# Inside

# Closing the Circle News

As we approach the first anniversary of the signing of Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," we can celebrate many accomplishments in increasing the sustainability of Federal agency operations. In this issue of *Closing the Circle News*, we focus on our on-going electronics stewardship activities.

We have made impressive progress since 11 Federal agencies, and the Executive Office of the President, signed on November 15, 2004, a Memorandum of Understanding (MOU) on "Promoting Sustainable Environmental Stewardship of Federal Electronics Assets." This MOU committed the Federal government, for the first time ever, to lead by example in demonstrating environmental stewardship in the management of its electronic assets.

Since the signing of this historical MOU, Federal agency involvement in initiatives such as the Federal Electronics Challenge (FEC) has grown from about a dozen facilities to close to 150 active partners. In FY 2005-06, these FEC partners purchased close to 500,000 green electronic products; reused or donated more than 59,000 computer desktops, laptops, and monitors; and recycled more than 35,000 obsolete computer desktops, laptops, and monitors. Federal agencies also donated and recycled approximately 4.4 million pounds of electronics as part of the Electronics Reuse and Recycling Campaign, which translated into an estimated savings of approximately $26.8 million in energy costs, and reduced energy use by 310 GWh — enough to power 27,000 households for a year! Between July 2006 — when the program was officially launched by the Environmental Protection Agency — through December 2006, we have used the government purchasing power to promote the purchase of 14 million Electronic Product Environmental Assessment Tool-registered computers, laptops, and monitors in the U.S. and 22 million EPEAT-registered products worldwide.

E.O. 13423 also marked a pivotal milestone in our continued commitment to Federal electronics stewardship by elevating, and expanding on, the MOU and giving it executive order stature. Section 2(h) of the E.O. requires that Federal agencies purchase available EPEAT-registered electronic at least a 95 percent rate, enable the Energy Star feature on agency computers and monitors, establish and implement policies to extend the useful life of agency electronic equipment, and use environmentally sound practices when the electronic equipment has reached the end of its useful life. New programs and initiatives already underway by the Federal community to meet these goals will help make the acquisition, operation and disposition activities of the federal government even more sustainable.

I dedicate this issue of *Closing the Circle News* to all of you who work so hard to demonstrate that the Federal government can indeed lead by example in electronics stewardship and other sustainable programs. Congratulations and keep up the good work!

Ed Pinero
Federal Environmental Executive

# The Electronics Stewardship Challenge

**R**apid advances in information technology (IT) have led to increasing sales of new electronic devices in the U.S. and all over the world. According to the Consumer Electronics Association (CEA), Americans own some 2 billion electronic products – about 25 products per household. This rapid growth has increased energy consumption and created a significant stream of obsolete and discarded products needing appropriate response at end-of-life. Certain types of electronic equipment also contain materials such as lead, mercury, and other toxic constituents which assist in the performance of the products but which can have adverse effects on human health and the environment if improperly managed during manufacturing, or disposal.

Increasing reuse and recycling of electronics at end-of-life is an important way to conserve resources and to minimize environmental harm involved in the extraction and manufacture of materials used in electronic products. Electronics are made with valuable resources such as precious metals, engineered plastics, glass, and other materials — all of which require energy to manufacture. When equipment is thrown away, these resources cannot be recovered, and additional pollution is generated when manufacturing new products out of virgin materials. Recycling end-of-life electronic materials conserves natural resources and reduces pollution and greenhouse gas emissions that are caused by manufacturing new products.

## Evolution of Federal Electronics Initiatives

In 2004, 11 agencies and the Executive Office of the President signed the trailblazing electronics stewardship Memorandum of Understanding (MOU). E.O. 13423 takes Federal electronics stewardship a step further by elevating the MOU and requiring all agencies to purchase green office electronics, operate electronics sustainably, and address end-of-life disposition.

Section 2(h) of the E.O. requires that Federal agencies: (i) when acquiring an electronic product to meet its requirements, meet at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product, (ii) enable the Energy Star feature on agency computers and monitors, (iii) establish and implements policies to extend the useful life of agency electronic equipment, and (iv) use environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.

In support of the MOU and E.O. 13423 electronics stewardship goals, representatives from Federal agency environment, IT, personal property, and procurement communities meet monthly as the Federal Electronics Stewardship Working Group (FESWG). The Office of the Federal Environmental Executive serves as the Chair of the FESWG. The workgroup helps coordinate efforts to implement the new E.O. electronics stewardship goals and to exchange information concerning existing and planned initiatives to improve Federal electronic equipment acquisition, operations, and disposal practices. **> > >**

### In FY 2005 and FY 2006, FEC Partners:

- Purchased more than 58,000 EPEAT-registered products

- Reused or donated more than 59,000 computer desktops, laptops, and monitors

- Recycled more than 35,000 obsolete computer desktops, laptops, and monitors

- Saved more than 189,000 megawatt hours (MWh) of energy, enough to power more than 16,000 U.S. households for one year

- Saved more than 66 million pounds (lbs) of primary materials, the weight of more than 234,000 refrigerators

- Reduced greenhouse gas emissions by 32.8 million lbs of carbon equivalent, equivalent to removing more than 11,000 passenger cars from the road for one year

- Reduced air emissions by 1.7 billion lbs

- Reduced water emissions by 3.5 million lbs

- Eliminated the use of more than 13,200 lbs of toxic materials, equivalent to the weight of over 3,000 bricks

- Saved 2.6 million lbs of municipal solid waste, equivalent to the waste generated by more than 650 U.S. households in one year

- Reduced hazardous waste by more than 871,000 lbs

- Saved $16.4 million

# Federal Electronics Challenge

## Electronics Stewardship One Byte @ A Time

**> > >** The "Implementation Instructions for Executive Order 13423," issued by CEQ Chairman James L. Connaughton to heads of agencies, on March 29, 2007, requires agencies and their facilities to become partners in the Federal Electronic Challenge (FEC) or implement an equivalent electronics stewardship program. The FEC is a partnership program that encourages Federal agencies and facilities to procure and lease environmentally preferable electronics, and reduce the impacts of the electronics during use and at disposal. The FEC provides agency and facility partners with resources and technical assistance for improving electronics management practices, and gives annual recognition to facility partners that have achieved specific goals. Fifteen Federal agencies have signed up as FEC agency partners, and 142 Federal facilities, covering more than 476,000 employees, have signed up for the challenge as facility partners.

A significant library of FEC resources is web-accessible at http://www.federalelectronicschallenge.net. The FEC has developed more than 60 document resources for Federal agencies and facilities on the environmentally preferable management of electronics. These resource documents and tools cover all three phases of the electronics life cycle at a Federal agency: acquisitions and procurement, operations and maintenance, and end-of-life management. The FEC also provides resources to assist in incorporating electronics stewardship into environmental management systems, calculating the environmental benefits of electronics stewardship, and collaborating across the Federal government. The Electronics Environmental Benefits Calculator, for example, estimates the environmental and economic benefits of purchasing EPEAT-registered products and improving operations and end-of-life management. It evaluates activities associated with desktop processors (CPUs), cathode ray tube (CRTs) and liquid crystal display (LCD) monitors, and notebook computers. It also can evaluate the benefits of recycling and reusing mobile telephones. You can find information about, and a link to, the calculator at http://www. federalelectronicschallenge.net/ resources/bencalc.htm.

**Answers to Frequent Questions: Energy Star and EPEAT**

The FEC, Energy Star, and EPEAT programs developed a fact sheet to assist Federal purchasers in understanding the new Energy Star 4.0 computer specification and its impact on EPEAT-registered products. This fact sheet is one of the many resources available on the FEC web site.

The FEC partnership includes Federal facilities of all sizes across the U.S., including small facilities such as the Drug Enforcement Agency Western Laboratory, which has 35 employees, as well as much larger organizations such as the Transportation Security Administration, with 43,000 employees. Many Federal agencies have incorporated participation in the FEC into their Electronics Stewardship Implementation Plans and have ambitious goals to register all of their subcomponents as facility partners and apply for annual FEC recognition. See the Fall 2004 and Fall 2005 editions of Closing the Circle News for more information about the FEC and the resources it offers. **> > >**

Each year, FEC Facility Partners may apply for and receive annual recognition at one of three levels – Gold, Silver, or Bronze – depending on the activities completed. Following are three of the best programs in 2007.

## Gold Level

**Region 10**
**U.S. Environmental Protection**
**Agency (EPA)**
**Seattle, WA**

A Silver-Level award winner in 2004, EPA's Region 10 advanced to Gold this year. EPA Region 10 purchased 100 percent of its new monitors Energy Star compliant. The laptops purchased for the past year were all EPEAT-Silver rated. The Energy Star function was enabled on all monitors for staff (approximately 95 percent of all monitors).

EPA Region 10 has a power off policy for computers when employees leave at night. The policy is posted on the Intranet website, and staff is reminded throughout the year. Only when the IT department needs to push out updates via the LAN are email messages sent telling employees to leave their computers on.

The Region also has a set policy for surplus electronic equipment that includes proper instructions for recycling of the equipment by the donee after the end of the equipment's useful life. A letter and a fact sheet are provided with donated excess equipment explaining the proper procedures and recommended companies for recycling and disposal of PCs and monitors.

For the last two years, EPA Region 10 has used the Recycling Electronics and Asset Disposition (READ) contract to manage its surplus electronic equipment. In 2006, the Region recycled an estimated 10 tons of electronics, including 170 CPUs, 67 monitors, 6 scanners, 12 routers, 27 printers, 13 typewriters, 22 docking stations, 6 fax machines, 40 servers, and 4 pallets of miscellaneous materials (peripherals).

## Silver Level

**Ames Research Facility**
**The National Aeronautics and**
**    Space Administration (NASA)**
**Moffett Field, CA**

A Silver-Level award winner in 2004, NASA's Ames Research Facility continues to excel. It is committed to reducing facility energy use to 30 percent by 2010. Among the various energy reduction activities, Ames ensures that energy-saving features are enabled on all are Energy Star office equipment. In 2006, Ames began to replace traditional electric office space heaters with radiant heat panels that use one-tenth the electricity. Ames also removed more than 1,000 CRT monitors, upgrading most of these with notebooks and LCD monitors which are more energy efficient.

Instead of landfilling used equipment, Ames donated 394 computer systems (both desktops and notebooks) to schools for reuse, and 1,040 units, mostly monitors, were sent to an approved recycling facility. All shredded or crushed material is separated and sent to recovery markets, and nothing is disposed in landfills.

## Bronze Level

**Idaho National Laboratory Site**
**U.S. Department of Energy**
**    (DOE)**
**Idaho Falls, ID**

At the INL Site, 100 percent of monitors purchased are Energy Star-compliant, and approximately 72 percent of monitors have the sleep function enabled. In addition, INL has a very active energy management program that tracks the compliance for the entire INL Site. INL utilizes its daily newsletters to regularly remind employees throughout the year to turn their computers off on nights and weekends. INL met all Federal regulations and executive order requirements for the energy efficiency of electronic equipment. These included the Energy Policy Act and E.O.s 13123 (the energy efficiency E.O. prior to E.O. 13423) and 13221 (low standby power). ■

# Purchasing More Sustainable Electronics with EPEAT

**T**he Federal government is one of the largest consumers of electronics in the world, purchasing in FY 2004-05 an estimated $122.4 billion in IT products and services. Realizing this tremendous purchasing power could be used to promote more sustainable electronics, EPA and various large government IT purchasers participated in a multi-stakeholder and consensus-based process, involving electronics manufacturers, non-governmental organizations, and others, to develop the Electronic Product Environmental Assessment Tool (EPEAT) — a set of environmental performance criteria that has been finalized into the IEEE American National Standard for the Environmental Assessment of Personal Computer Products (1680). A registry of products meeting these criteria is located at www.epeat.net.
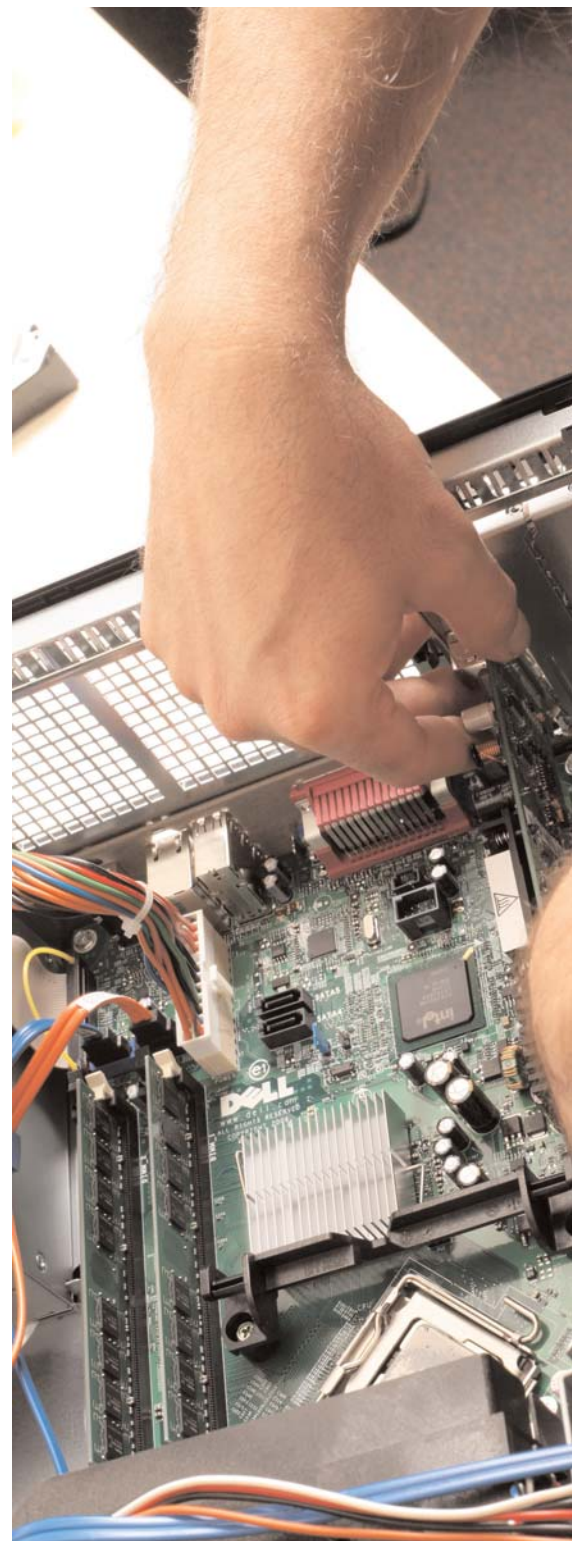
EPEAT was created to meet growing demand by large institutional purchasers for a means to readily distinguish "green" electronic products in the marketplace. EPEAT is modeled on other environmental rating tools, such as the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) Green Building Rating system. The EPEAT rating system establishes performance criteria in eight categories of product performance, including reduction or elimination of materials sensitive to the environment, design for end-of-life, life cycle extension, energy conservation, and end-of-life management.
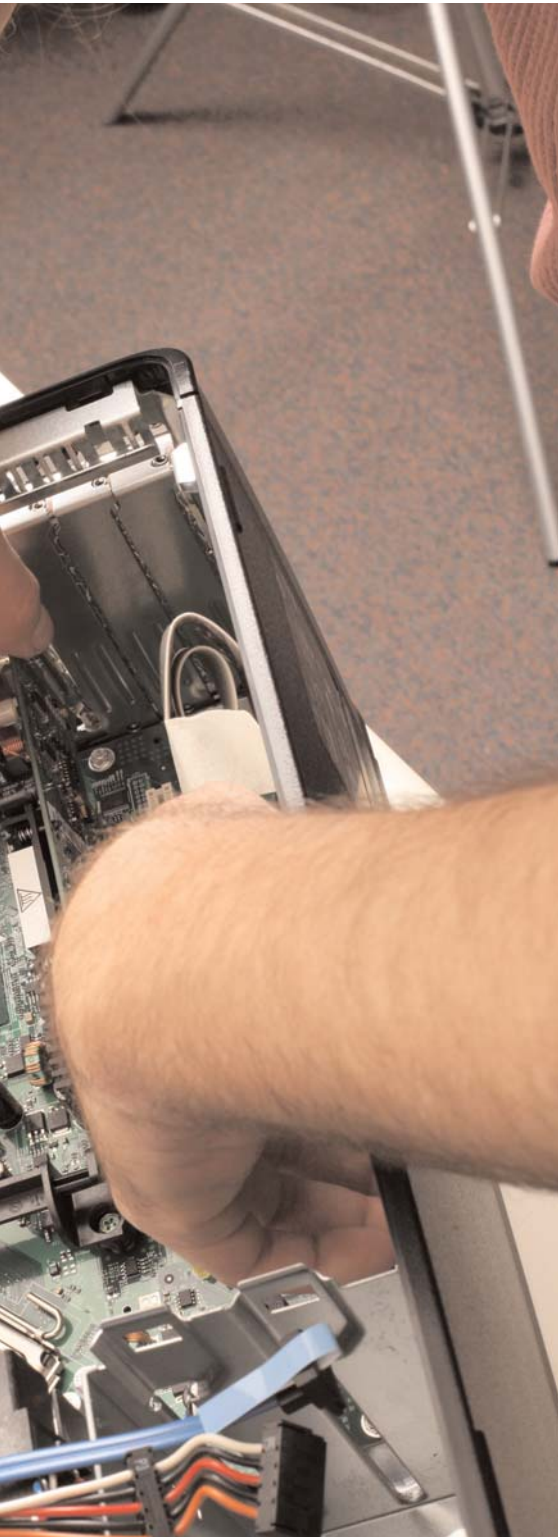
Energy consumption during use phase is a very important aspect of computers' and monitors' overall environmental performance. For this reason, American National Standard IEEE 1680 includes a criterion (4.5.1.1) that requires that any EPEAT registered product meet the current version of the applicable Energy Star standard. Therefore, all EPEAT registered products are also Energy Star qualified.

EPEAT evaluates electronic products according to three tiers of environmental performance – Bronze, Silver, and Gold. There are 51 total environmental criteria in IEEE 1680: 23 required criteria and 28 optional criteria. To qualify for registration as an EPEAT product, the product must conform to all the required criteria. Manufacturers may pick and choose among the optional criteria to boost their EPEAT "rating" to achieve a higher level. Most criteria refer to environmental performance characteristics of the specific product, and the manufacturer declares to those product criteria for each product of their choice. Some criteria refer to general corporate programs, such as a Corporate Environmental Policy, and the manufacturer declares to those criteria in an annual report.

In a short time, EPEAT has gained wide acceptance by purchasers of IT equipment in the Federal and state government and other large institutions. As of October 2007, there were a total of 651 EPEAT-registered products listed on the EPEAT Registry and available in the marketplace from 23 vendors (see text box). EPEAT has been integrated into almost $42 billion in IT procurement contracts by Federal agencies such as the Army, General Services Administration (GSA), EPA, the Executive Office of the President, and NASA, and the Departments of Energy, Homeland Security (DHS), the Interior (DOI), and Transportation (DOT). **> > >**

According to the Electronics Environmental Benefits Calculator, developed by the University of Tennessee under a Cooperative Agreement with EPA, the first six months of sales for EPEAT-registered green computers, when compared with traditional computers, produced the following environmental benefits:

- Saved 13.7 billion kWh of electricity, enough to power 1.2 million U.S. homes for a year

- Saved 24.4 million metric tons of materials, equivalent to the weight of 189 million refrigerators

- Prevented 56.5 million metric tons of air pollution, including 1.07 million metric tons of global warming gases (the equivalent of removing 852,000 cars from the road for a year)

- Prevented 118,000 metric tons of water pollution

- Reduced toxic material use by 1,070 metric tons, equivalent to the weight of 534,000 bricks, including enough mercury to fill 157,000 household fever thermometers

- Avoided the disposal of 41,100 metric tons of hazardous waste, equivalent to the weight of 20.5 million bricks

**> > >** DHS's Transportation Security Administration (TSA) recently purchased $24 million worth of EPEAT-Silver registered computers, which it is now using at airport screening stations across the country. "The EPEAT computers are meeting all our performance needs and didn't cost us any more to buy. We are very pleased", said Joe Peters, TSA's Deputy Chief Information Officer.

The Army's Small Computer Program also recently issued an IT Request for Proposal and found that 7 of 8 bidders were able to provide computers that are EPEAT registered and Energy Star 4.0 qualified.

Between the program's launch in July 2006 through December 2006, more than 14 million EPEAT-registered computers, laptops, and monitors have been sold in the U.S., and 22 million EPEAT-registered products have been sold worldwide.

EPEAT is gearing up to respond to stakeholder input and develop EPEAT standards for imaging equipment, TVs, servers, and cell phones. To get involved in any of these standard development workgroups and represent the Federal purchaser perspective, please contact Holly Elwood at elwood.holly@epa.gov. ∎

# Greener by Design

The Design for the Environment (DfE) program is one of EPA's premier partnership programs, working with individual industry sectors to compare and improve the performance and human health and environmental risks and costs of existing and alternative products, processes, and practices. DfE partnership projects promote integrating cleaner, cheaper, and smarter solutions into everyday business practices.

The DfE program has worked closely with the electronics industry to help green the manufacturing of electronics. DfE worked with the industry on ways to green the manufacture of printed wiring boards (also known as printed circuit boards), assessed the life-cycle impacts of cathode ray tubes and flat panel displays, and assessed the life-cycle impacts of tin-lead and lead-free solders used in electronics. DfE is currently working in a multi-stakeholder partnership with the electronics industry, chemical manufacturers, environmental groups, and others to evaluate flame retardant options in printed circuit boards. Following is a discussion of the lead solder life-cycle assessment and the nascent flame retardant evaluation.

## Lead-Free Solders

According to EPA, lead may cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. While initial programs to reduce lead exposure resulted in lead-free gasoline and the removal of lead from paint, more recent programs are looking at alternatives to lead in solder. The transition to lead-free solders presents a significant opportunity for risk reduction through the reduced use of lead, with worldwide estimates of tin/lead solder use at more than 176 million pounds in 2002.

International regulatory drivers such as the European Union's Waste Electronics and Electronic Equipment and Restriction of Hazardous Substances directives and Japanese takeback legislation created a global demand within the electronics industry for an objective analysis of the life-cycle environmental impacts of leading lead-free solder candidates. To address this demand, DfE entered into a voluntary partnership with representatives of the electronics industry and other interested parties to conduct a life-cycle assessment (LCA) of tin-lead and lead-free solders.

Goals of the project included:

- Evaluating the environmental impacts of tin/lead solder and selected lead-free alternative solders

- Evaluating the effects of lead-free solders on recycling and reclamation at the end of the electronic product life-cycle

- Assessing the leachability of lead-free solders and their potential environmental effects

The results of the DfE Solder LCA allows manufacturers to consider environmental concerns as well as cost and performance in choosing solders and also allows them to redirect their efforts in ways that reduce solder's environmental footprint, including reduced energy consumption, reduced releases of toxic chemicals, and decreased risks to human health and the environment. The Solders in Electronics: A Life-Cycle Assessment report and summary document are available on the DfE Program web site, at http://www.epa.gov/oppt/dfe/pubs/solder/lca/index.htm.

## Flame Retardants

Circuit boards are commonly found in electronics in consumer and industrial products, including computers and cell phones. Manufacturers commonly produce circuit boards with flame-retardant chemicals to help ensure fire safety. Some flame-retardant chemicals, however, can be harmful if released into the environment. To better understand the issue, the electronics industry is engaging with other stakeholders in a partnership with DfE to better understand the full range of options for flame retarding circuit boards.

Currently, more than 90 percent of the printed circuit boards produced meet the Underwriters Laboratory UL 94 standard for fire safety. This is achieved by the use of brominated epoxy resins in which the reactive flame retardant tetrabromobisphenol A (TBBPA) forms part of the polymeric backbone of the resin. These UL 94-compliant boards are referred to as FR-4 boards, which also must meet other performance specifications as well. Alternative flame retardant materials are used in only 3-5 percent of the current FR-4 boards, but additional alternative flame retardant materials are also under development.

Environmental and human health impacts can occur throughout the life cycle of a flame retardant material, from development and manufacture, through product use and finally at end of life of the material or product. TBBPA is the highest volume brominated flame retardant in the world, with **> > >**

> > > annual use of approximately 330 million pounds. The primary use for TBBPA is to flame retard printed circuit boards. Little information exists concerning the potential environmental and human health impacts of the materials which are being developed as alternatives to those used today that are based on brominated epoxy resins. In addition to understanding these potential impacts associated with flame retardant chemicals, stakeholders have expressed a particular interest in understanding the combustion products that could be formed during certain end of life scenarios.

The partnership has developed a testing plan to better understand the potential combustion by-products that could be formed from FR-4 laminates. Thirteen partner companies have recently committed funds to sponsor this testing. These partners include: Boliden, Supresta, ITEQ, Hewlett-Packard, Clariant, Ciba Specialty Chemicals, Sony, Intel, Isola, Dell, Fujitsu-Siemens, BSEF (Bromine Science and Environmental Forum), IBM, Matsushita Electric Industrial, and Matsushita Electric Works.

For the full list of partners in the flame retardants project and more information on the Design for the Environment program and its current and past partnerships, go to http://www.epa.gov/oppt/dfe/pubs/projects/index.htm. ■

# Extending the Useful Life of Electronic Equipment and Saving Energy

The ongoing IT revolution presents a particular challenge with regard to escalating energy use and costs. For example, the U.S. has more than 180 million personal computers (PCs) in use, which consume nearly 58 billion KWh per year, or about 2 percent of the annual electricity consumption in the nation.

Power management of PCs and monitors to reduce their energy consumption when not in use has the potential to save significant amounts of electricity as well as deliver substantial economic and environmental benefits. Power management features can save $25 to $75 annually per computer.

The Army, Department of Labor, and DOE provide three recent examples of proactive power management. In May 2006, the Army Headquarters Information Management Support Center (IMCEN), in Virginia, activated computer power management on 10,000 computers, setting them to 30 minutes. In August 2007, the U.S. Department of Labor's CIO office set a deadline of the end of the end of 2008 for computer power management implementation on their approximately 17,000 PCs. In January 2007, DOE's Office of Legacy Management in Grand Junction, CO, confirmed that it had activated computer and monitor power management on 500 computers, setting them also to 30 minutes.

The Energy Star program is making great strides to transform the computer and electronics market so that products are more efficient while they are in use (through on mode and power supply efficiency requirements) and move quickly to low power states when not in use through implementation of power management. EPA recently revised the Energy Star specifications for desktop and notebook computers, workstations, integrated computers, desktop-derived servers, and game consoles. Under the new version 4.0 specifications, only the most energy-efficient computer related equipment will earn the Energy Star label, representing the top of their class. The new specifications went into effect in July 2007and are expected to save consumers and businesses more than $1.8 billion in energy costs over the next five years and avoid greenhouse gas emissions equivalent to those from 2.7 million cars.

If every computer they purchase meets the new Energy Star requirements, businesses could potentially save $210 million over the lifetime of their new computers, equal to lighting 120 million square feet of U.S. commercial building space each year. Government agencies buying Energy Star will also garner big savings. If the government sector buys only computers that meet the new Energy Star requirements, it could potentially save nearly 1.4 billion KWh and reduce greenhouse gas emissions by 2 billion pounds each year.

EPA has also recently made the Energy Star label available for external power adapters that meet EPA's newly established energy efficiency guidelines. Power adapters, also known as external power supplies, recharge or power many electronic products – such as cell phones, digital cameras, answering machines, camcorders, personal digital assistants (PDAs), MP3 players, and a host of other electronics and appliances.

As many as 1.5 billion power adapters are currently used in the U.S. — about five for every American. The total electricity flowing through external and internal power supplies in the U.S. alone is about 300 billion Kilowatts per year. This equals about $30 billion a year, or 11 percent of the national electric bill.

On average, Energy Star qualified power adapters will be 35 percent more efficient than non-qualified products, according to EPA. More efficient adapters have the potential to save more than 5 billion KWh of energy per year in this country and prevent the release of more than 4 million tons of greenhouse gas emissions. This is the equivalent of to making 700,000 cars emissions free. ■

# Computers for Learning Program

The Computers for Learning Program (CFL) program evolved as a guide for implementing Executive Order 12999, Educational Technology: Ensuring Opportunity for all Children in the Next Century. E.O. 12999 directs Federal agencies, to the extent permitted by law, to transfer excess computers and related peripheral equipment directly to schools and some educational nonprofit organizations.

The CFL program's ambitious goal is to make modern computer technology an integral part of every classroom so that every child has the opportunity to be educated to his or her full potential. Direct transfers are authorized by law through 15 USC 3710(i) commonly known as the Stevenson-Wydler Act (amended by Public Law 102-245 on February 14, 1992).

During FY 2004 through 2006, GSA successfully transferred 41,973 computers and 6,230 printers to schools and educational non-profit organizations. Arrangements are made through http://computersforlearning.gov. The new CFL web site is an excellent tool to match school's needs with excess Federal computers.

For example, in the Spring of 2006, GSA's Northeast & Caribbean Region employees Catherine Morant, Philip Heitner, and Diane Marinacci went back to grade school recently when they paid a visit to P.S. 89 in the Bronx, New York City. The trio was invited to the school by Principal Ronald Rivera to see first hand how the computers GSA donated to the school through the GSA program were being used. Several months earlier, Principal Rivera was bemoaning the lack of computers at his school to WINS radio. The on-air segment was heard by Ms. Marinacci who contacted Principal Rivera and told him about CFL. The result was a donation of 400 pieces of excess computer equipment to the school and the invitation for the GSA team to visit. ∎

# Electronics Reuse and Recycling Campaign

In 2005, in order to demonstrate the Federal government's commitment to electronics stewardship at end-of-life, to address problems associated with electronics recycling in the federal sector, and to recognize agency efforts to reuse and recycle excess or surplus electronics, OFEE, EPA, and several other Federal partners launched the Electronics Reuse and Recycling Campaign (ERRC).

After the first competition, the program successfully reused and recycled approximately 2 million pounds of electronics. DOE was recognized as the Agency winner for reusing and recycling more than 250 tons of electronics from their participating facilities. A special award was also presented to the Federal Emergency Management Agency (FEMA) and EPA for their electronic recycling efforts in the Hurricane Katrina-affected areas. In response to the devastation caused by Hurricane Katrina, EPA's Region 6 coordinated with FEMA and properly disposed of 5,000 tons of discarded electronics from New Orleans and surrounding areas.

In the 2006 ERRC, a total of 14 winners were selected from 12 agencies and 124 facilities which reused and recycled approximately 1,200 tons of electronics. DOE again received the top Agency honors for reusing and recycling more than 300 tons of electronics from its 19 participating facilities.

For more information about the ERRC, go to http://www.federalelectronicschallenge.net/errc/ ∎

Overall, agency participants in the ERRC successfully reused and recycled approximately 2,200 tons of electronics, which translates into the following benefits:

- Estimated savings of approximately $26.8 million in energy costs

- Reducing energy use by 310 GWh, enough to power 27,346 households for a year

- Reducing greenhouse gas emissions by 24,345 metric tons of carbon equivalent, which is equal to driving 19,322 "emission-free" cars for a year

- Reducing material use by 1,963 metric tons

# E.O. 13423 Implementing Instructions for Electronics Stewardship

*E.O. 13423, sec. 2(h): In implementing the policy set forth in section 1 of this order, the head of each agency shall:*

*(h) ensure that the agency (i) when acquiring an electronic product to meet its requirements, meets at least 95 percent of those requirements with an Electronic Product Environmental Assessment Tool (EPEAT)-registered electronic product, unless there is no EPEAT standard for such product, (ii) enables the Energy Star® feature on agency computers and monitors, (iii) establishes and implements policies to extend the useful life of agency electronic equipment, and (iv) uses environmentally sound practices with respect to disposition of agency electronic equipment that has reached the end of its useful life.*

*Sec. 3(a), excerpted, and (f): In implementing the policy set forth in section 1 of this order, the head of each agency shall:*

*(a) implement within the agency sustainable practices for… (ix) electronic equipment management ….*

*(e) ensure that contracts entered into after the date of this order for contractor operation of government-owned facilities or vehicles require the contractor to comply with the provisions of this order with respect to such facilities or vehicles to the same extent as the agency would be required to comply if the agency operated the facilities or vehicles.*

*Lead Agencies: OFEE and EPA Workgroup: Federal Electronics Stewardship Workgroup*

## A. Life-Cycle Activities

Each agency shall seek to reduce the environmental and energy impacts of its electronic equipment purchase, use, and disposal through continual improvements to the acquisition, design, specifications, material choices, distribution, and use of new electronic equipment, and the reuse, de-manufacturing, and recycling of surplus electronic equipment.

In meeting the electronics stewardship goal of section 2(h) of the E.O., each agency shall:

- Acquire more energy efficient and environmentally sustainable electronic equipment that is cost effective, while maintaining or improving equipment quality and performance.

- Identify and implement best life-cycle management business practices for electronic equipment.

- Reduce the economic and environmental life-cycle costs of Federal electronic equipment.

- Promote growth of the market and infrastructure for the reuse, donation, transfer, sale, de-manufacturing, and recycling of obsolete electronic equipment.

• Coordinate and cooperate with other public and private sector efforts aimed at achieving similar goals.

## B. Electronics Stewardship Plan

By May 1, 2007, each agency shall develop and submit to OFEE a plan to implement electronics stewardship practices for all eligible owned or leased electronic equipment in support of the goals in section 2(h) of the E.O.1

The plan shall:

(1)  Address the three life-cycle phases for electronics assets: acquisition, operations and maintenance, and end-of life.

(2)  Be developed and implemented in coordination with the energy, environmental, information technology, acquisition, financial and property officers, and facility managers and maintenance personnel, within each agency.

(3)  Address how the agency will:

    (i)  Acquire 95 percent of its electronic products as Electronic Product Environmental Assessment Tool (EPEAT)-registered (for products for which there are EPEAT standards).2

        a  Agencies will ensure applicable IT contracts incorporate appropriate language for the procurement of EPEAT-registered equipment, and address any future FAR clauses related to EPEAT.

        b  Agencies will strive to purchase to EPEAT Silver rated electronic products or higher if available.

    (ii)  Ensure that Energy Star® features are enabled on 100 percent of computers and monitors or to the maximum degree based on mission needs.3

    (iii)  Have policies and programs to extend the useful lifetime of electronic equipment. As part of the policies and programs, agencies will:

a. Strive to extend the useful lifetime of electronic equipment to four (4) or more years.

b. Use EPA's guidance to improve the operation and maintenance of electronics products provided at www.federalelectronicschallenge.net/resources/docs/oandm.pdf.

c. Implement procedures to ensure the timely reuse and donation of equipment.

(iv) Ensure that all non-usable electronic products are reused, donated, sold, or recycled using environmentally sound management practices at end of life.

a. Agencies shall comply with GSA procedures for the transfer, donation, sale and recycling of electronic equipment, provided at www.federalelectronicschallenge.net/resources/docs/gsa_eolfact.pdf, as well as any applicable Federal, State an local laws and regulations.

b. Agencies shall use national standards, best management practices, or a national certification program for recyclers. In the absence of national standards, best management practices, or a national certification program for recyclers, agencies shall use EPA's Guidelines for Materials Management for Plug-In To eCycling partners found at www.epa.gov/epaoswer/osw/conserve/plugin/guide.htm.

c. Agencies shall comply with GSA's Computers for Learning Program (CFL) under E.O. 12999 when transferring their computers and other eligible equipment and shall use GSA's CFL website, www.computers.fed.gov, to affect the transfer.

d. Agencies shall ensure applicable IT contracts for leased equipment incorporate adequate language to require that, at the end of the lease period, the equipment is reused, donated, sold, or recycled using environmentally sound management practices.

(4) Address the reporting procedure to be used in measuring progress toward meeting the goals in section 2(h) of the E.O. The Federal Electronics Stewardship Workgroup may provide additional guidance on options for reporting.

## C. Federal Electronics Challenge

Each agency and its facilities shall choose either to become a partner in the Federal Electronics Challenge (FEC), or to implement an equivalent electronics stewardship program that addresses purchase, operation and maintenance, and end-of-life management strategies for electronic assets consistent with FEC's recommended practices and guidelines.

Information about the FEC, including instructions for how to become a partner, can be found on the FEC website, http://www.federalelectronicschallenge.net.

-----

[1] Federal agencies could determine that some electronic equipment may not be eligible to comply with some or all the goals in section 2(h) of the E.O. because of security, emergency support or other sensitive/mission critical considerations.

[2] The Electronic Product Environmental Assessment Tool (EPEAT) is an easy-to-use tool to help purchasers rank electronics products based on their environmental attributes. For information, assistance and other support on the EPEAT tool, go to: http://www.epeat.net.

[3] For information, assistance and technical support on purchasing Energy Star Compliant Electronics and implementing power management features in PCs, laptops and monitors, go to http://www.energystar.gov/index.cfm?c=ofc_equip.pr_office_equipment

# Plug-In to eCycling

In 2003, EPA launched Plug-In To eCycling, a voluntary partnership with electronics manufacturers and retailers to offer consumers more opportunities to donate or recycle their used electronics. Partners design and implement various approaches — either national or regional in scope — to give individuals eCycling options. Partners might offer online takeback or trade-in programs, create partnerships with local organizations to facilitate collections, host collection events at retail locations, and support local recycling events with cities and municipalities.

Through Plug-In, EPA has partnered with 23 manufacturers and retailers of consumer electronics. Plug-In partners include AT&T, Best Buy, Dell, eBay's Rethink initiative, Intel, Hewlett Packard, JVC, Lexmark, LG, Motorola, NEC Display, Nokia, Office Depot, Panasonic, Philips, Sharp, Sony, Sony Ericsson, Sprint, Samsung, Staples, T-Mobile, and Toshiba. As a result of their collaborative efforts, partners recycled more than 17,000 tons of electronics in 2006 alone. The energy conserved and greenhouse gas emissions prevented through these recycling efforts is equivalent to saving enough electricity to power more than 7,000 homes and having more than 12,000 cars emissions-free for a year. Between 2003 and 2006, approximately 47,500 tons of electronics were recycled via voluntary industry efforts.

In Fall 2007, the program began to increase public awareness of opportunities for donating and recycling cell phones. In conjunction with its partners who are cell phone manufacturers, retailers, and carriers, Plug-In plans to develop a national campaign to spur consumer partici-pation in existing collection programs.

## What Can Be eCycled

- Hard drives
- Monitors
- Keyboards
- Printers
- Televisions
- DVD players
- VCRs
- Software
- Cell phones
- Pagers
- Digital equipment
- Scanners
- and much, much more...

## EPA's Plug-In To eCycling Program

Plug-In To eCycling aims to give Americans more opportunities to safely, conveniently, and affordably recycle their old electronics.

Plug-In is one of many new efforts under EPA's Resource Conservation Challenge (RCC). The RCC challenges all Americans—makers, sellers, and buyers of goods—to embrace a new resource conservation ethic. It encourages the design of greener products, wiser product purchasing, and reuse and recovery of products.

EPA recognizes the following Plug-In To eCycling partners for their contribution to safe electronics recycling.

Apple · AT&T Wireless · BEST BUY · brother · DELL · EPSON · good guys · hp invent · intel · JVC · LEXMARK · Office DEPOT · Panasonic · Pioneer · PHILIPS · SHARP · SONY · SAMSUNG · STAPLES

All Plug-In partners work with recyclers who meet or exceed EPA's "Guidelines for Materials Management," the Agency's voluntary guidelines for safe electronics recycling, located at www.epa.gov/plugin. The Guidelines encourage anyone who handles used electronic equipment to do the following:

- Maximize the reuse, refurbishment, and recycling of equipment

- Take precautions to reduce emissions and exposures to workers and the environment

- Provide special handling of components which may contain substances of concern

- Ensure that exported electronic products are being sent for legitimate reuse, recycling, or refurbishment

- Ensure that collection, recycling and refurbishing, and disposal facilities follow management practices that are consistent with the guidelines

EPA also developed "Do the PC Thing," guides for both consumers and businesses to help them donate their used electronics. Go to http://www.epa.gov/epaoswer/osw/conserve/plugin/pcthing.htm to see the brochures. > > >

## Past and Recent Program Accomplishments

In 2004, EPA launched a number of Plug-In pilot programs with manufacturers, retailers, and local governments to create more compelling opportunities for consumers to drop off old electronics. These pilots succeeded in collecting more than 5,500 tons of used electronics and demonstrating that, when the circumstances are right, retail collection can be a successful model:

- A Staples pilot in New England collected more than 57 tons through in-store collection and "reverse distribution," by making use of Staples existing distribution network. In this pilot, trucks dropping off new equipment at Staples stores removed electronics that had been dropped off and took them to Staples distribution centers rather than returning empty.

- The Good Guys pilot in the Seattle area collected more than 4,000 TVs — double the quantity expected — by offering in-store take back and a low fee for drop-off countered by a purchase rebate.

- Office Depot and Hewlett Packard worked together to offer free in store take-back of consumer electronics in all 850 Office Depot stores for a limited time period. It resulted in 10.5 million pounds collected — more than 440 tractor-trailer loads.

As a result of the pilot programs, in 2005, Staples became the first national retailer to offer ongoing in-store take back of used computers, monitors, and other computer peripherals through its participation in the Pacific Northwest's Take it Back Network, a consortium of retailers and recyclers that accept electronics from consumers for recycling. Then, in May 2007, Staples took its program nationwide, where consumers can recycle used computer equipment for a $10 fee in all 1400 Staples stores across the continental U.S.

In 2005 and 2006, Plug-In partners assisted in Hurricane Katrina cleanup efforts. Dell's sponsored event in December 2005 collected more than five tons from residents in New Orleans. In March 2006, Best Buy collected and recycled more than 110 tons of electronics from households in Mississippi and New Orleans that would otherwise have been landfilled.

Also during 2005 and 2006, various partners cultivated and supported sustainable eCycling solutions via new partnerships with community organizations and states. Dell partnered with Goodwill industries in San Francisco, the state of Michigan, parts of North Carolina, Pittsburgh, and Austin and San Antonio, TX, allowing consumers to bring used computers at no cost to their local Goodwill stores for resale and recycling. In September 2006, Dell also launched free online recycling for any used Dell computer. In Fall 2006, Hewlett Packard launched a recycling tour in 6 states by partnering with Wal-Mart, Best Buy, and local recyclers to collect more than 300 tons of electronics in events held in the retailers' parking lots.

In 2006, Plug-In To eCycling also partnered with the State of Montana to pilot shared responsibility electronics recycling systems in a rural setting. With the support of Best Buy, Staples, and seven electronics manufacturers — Panasonic, Sony, JVC, Philips, Toshiba, Lexmark, Sharp – more than 129 tons were collected in 4 cities. Based on lessons learned, Montana will determine how to structure its future electronics recycling program and EPA will apply lessons learned to other rural states that currently lack electronics recycling programs.

- In 2007, partners expanded their programs even more.

- In addition to Staples' program, Dell expanded its Reconnect program to the state of New Jersey.

- Toshiba launched an online recycling program for used Toshiba laptops.

- Sony teamed up with Waste Management to offer free recycling of Sony televisions at Waste Management Depots across the country. The program will be piloted at 75 locations during its first year, starting Fall 2007, with a rollout to 150 locations afterwards.

- AT&T launched "Cell Phones for Soldiers," which uses proceeds from cell phone recycling to provide calling cards to soldiers stationed overseas.

In 2008, EPA anticipates that more companies will continue to develop convenient, environmentally friendly programs to help consumers reuse or recycle their used electronics.

More information is available at www.epa.gov/plugin/. ■

# Combining Government Purchasing Power to Promote Recycling

In FY 2005, EPA awarded a government-wide acquisition contract (GWAC) for electronics recycling and asset disposal services. Known as the Recycling Electronics and Asset Disposition (READ) services program, the GWAC provides all Federal agencies with a procurement tool to properly manage electronics and recycle and properly dispose of excess or obsolete electronics in an environmentally responsible manner. The READ GWAC consists of five-year multiple awards contracts to seven small businesses. The READ contractors offer logistical and inventory support, testing, auditing, and tracking, data security, valuation process, recycling, management and technical support services.

To date, READ has issued more than 30 task orders to seven agencies, including EPA, the Federal Emergency Management Agency (FEMA), the Bureau of Alcohol, Tobacco and Firearms (ATF), the National Park Service (NPS), the Department of Education (DoEd), the Federal Retirement Thrift Investment Board (FRTIB) and the U.S Army Corps of Engineers (USACE). FEMA and USACE have allotted close to $6 million to READ to recycle electronic equipment from the regions affected by Hurricanes Katrina and Rita. READ contractors removed two to four truckloads of electronic equipment per day for recycling, weighing approximately 30,000 pounds each. More than 12,500 tons of electronic scrap have been recycled to date through the READ GWAC. USACE is now providing its services for the continuing READ Katrina and Rita cleanup efforts. ATF and Education have several READ orders for their nationwide locations, while the FRTIB was the first Agency to issue its own READ order.

For more information about the READ GWAC, visit www.epa.gov/oam/read. ∎

# Electronics Recycling Through Federal Prison Industries



Federal Prison Industries (FPI), under its trade name UNICOR, recycles computers and other electronic items in a safe manner, while fulfilling the Agency's mission to train prison inmates. UNICOR's Recycling Business Group is ISO 9001:2000 registered and International Association Electronics Recyclers (IAER) registered. UNICOR factories undergo intensive technical reviews of their ability to perform effective, responsible recycling activities, including safety procedures, and materials handling and disposition.

UNICOR processes computers and electronic equipment from anywhere in the country, refurbishes equipment for resale, and recycles millions of tons of electronics material annually that cannot be reused or resold. Several Federal agencies, including the Departments of Defense, the Interior, Veterans Afffairs, Justice, and the Treasury are using UNICOR to recycle or destroy surplus computers and electronics. UNICOR also works with many other Federal and state agencies in developing recycling partnerships.

UNICOR's recycling program gives more than 1,200 Federal inmates at eight computer/electronics recycling locations and five collection sites in the U.S. an opportunity to voluntarily participate in a work program. While developing job skills, these inmates improve their self-worth and prepare for release. Inmates use their earnings to pay victim restitution and court-ordered fines, as well as to meet family and child support obligations.

UNICOR's Recycling Business Group has expanded its operations to eight recycling factories and five collection sites. The Recycling Factories are located in Atwater, CA; Tucson, AZ; Texarkana, TX; Marianna, FL; Ft. Dix, NJ; Elkton, OH; Lewisburg, PA and Leavenworth, KS. The collection sites are located in Landover, MD; Englewood, CO; Atlanta, GA; Miami, FL; and Sheridan, OR. ∎

# E-Cycling @ USDA

*By Mark Sajbel, Program Analyst, USDA*

The U.S. Department of Agriculture (USDA) has three good reasons to implement the electronics stewardship provisions of E.O. 13423: it's the law, it's good for the environment, and it will save money. In compliance with E.O. 13423, USDA wrote an Electronics Stewardship Implementation Plan, which was signed by the Agency Senior Official and the Acting Chief Information Officer in July 2007 (http://greening.usda.gov/elect_steward.htm). To implement the first two life cycle phases — acquisition and operations — USDA has put together teams from procurement, IT, environmental policy, and finance to work out the guidance and logistics necessary to cover such a large organization (110,000 employees). In these life cycle phases, USDA is working on factors it can control, such as computer power management policy, while awaiting others, such as the issuance of the Federal Acquisition Regulation (FAR) clause for purchasing EPEAT-registered products. The focus of this article, however, is on USDA's accomplishments and objectives for the third and final lifecycle phase, end-of-life management.

## Screening (Transfer to other Federal Agencies)

The Council on Environmental Quality's implementing instructions for the end-of-life management phase of electronics stewardship are clear: "Ensure that all non-usable electronic products are reused, donated, sold, or recycled using environmentally sound management practices at end of life." To ensure that reuse, donation, sales, and recycling occur, USDA follows the Federal Management Regulation (FMR). One of the prime features of the FMR is reuse, since agencies must make excess electronics available to the entire Federal community for 21 days; this process is known as "screening". Furthermore, the FAR states that the top two mandatory sources of supply are not procurements at all but rather (1) agency inventories and (2) excess from other agencies (FAR Part 8.002). GSA, the agency with authority over most Federal excess and surplus property, has made it easy for Federal agencies to screen personal property by setting up a website that's organized by property type and geographic location, called GSAXcess® (http://gsaxcess.gov/).

## Computers for Learning

The GSAXcess® website now has a built-in module where agencies can authorize transfer of used computers to schools during the process of reporting excess property. (E.O. 12999 authorized Federal agencies to donate computers to eligible schools as soon as the computers become excess to the agencies' needs.) Previously, agencies had to post computer equipment for schools on a separate "Computers for Learning (CFL)" website. From their end of the retooled website, registered schools and educational nonprofits select the computer equipment they need by placing the items in a virtual shopping cart and proceeding to checkout. Upon checkout, the system sends the reporting agency an email notice, notifying it that a school has requested property. The agency decides if the property is available and approves allocation. Upon allocation of the property by the agency the recipient will receive final notice of transfer.

In FY 2006, USDA donated to eligible schools more than 12,000 computers worth more than $14 million in original acquisition cost. In other years, the number of donated computers has been even higher. For instance, in FY 2005, USDA donated more than 35,000 pieces of IT equipment to schools at an acquisition value of $35 million!

## Transfers to Land-Grant Institutions of Higher Learning

USDA also has the unique authority to transfer computers and other electronics, including excess medical and laboratory supplies, to certain eligible institutions of higher learning. In 1996, Congress included a provision in the Federal Agriculture Improvement and Reform Act (FAIR), Public Law 104-127, which authorizes the Secretary of Agriculture to acquire and transfer title of Federal excess personal property (FEPP) to certain eligible institutions in support of research, educational, technical, and scientific activities or related programs. This provision of the law allows eligible institutions to screen FEPP at the same time it is being screened by Federal agencies and before it is offered for screening to State agencies and other interested parties.

Under FAIR, the following institutions are eligible to participate in the FEPP program:

- 1994 Institutions as defined in the Equity in Education Land Grant Status Act of 1994 (specific Native American Institutions)

- Any Hispanic-Serving Institution as defined in the Higher Education Act of 1965; (institutions with more than 25 percent Hispanic enrollment as determined by the Department of Education) **> > >**

- Any college/university eligible to receive funds under the Act of August 30, 1890 (1890 Historically Black Colleges and Universities)

In FY 2006, several FAIR Act institutions acquired 94 electronic items worth $95,000, which was part of the 2,000 items of FEPP valued at $1.7 million that USDA transferred to them.

## Sales of Surplus Electronics

Under the FMR, surplus computers not donated to schools or State Agencies for Surplus Property are auctioned off to the public. In FY 2006, the Office of Management and Budget granted USDA authority to conduct sales of surplus property, which it does at its Beltsville Service Center (BSC) in Maryland, near Washington, DC. USDA was one of three agencies granted such authority under the Federal Asset Sales portion of the President's E-Government Initiative, the other two being the Departments of Justice and Transportation. (GSA retains overall management of Federal sales). USDA now holds

auctions not only for its own used personal property, but also for that of 13 other Federal agencies. In FY 2007, the BSC sold more than 41,000 items of FEPP. In other parts of the country, USDA uses the GSAAuctions® website (http://gsaauctions.gov/gsaauctions/gsaauctions/) as well as GSA on-site auctions to sell surplus electronics.

## Refurbishment and Recycling

The final disposition for electronics that do not sell at auction is refurbishment or recycling by an entity that uses "environmentally sound management practices." Starting in early 2007, USDA began using UNICOR, also known as the Federal Prison Industries, as the recycler and refurbisher of unusable computers in the National Capital Region. (UNICOR is a non-appropriated government program

that employs inmates in Federal prisons throughout the country, and can sell its goods and services only to other Federal agencies.) Because of the volume USDA generates, UNICOR picks up and hauls USDA's used electronics free of charge, generally taking them to the U.S. Penitentiary in Lewisburg, PA, the nearest UNICOR factory to Beltsville. USDA has sent out from the BSC about 15 truckloads of computers and other electronics — more than 60 tons' worth — to the UNICOR factory from the time this practice began in February 2007 through September 2007. In parts of the country outside the National Capital Region, USDA relies on GSA to let contracts for recycling electronics.

## Conclusion

USDA has found that complying with the FMR, as well as with E.O. 13423, not only has been good for the environment, but also has helped save the government money. In the future, USDA plans to expand the use of its Federal Asset Sales authority so that more internal, as well as external, customers are covered by the end-of-life practices that have proven so fruitful in the National Capital Region. ■
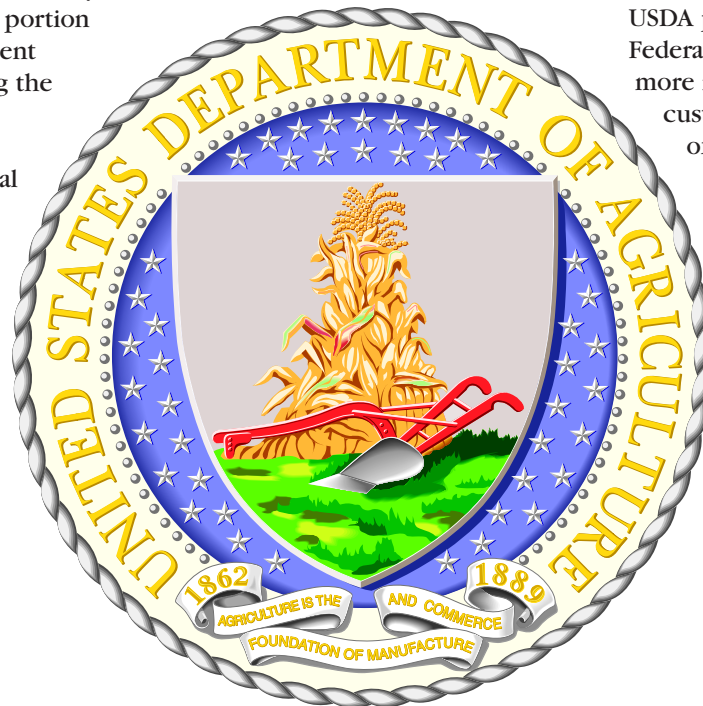
# Department of Energy's Continuous Improvement Strategies for Sustainable Electronics

As the fourth largest civilian Federal agency consumer of electronics, DOE is committed to leadership in continuously improving its sustainable purchase, operation, and disposition of electronics assets. The Department is revising DOE Order 450.1A, Environmental Protection Program and expanding its Pollution Prevention Tracking and Reporting System (P2TRS) to address the new requirements of E.O. 13423 and the E.O. implementing instructions.

The new revised order, O 450.1A, focuses on two key goals to integrate sustainable electronics stewardship requirements into the Department's culture: maximize the acquisition and use of environmentally preferable products and reduce the environmental impacts of electronic assets.

DOE is already committed to acquire EPEAT-registered environmentally preferable electronics products. But DOE Order 450.1A also prescribes additional strategies to reduce the environmental impacts of electronics assets, including:

- Establishing objectives and measurable targets in site Environmental Management Systems (EMS)

- Enabling Energy Star features (power management capabilities) on electronics products

- Extending the useful lifespan of computer systems through software upgrades and other practices

- Reusing surplus and recycling end-of-life electronics using Department-specified environmentally compliant sources

- Encouraging DOE sites to join the Federal Electronics Challenge

- Identifying adequate funding and resources needed to implement these sustainable electronics practices through the annual Department budgetary process

In order to improve effective sustainable practices among its 45 sites, DOE integrated electronics into its Pollution Prevention Tracking and Reporting System (P2TRS). The P2TRS annually tracks Departmental facility environmental progress under E.O. 13423 and the Office of Management and Budget (OMB) Environmental Stewardship Scorecard in two separate, password-protected databases:

- The Pollution Prevention Performance Database (P2 Performance Database) now reports whether or not objectives and targets for electronics stewardship have been established in the site EMS, whether or not Energy Star features have been enabled, and how end-of-life computers and monitors generated at the site are recycled.

- The Environmentally Preferable Purchasing (EPP) Database in the P2TRS was expanded to cover purchase of "green" electronics products. Users report whether or not their site has a procurement preference for EPEAT-registered electronic assets and the number of desktop computers, monitors, and laptop computers purchased or leased that had EPEAT-registered bronze, silver and gold ratings. The recycling data section of the EPP Database was re-aligned with the FEC to record the number of product types (desktop computers, CRT monitors, LCD monitors, and laptop computers) reused, recycled,

or sent for disposal to either waste-to-energy or landfill facilities.

In FY 2006, DOE disposed of approximately 1,340 metric tons of electronics (mainly desktop and notebook computers and monitors) according to its P2TRS. About 98 percent of these electronics, or more than 100,000 computers and monitors, were reused or recycled. About 208 metric tons (15.5 percent) of the total were reused, mostly through internal reuse and donations to schools and other educational institutions. More than 1,100 metric tons (82.7 percent) of DOE electronics were recycled, primarily through approved recyclers. Only 24 metric tons or 1.7 percent of electronics were disposed of in other ways.

Effective site waste reduction, operations, and procurement strategies documented by the P2TRS become lessons learned to highlight in agency-wide awards programs and share as best practices within and outside the Department. The P2TRS tracks site accomplishments for nominations for the White House Closing the Circle and FEC awards program as well as DOE's own Pollution Prevention Star Awards program.

DOE's commitment to implementing these strategies and tracking systems for the environmental management of its electronic assets will drive continual improvements in its environmentally preferable product purchases, waste reduction, reuse, recycling, and final disposition metrics. For more information about DOE's continuous improvement practices in electronics stewardship, contact EMS Assistance Network and Electronics Stewardship Coordinator Jeff Eagan at 202-586-4598 or jeff.eagan@hq.doe.gov. ■

# FAA Reclaims Space

**B**y finding an innovative mechanism to recycle obsolete office electronics while meeting the requirements of the Federal Management Regulations, the Federal Aviation Administration's (FAA) IT Asset Management Team recycled unneeded electronics, reclaimed storage space, and saved resources. The team, consisting of experts from Contracts, Purchasing, Logistics Management, IT, and process management, was tasked with clearing out unused equipment across the Air Traffic Organization (ATO). The team determined that FAA could exchange equipment for credit in the form of an exchange allowance. In September, 2006, FAA implemented new procedures that allowed for the exchange of equipment at end of life rather than excessing the equipment.

Program implementation consisted of the creation of a new Personal Property Bulletin, employee training sessions, and establishment of an exchange program with Dell Corporation's Asset Recovery Service (ARS). Since the FAA is subject to personal property disposal rules, the Personal Property Bulletin defined the policies regarding the Dell exchange program. This agreement between Dell and the FAA applies to computers, system workstations, monitors, printers, scanners, desk top copiers, facsimile machines, servers, routers, and switches. Under the new Personal Property Bulletin, the property life cycle is three years for laptops, four years for personal computers, and five years for servers, printers, and scanners. Dell exchanges old IT equipment with IT equipment procured from Dell and provides a credit to be applied toward the purchase price of replacement equipment procured. This solid, well thought out program has benefited the agency greatly by:

- Sending a driver to do Packing, Crating, Handling and Transportation (PCHT) for 10 items or more

- Picking up equipment from locations worldwide, including FAA facilities in Puerto Rico

- Crediting 90 percent of the value for marketable systems

- Sanitizing the media of saleable items using a three-pass Department of Defense standard wipe

- Destroying non-saleable items

- Providing a Settlement Report that includes every item turned in and specifics about each item

- Providing a "Certificate of Disposal" for every item turned in

Removal of equipment begins after a program officer determines that the equipment is no longer required. Personal property is identified, assessed, marked for exchange, and removed by technicians prior to pickup by Dell's ARS.

In creating the Personal Property Bulletin, the FAA made provisions for emergencies by specifying that, if IT equipment is required nationally as a result of a disaster or a critical need is identified, FAA will support that effort.

To reduce the FAA's need for additional funding for the acquisition of personal property that is being replaced, FAA exchanges property with Dell Corporation for an exchange allowance. The FAA can apply that credit to the acquisition cost of the replacement property. Using the exchange authority also enables the FAA to avoid the costs (e.g., administrative and storage) associated with holding the property and processing it through the normal disposition cycle.

The next big challenge that FAA faced was to come up with a process that could combine FAA practices with Dell's ARS program. FAA created a software interface to track the entire process flow from the creation of the job order to the final Certificate of Disposal. With this centralized process and database, FAA is able to have an accurate picture of disposals and maximize its report capabilities.

Since program conception in September 2006 through September 2007, FAA has turned in more than 16,000 items with an estimated weight of half a million pounds of raw material. Pick-ups occurred in 138 cities throughout the U.S. and U.S. territories. Additionally, FAA has saved more than $250,000 in manpower use due to program efficiency.

Equipment used in the National Airspace System (NAS) is normally exempt from the exchange process and is required to have an approved disposition plan. There are several NAS Programs that are now partnering with ATO-IT to use the Dell Exchange.

For further information please contact Bob Nims at (425) 227-2534 or Bob.Nims@faa.gov. ■

# Greening Data Centers

**D**ata centers are facilities that contain IT equipment (computing, networking, and data storage equipment), as well as power and cooling infrastructure. They are part of our critical national infrastructure, found in nearly every sector of the economy, including banking and financial services, media, manufacturing, transportation, education, health care, and government.

Power availability is one of the most important challenges facing data centers today. In the past, data center floor space was the primary area of concern. But now, more and more data centers run out of power availability before they run out of floor space. Companies such as IBM, Hewlett-Packard, Cisco, and VMware are developing new technologies, systems, and processes that can help consolidate energy use and drive down the power and cooling costs of data centers.

Here are some useful hints to consider when developing a successful strategy to address the energy management challenge in data centers:

- **Use Power-Efficient Blade Servers.** A blade server is a server chassis housing multiple thin, modular electronic circuit boards, known as server blades. Each blade is a server in its own right, often dedicated to a single application. The use of blade servers allow more processing power in less rack space, simplifying cabling and reducing overall power consumption.

- **Consolidate and Virtualize.** Virtualization is a method of running multiple independent virtual operating systems on a single physical computer.   It is a way of maximizing physical resources to maximize the investment in hardware. This technology significantly reduces the need for extra hardware, energy consumption, power, cooling, and floor space.

- **Replace CRTs with Flat Screens.** Liquid crystal displays (LCDs) in flat screen monitors use considerably less energy than cathode ray tubes (CRTs), both when running and also when in standby mode. Overall, LCDs can reduce display energy use by some 60 percent. For example, a 15 inch LCD uses around 25 watts when operational and around 3 watts when in standby mode, compared with an equivalent viewing area 17 inch CRT that uses 80 watts when operational and 5 watts in standby mode. Also, LCDs do not emit the same heat load as does a CRT, and this saves energy on air conditioning.

- **Buy Energy Star-Certified Systems.** In July 2007, Energy Star's new specifications for computers went into effect. The new specification applies to a variety of products, including desktop and notebook (or laptop) computers, integrated computer systems, desktop-derived servers, and workstations. Qualified products must now meet energy use guidelines in three distinct operating modes: standby, sleep mode, and while computers are being used. This approach ensures energy savings when a computer is active and performing a range of tasks, as well as when standing by. Newly qualified computers must also include a more efficient internal power supply.

- **Use Power Management Tools.** Energy Star Power Management features — standard in Windows and Macintosh operating systems — place inactive monitors and computers (CPU, hard drive, etc.) into a low-power sleep mode. A simple **> > >**

> > > touch of the mouse or keyboard "wakes" the computer and monitor in seconds. EPA can help activate power management features organization-wide quickly and easily to save energy, money, and help protect the environment. Monitor power management (MPM) can save $10 to $30 per monitor annually by placing inactive monitors into a low-power sleep mode. Computer power management (CPM) places inactive computers (CPU, hard drive, etc.) into a low-power sleep mode, which can save $15 to $45 per desktop computer annually. Other hardware, such as network printers, can set automatically to sleep mode when not been used for a period of time and use significantly less power.

## EPA Efforts to Green Data Centers

A recent EPA "Report to Congress on Server and Data Center Energy Efficiency" shows that data centers in the U.S. have the potential to save up to $4 billion in annual electricity costs through the use of more energy efficient equipment and operations, and a broad implementation of best management practices.

Findings from the report include:

- Data centers consumed about 60 billion kilowatt-hours (kWh) in 2006, roughly 1.5 percent of total U.S. electricity consumption.

- The energy consumption of servers and data centers has doubled in the past five years and is expected to almost double again in the next five years to more than 100 billion kWh, costing about $7.4 billion annually.

- Federal servers and data centers alone account for approximately 6 billion kWh (10 percent) of this electricity use, at a total electricity cost of about $450 million per year.

- Existing technologies and strategies could reduce typical server energy use by an estimated 25 percent, with even greater energy savings possible with advanced technologies.

The EPA report recommends various programs and incentives such as collaboration between industry and other stakeholders in the development of a standardized whole-building performance rating system for data centers, developing Energy Star specifications for servers and related product categories, and encouraging electric utilities to offer financial incentives to facilitate data center energy efficiency improvements.

The report also encourages the Federal government to partner with industries and issue a Chief Executive Officer Challenge, for private-sector CEOs to assess and improve the energy efficiency of their data centers.

EPA is initiating its process to develop an Energy Star specification for enterprise computer servers. In the coming months, EPA will conduct an analysis to determine whether such a specification for servers is viable given current market dynamics, the availability and performance of energy-efficient designs, and the potential energy savings.

In addition, EPA's Energy Star program is assessing strategies, operational changes, and behaviors that can reduce energy usage in data centers. For example, the change out of equipment in a data center, including associated cabling, can affect the flow of air in the data center, which in turn affects energy use. Other strategies being assessed include assuring that air vents are open or closed appropriately and educating data center operators about the greater range of tolerance of temperature variations of today's equipment. EPA plans to enter into dialogs with both public and private center data center operators and equipment manufacturers to identify and assess strategies and operational changes that work for reducing energy usage in data centers. In EPA's experience with similar dialogs about energy usage in other building space, a 10 – 15 percent improvement in energy efficiency can be achieved through low- or no-cost changes. ■

### An Inconvenient IT Truth

**What do Data Centers Consume?**

- 177 million kwh of electricity

- 60 million gallons of water

- 145,000 pounds of copper

- 21,000 pounds of lead

- 33,000 pounds of plastic

- 73,000 pounds of aluminum

- 12,000 pounds of solder

- 377,000 pounds of steel

- 32 million kwh of primary energy

(Source: APC -MGE)