP supports increased recycling to conserve natural resources and protect our environment through a harmonized national approach. HP calls on Congress to support a national solution to the challenge of recycling used electronics, the adoption of recycling incentives and the removal of regulatory barriers to cost-effective recycling, and market-based solutions to finance government recycling programs. We further call on Congress to support research in this area to help address challenges that are hindering the development of a cost-effective recycling infrastructure. We offer our suggestions for research priorities later in this testimony.

As a major manufacturer of a broad range of technology products, as well as a leading recycler of these products, HP has a strong interest in the development of policies relating to electronics recycling. HP has nearly

twenty years of first-hand experience in product take-back and recycling. Since 1987, HP has successfully collected and recycled more than 1 billion pounds of used or unwanted computer-related equipment globally. With our vast knowledge and experience, HP's goal is to recycle an additional 1 billion pounds of equipment (for a total of 2 billion pounds worldwide) by the end of 2010. HP has established a recycling service throughout the US (as well as other countries around the world) that provides consumer and commercial customers with a convenient opportunity to recycle their old products in an environmentally sound manner. For more information on HP's environment and broader global citizenship activities, see: http://www.hp.com/hpinfo/globalcitizenship/.

HP currently partners with operators of seven large, state-of-the-art recycling facilities in the U.S. and Canada, as well as operating our own technologically-advanced facility used to recycled print supplies. Our recycling facility for printer supplies is located outside of Nashville, Tennessee, in the district of Chairman Gordon. This facility consists of a 40,000 square foot building, including separation and recycling technology. The facility employs approximately 50 full time employees and processes all of the material returned to HP through our different print supplies programs in the US, Canada and Latin America.

All materials collected in the U.S. and recycled by HP are managed in the U.S. and Canada in an environmentally sound manner; under HP's program, no waste materials are shipped overseas and no electronic material is sent to a landfill.   In the past year, HP recycled almost 40 million pounds of electronic waste in the US in 2007 and reused or donated an additional 30 million pounds. Including remarketed equipment, we achieved a total reuse and recycling rate in 2007 of 15 percent of relevant hardware sales. While this metric attempts to account for the time difference between when HP products are sold and returned, we recognize the difficulty of matching returned product to the appropriate sales period, which may affect the accuracy of the calculation.

HP encourages Congress to continue to support technological innovation such as HP has employed to reduce the impact of electronic products on the environment and to encourage the reuse and recycling of electronic products. Creating opportunities and incentives to support the innovation of American companies which efficiently achieve superior recycling results will help to best protect our nation's natural resources for future generations.

We wish to emphasize the following points in our testimony today:

- HP's history and leadership in electronics recycling, including the effect of these recycling activities on design and manufacture of HP products as a means of reducing the overall environmental impact of our products.
- The need for further research into creating innovative recycling and disposal methods for the leaded glass from CRT tubes and the older plastics from electronics in order to find innovative, effective reuse options for these materials of concern.
- Increasing the understanding of regulators, environmental groups, and the general public on the subject of the environmental issues surrounding the management of discarded electronics, and the appropriate level and type of regulation surrounding recycling operations and the shipment and handling of whole products. Additional research on these issues is warranted ensure that the emerging electronics recycling industry can find market- and economic-based solutions for recycling and reuse, while also providing for protection of the environment.
- The necessity of research into the net carbon or climate impact of electronics recycling is crucial to designing appropriate collection, reuse, and recycling systems, particularly given the likelihood of future legislation that limits emissions of greenhouse gases or places greater costs on such emissions.

I. HP'S RECORD OF ACHIEVEMENT IN RECYCLING ELECTRONICS

HP has been recycling used electronics for over 21 years. HP has made great strides in increasing the volume of our products recovered for reuse and recycling. However, the number of PCs, servers, print cartridges and other electronics reaching the end of their usable life is growing rapidly. In order to meet this need, HP offers a variety of recycling services to customers in 52 countries and territories worldwide.

Managing this increasing volume of discarded equipment conserves natural resources by reducing the need for raw materials and energy to manufacture new products. As such, our commitment to responsible product reuse and recycling is integral to meeting our energy efficiency objectives.

Product reuse and recycling offers other benefits as well. Remarketing used equipment is profitable for HP, and businesses and consumers are increasingly seeking out manufacturers that offer responsible reuse and recycling options for used equipment. Plus, many governments have passed legislation, such as the European Union's Waste Electrical and

Electronic Equipment (WEEE) Directive, requiring that discarded electronic equipment be recycled. Our proactive approach to product reuse and recycling helps us meet legal requirements, maintain access to markets and win business.

HP began remarketing used equipment in 1981 and recycling in 1987. This year, we exceeded our goal to recycle 1 billion pounds (450,000 metric tonnes) of electronic products and supplies by the end of 2007. We have set an aggressive new goal to recover an additional 1 billion pounds for reuse and recycling by the end of 2010.

Beyond that major milestone, our world wide efforts in 2007 yielded significant progress. Specifically, we:

- Increased our annual recycling volume by more than 50 percent over 2006 to 113,000 tonnes (250 million pounds). For comparison purposes, the Environmental Protection Agency (EPA) has reported that our nearest competitor recycled 78 million pounds. See "Plug Into e-Cycling with the EPA: 2007 Activities" (EPA 530-F-08-002).
- Collected approximately 3 million hardware units weighing 28,500 tonnes (63 million pounds) for reuse and remarketing, an increase of more than 31 percent compared to 2006.
- Increased the volume recovered for reuse and recycling as a proportion of relevant sales from 10 percent in 2006 to 15 percent.
- Introduced recycling programs in several countries, including Bulgaria, Indonesia, Malta, Philippines, Romania and Turkey.
- Introduced several products that use recycled materials and include features to facilitate recyclability.

We offer a range of take-back services for both companies and consumers. Responsible take-back is core to our leasing and reuse services, and saves customers time and expense managing old equipment. Free return and recycling is available for print cartridges in 47 countries or territories. We make arrangements with commercial customers depending on the equipment involved and the specific circumstances. Consumer recycling services vary from country to country, depending partly on local regulations.

In all cases, it is important to manage the disposal of returned equipment to protect data security. We have safeguards in place for all products we take back, whether by trade-in, via donation or through our recycling services.

The equipment returned to HP is managed through a network of partners and service providers who perform the recycling of the equipment. HP formerly partnered with a large electronics recycling company to operate two recycling centers in the US; our partner now operates these facilities with the assistance of HP. HP invested in the development of those recycling centers in order to directly participate and lead the development of the types of technology and processes necessary to recycle used electronics to the environmental and data security standards we require. Over time, an infrastructure has started to emerge which has created an ability for HP to reduce our focus on the actual recycling operation and to renew our focus on the design of products which are easier to recycle and can include recyclable commodities in their manufacture as well as the development of recycling services for our customers.

Any reusable equipment is segregated. From there, any customer data is destroyed and the equipment is then reused either in whole or in part. Equipment without a reuse channel is sent for removal of any hazardous components (typically CRT glass, batteries or other elements). After removal of any hazardous components the equipment is either manually or mechanically separated into a variety of basic commodities: various types of precious and base metals, plastics and other constituent materials. These materials are processed in the separation process to create valuable commodity streams which are then sold for reuse into a variety of industrial processes. These include the manufacture of new parts and products for a number of industries, including, in some cases, the electronics industry.

II. RECYCLING AND ITS IMPACT ON HP's PRODUCT DESIGN

HP established our Design for Environment (DfE) program in 1992, and it remains central to our business strategy today. Our approach to DfE encompasses the entire product life cycle. In addition to considering important product attributes such as energy efficiency and materials innovation, design for recyclability (DFR) is one of our primary design for the environment priorities. We believe that our experience and expertise in recycling provides an important feedback loop to designers to design future products so that they can be more readily recycled.

HP's DFR efforts include using common fasteners and snap-in features and avoiding the use of screws, glues, adhesives and welds where feasible. This makes it easier to dismantle products and to separate and identify

different metals and plastics. The materials we choose can also enhance recyclability. For example, in 2007 we introduced several notebook PC models with LED technology, eliminating mercury fluorescent tubes and making the display screens easier to manage at end-of-life. These efforts have significantly improved the recyclability of HP products, and we are pleased to report the following:

- **HP notebook PC products** are now more than 90 percent recyclable or recoverable by weight (as per the definition used in the European Union WEEE regulations).
- **HP printing and imaging products** are typically 70 percent to 85 percent recyclable or recoverable by weight (as per the definition used in the European Union WEEE regulations).

We also made great progress in incorporating recycling materials into our products. For example, HP has engineered print cartridges that use recycled plastic without compromising quality or reliability. We design HP print cartridges to meet the needs of our recycling system and incorporate recycled material. Since we take back only our own cartridges, we can be certain about the material content, making it easier to process exhausted cartridges and reuse the material to manufacture new ones. More than 200 million cartridges have been manufactured using the process through 2007. HP used more than 5 million pounds (2,300 tonnes) of recycled plastic in its original HP inkjet cartridges in 2007, and the company has committed to using twice as much in 2008. HP also uses post-consumer recycled plastic recovered through our return and recycling program in the manufacture of original HP LaserJet print cartridges. This recycled plastic can represent as much as 25 percent, by weight, of the newly molded LaserJet cartridge housing. HP has also incorporated recycled content into some hardware products. For example, in 2007, we introduced a speaker module made from 100 percent post-consumer recycled plastics in all HP Compaq 6500 and 6700 series Notebook PCs.

We strive to use recycled plastics in our products, but their potential is limited for several reasons:

- Most recycled plastics contain substances such as BFRs, which we have eliminated from the external cases of our current products. (See Part III below).
- Mixed plastics do not have the mechanical properties necessary for use in new IT products.
- It is difficult to separate dissimilar plastics during recycling to produce a homogenous material

As we discuss in further detail below, Congress should consider supporting research on ways to promote the use of recycled materials in future products and help overcome these challenges.

As one outside observer states in HP's Global Citizenship Report (see http://www.hp.com/hpinfo/globalcitizenship/gcreport/productreuse/perspectives.html) :

> HP has made significant strides in design for recycling. Its engineering and design teams have taken into account the concerns of refurbishers and recyclers by creating products that can easily be repaired, refurbished, disassembled or recycled. Such enhancement in product design has been augmented by the company's assistance to recyclers, making available to them guidelines that greatly simplify the recycling process.
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> Among the latest of the company's techniques in the area of design for recycling is the concept of modular design, which combined with the use of the proper "environmentally-friendly" materials help HP to increasingly establish itself as a leading "green" IT supplier. HP further pushed to reduce its products' environmental impact by incorporating more easily recyclable plastics, reducing the number of different plastic types in a single product and replacing coating and paint with molded-in colors. Furthermore, reuse, as a way to extend the life of a system, has been facilitated by HP's modular design approach, enabling simple component swapping during the refurbishing process.

These efforts have resulted in HP products qualifying for a large number of global ecolabels, including the EPEAT (Electronic Product Environmental Assessment Tool) designation in the U.S. HP is working hard to improve our record of success in this area, including establishing the following goals:

- Double the use of recycled plastic in print cartridges in 2008 compared to 2007, to 4,500 tonnes (10 million pounds)
- Eliminate the remaining uses of BFRs and PVC from new computing products launched in 2009 as technologically feasible alternatives become readily available that will not compromise product performance or quality and will not adversely impact health or the environment

III. INNOVATION NEEDED TO INCREASE THE RECYCLABILITY OF ELECTRONIC PRODUCTS

There are two materials which present particular challenges to the current recycling processes used within the electronics industry and which will present even greater challenges as time progresses. These materials are (a) the leaded glass found in CRT tubes and (b) plastics which may contain flame retardant additives which have been banned from further use in many countries in the world.

A. CRT glass

Cathode Ray Tubes (CRTs) are the glass picture tubes found in previous generations of computer monitors, televisions, and other displays. CRTs contain leaded glass for two reasons:

- It improves the optical quality of the glass. Adding a small amount of lead to glass is very common when creating glass for lenses, and you may have also heard of leaded crystal. Optical quality is especially important at the front of the CRT.
- It acts as a shield against radiation generated by the electron gun and electron beam.

Users of computer equipment are in the process of transitioning from CRT displays to flat panel technologies, but large volumes of traditional CRT displays remain in use or in storage. This presents a recycling and logistical challenge. Among other things, one important challenge is the limited current opportunities to reuse leaded CRT glass. Congress should consider support for research in new applications for leaded glass in building, the medical field, and other applications.

B. Plastics containing banned/restricted flame retardants

Both the internal circuit boards and the external plastic housings of electronic products contain chemical flame retardants for fire safety purposes. Many of the chemical flame retardants used in the past, such as brominated flame retardants (BFRs), have come under increasing scrutiny by environmental and health officials in many countries, and several U.S. states and many countries have banned or restricted the use of some of these chemicals. These chemicals cannot be removed from the plastics, so as a result the presence of these chemicals in plastic parts

presents a significant recycling and reuse challenge. To address this concern, Congress should consider support for research on reuse opportunities for plastics containing banned or restricted chemicals.

IV. RESEARCH NEEDED ON THE PROPER REGULATORY APPROACH FOR THE CLASSIFICATION OF USED ELECTRONICS

The federal government can play an important role in promoting recycling by establishing an appropriate regulatory framework for managing used electronics, including the removal of regulatory impediments to cost-effective recycling. Under some interpretations of current federal and state regulations, used electronics may be classified as "hazardous waste," even though they are routinely used in our homes and offices and pose no risk to human health or the environment when properly stored, transported, and recycled. When these used products are classified as hazardous waste, they become subject to burdensome and costly regulatory requirements associated with their collection, storage, transportation, and processing. When classified as "hazardous," these regulations can impede the development of a cost-effective recycling infrastructure without adding to greater environmental protection. Congress and the EPA should work to reform these regulatory requirements to facilitate recycling of used electronics, while continuing to protect human health and the environment.

Additional research should be conducted regarding the actual environmental and human health risks associated with the storage, transport, and recycling of used electronics. This research should also consider whether new test methods for assessing these risks should be developed, instead of the current practice of using the test method developed and employed for testing industrial process waste.

V. RESEARCH INTO THE NET CLIMATE IMPACT OF RECYCLING OF ELECTRONICS

Another area that warrants further research is the overall climate impact of recycling discarded electronics. There is currently little data on the net carbon impacts of collecting, transporting, and processing large volumes of discarded electronics. In a future "carbon constrained" world, these impacts need to be better understood.

Recycling can play a positive role in addressing climate change by conserving resources such as precious metals contained in electronics, and displacing the energy impacts associated with mining or otherwise producing necessary raw materials. But the process of collecting and transporting these products on a large scale will also generate emissions of greenhouse gases, and therefore contribute to climate change. We need a better understanding of whether the benefits of recycling these products outweigh the potential adverse climate impacts associated with this activity, as well as ways of mitigating any adverse impacts. Unfortunately, little research has been done in this area to enable policymakers and industry to understand these impacts and assess ways of mitigating them. These climate impacts can also have an important effect on the economics of e-recycling in a future world where emissions of greenhouse gases are capped or otherwise restricted.

V.   CONCLUSION

HP is committed to strengthening our leadership in e-recycling and innovative product design. We have suggested a number of areas for further research that would enable HP and others in the tech industry to do a better job at these tasks. HP looks forward to working with the Subcommittee and other Members of Congress on the development of a national recycling system that leverages the capabilities and expertise of manufacturers, retailers, recyclers, and others to achieve efficient and low cost opportunities for all consumers.

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