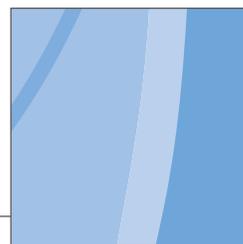
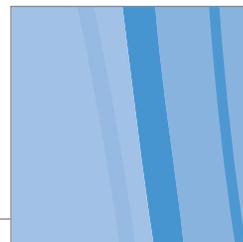
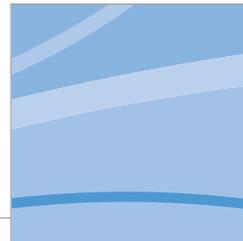
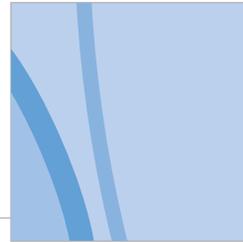

Guidelines for the Procurement, Use and End-of-Life Management of Electronic Equipment

A cooperative project between the
California Integrated Waste Management Board
and the Department of General Services



M A Y 2 0 0 3

Prepared by:
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and Maria Socolof,
University of Tennessee
in conjunction with Green Seal

Contract No. 4-01-03-0005A

STATE OF CALIFORNIA

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INTRODUCTION

Today, economic activity at California governmental agencies is increasingly occurring in an environment of information technology (IT). The rapid development of IT is transforming the nature of governmental work. This new development is driven by new technologies like the Internet, high-volume electronic data storage devices, and wireless communication.

The objective of these guidelines is to help California State agencies reduce costs and environmental impacts, and improve the efficiency of the procurement, use, and end-of-life (EOL) management of electronic equipment. The guidelines are organized into three modules:

Module I – Procurement

Module II – Use (information technology staff)

Module III – End-of-life management (surplus property management and business service officers).

Electronic equipment includes computers, monitors, servers, printers, copiers, fax machines, televisions and related office equipment.

The guidelines are designed for State agency procurement officers, information technology staff, surplus property managers and any other staff or managers involved in purchasing, using, or managing electronic equipment. Depending on the size of the State agency, multiple people may be involved in managing electronic equipment. As a result, coordination between these various staff is critical to improving the management of electronic equipment. The structure of the guidelines is based in part on the staff involved in managing electronic equipment. Purchasing managers will find Module 1 most relevant to their role. Information technology (IT) staff responsible for day-to-day operation will find Module 2 most relevant. For surplus property staff and business service officers, Module 3 will be the most relevant.

Attributes considered for electronic equipment guidelines

Electronic equipment includes computers, monitors, servers, printers, copiers, fax machines, televisions, and related office equipment. From design to disposal, electronic equipment affects the environment. Three major categories of environmental attributes should be considered in managing the purchase, use, and disposal of electronic equipment:

- 1. Energy efficiency**
- 2. Materials efficiency**
- 3. Toxics reduction**

Within each category, there may be subcategories of attributes that affect procurement, use or management. Table 1 identifies categories of environmental attributes that are considered in these guidelines and identifies which are applicable to each module. Brief descriptions of each of these three attributes follow in this section. Further discussion of how to implement purchasing and management decisions based on these attributes will be presented in each module. Figure 1 shows graphically how many of the environmental attributes apply to overlapping areas of procurement, use, and EOL considerations.

Energy Efficiency

Energy efficiency is defined as minimizing the consumption of energy, which in turn minimizes associated environmental impacts. How an electronics product is designed, set up, and used helps to determine its energy efficiency. The guidelines provide information on how to maximize energy-efficiency through procurement of electronics products that are designed to be energy efficient. These guidelines also provide information on how to set up equipment for use in the most energy-efficient manner. These issues are presented in Modules I and II.

Materials Efficiency

Materials efficiency is defined as minimizing the consumption and processing of materials, which in turn minimizes associated environmental impacts such as waste generation and natural resource consumption. Several attributes associated with the use of electronics equipment affect the efficiency with which materials are used.

These include:

- **Reduced packaging**—Can be achieved when purchasing departments work with suppliers. Reduces waste management activities for State agencies.
- **Extended product lifetime**—Reduces the need to purchase new products and dispose of surplus products. Upgrading instead of replacing products, encouraging internal reuse, proper operation and maintenance, and networking equipment help promote an extended product life, reducing waste generation and material consumption.
- **Reduction of materials use**—Reduces the need to purchase and dispose of materials (for example, reducing the use of paper by networking computers to allow for electronic transfer of documents and using duplexing photocopiers).
- **Product components or materials made with recycled content**—Using recycled materials implies that fewer raw materials were used to produce the product, likely resulting in fewer natural resource impacts.
- **Product designed for ease of recycling and reuse at end of its life**—Reduces waste generation and enables surplus property managers to lead the product into a recycling loop. This may be done by identifying suppliers who will take back or lease products, thus reducing the EOL burden on the State. Another option is to establish a memorandum of understanding (MOU) with a local recycling facility that refurbishes computers for schools.

Table 1. Environmental attributes considered in each module

Environmental Attributes	Procurement (Module I)	Use (Module II)	EOL (Module III)
Energy Efficiency	X	X	
Materials Efficiency			
Reduced packaging	X		
Extending product lifetime (internal reuse, proper operation, etc.)	X	X	X
Materials use reduction (paper, ink, etc.)		X	
Increasing recycled content of components or materials	X		X
Designed for ease of recycling and reuse at EOL	X		X
Toxics Reduction			
Manufacturer’s practices (reduced toxic materials in manufacturing)	X		X
EOL management (e.g., external reuse)	X		X
Direct product emissions	X	X	

Toxics Reduction

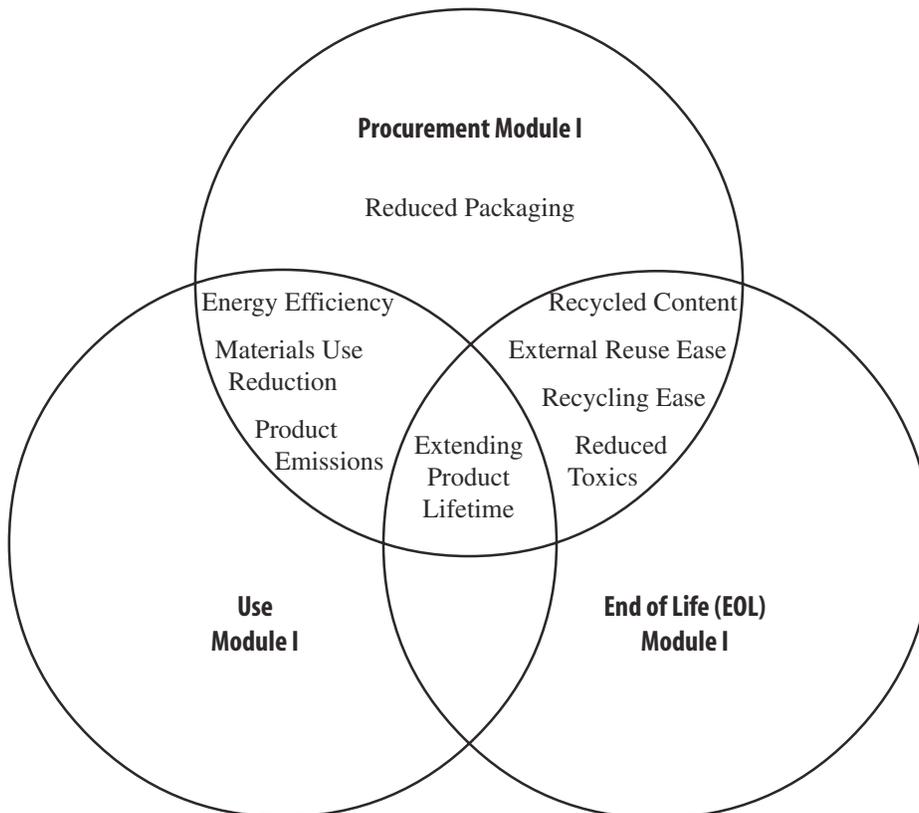
Toxic emissions can result from all life-cycle stages of a product, including manufacture, use and disposal. Procurement, IT, and surplus property managers can all have some effect on how toxics are released into the environment. Procurement, use, and EOL managers can effect positive environmental change by purchasing from environmentally responsible companies, using products in a way that minimizes emissions, and recycling and re-using products and materials. While reducing toxic emissions may be a less tangible activity, these guidelines are presented in the appropriate modules. Toxics reduction attributes include:

Electronic Equipment Emissions—Copiers and laser printers are sources of volatile organic compounds (VOCs), ozone, and particulate emissions, which may be controlled through proper design, ventilation, and maintenance.

Manufacturers' practices (reduced toxic materials in manufacturing)—Manufacturers' reduction in use of toxic materials reduces the impact of the equipment on health and safety during the manufacturing and EOL phases.

EOL management—Reuse and domestic recycling options help minimize potential environmental and human health impact.

Figure 1: The relationship among the environmental attributes and the three modules



MODULE I: PROCUREMENT GUIDELINES

The information in this module will help purchasing managers develop and negotiate equipment purchases. When purchasing equipment, it is important to consider the three major environmental attributes identified in Table 1: energy efficiency, materials efficiency, and toxics reduction. This module presents issues to consider and discuss with product vendors that will lead to the purchase of more efficient electronic equipment. Informed purchasing practices can potentially reducing purchase costs for equipment, operating costs, and future disposal costs. Consider these aspects along with product reliability, speed, ease of use, and quality of output when making a purchasing decision.

Operating costs include energy costs, which may be reduced if energy-efficient products are purchased. Future disposal costs may be avoided by arranging for take-back of equipment and packaging during the procurement phase.

Checklist: Procurement of Electronic Equipment

Promote Energy Efficiency

- Purchase Energy Star® labeled equipment
- Purchase equipment with Energy Star® modes active upon delivery
- Network equipment such as printers, scanners, copiers, fax machines and other multifunction devices whenever possible to reduce energy use
- Review State Administrative Management Memo 01-14 for information on Energy Star® purchasing

Promote Materials Efficiency

- Ask the manufacturer or supplier to send equipment with a minimum of packaging and with recycled packaging
- Check to see if the supplier will take back the packaging for reuse or recycling
- Look for design features that allow for product upgrade, repair, and remanufacture
- Choose the right capacity for copiers (e.g., duplex copy speed and monthly volume) and make sure that the use of recycled paper is compatible with the copier
- Ask manufacturers of new printers and fax machines if they have a take back program for spent cartridges or can show they recycle spent cartridges.
- For existing equipment, consider using vendors who can either provide re-manufactured cartridges or recycle returned cartridges.
- Consider leasing equipment or including take-back clauses to eliminate the need to manage future surplus equipment

Promote Toxics Reduction

- Purchase equipment with reduced levels of toxic or hazardous constituents (e.g., chlorinated or brominated flame retardants, chlorofluorocarbon [CFC] or hydro chlorofluorocarbon (HCFC) compounds, mercury, cadmium).
- Purchase laser printers and copiers with low indoor air-pollutant emissions (for large copiers look for those with ozone filters)
- Request that the vendor collect, or refill, or recycle toner cartridges
- Request recycled content materials in electronic equipment
- Purchase re-manufactured toner cartridges for printers and fax machines
- Request features that will save ink and toner in printers and copiers (e.g., draft printing capacity, refillable toner and separate ink cartridges on inkjet printers)

- Purchase from environmental responsible corporations (e.g., those that have completed ISO 14000 certification, that have implemented an Environmental Management System [EMS], or that sell products with Energy Star® or TCO labels).

Energy Efficiency

As outlined in the State of California’s August, 1, 2001 Management Memo 01-16 (Appendix A), energy efficiency (along with recyclability of parts) is perhaps the most important environmental issue associated with electronic hardware. IT staff should network peripheral devices such as printers, scanners and other multifunction devices whenever possible to minimize the draw of power in desktop computer systems. Purchasers should also acquire electronic equipment with the proper level of capability and expandability.

As directed in State Administrative Manual Management Memo 01-16, the procurement officer should:

- **Purchase equipment that meets—but does not exceed—realistic business needs in order to avoid unnecessary energy consumption**
 - **90 to 95 percent of computers should be Mini CPU systems with power supplies of less than 100 W**
 - **Purchase peripheral devices with the aim of networking equipment wherever possible**

Computer systems that meet Energy Star® requirements can save up to 80 percent of the energy that might otherwise be wasted when the machines are on but not in use.

The U.S. Environmental Protection Agency (EPA) has developed the Energy Star®

Some facts about Energy Star® labeled electronic equipment:

- *Monitors equipped with a “sleep” feature can save 60 to 80 percent of the energy that would otherwise be wasted, depending on use.*
 - *According to U.S. EPA, a single Energy Star® labeled computer and monitor can save from \$7 to \$52 annually in electricity bills.*
 - *Energy Star® labeled copiers typically cost no more to buy than comparable models without power-management features.*
 - *Energy Star® compliant copiers save 30 to 40 percent in energy costs.*
-

program, which is a now widely accepted standard for identifying energy-efficient electronic devices. This program works with manufacturers of computers, monitors, photocopiers, fax machines, and printers to produce energy efficient equipment. Visit www.energystar.gov for more information.

SAM Management Memo 01-14 directs State agencies to purchase Energy Star®-labeled equipment. According to U.S. EPA, over 85 brands of computers and over 120 brands of monitors and terminals are Energy Star®-labeled, covering hundreds of specific models. At least 17 copier manufacturers participate in the Energy Star® program, which includes a power management feature that reduces energy consumption during periods of inactivity. In general, there should be little or no price or performance differential between otherwise similar Energy Star® and non-Energy Star® electronic equipment.

- **Solicitation for electronic equipment bids should cite SAM Management Memo 01-14 and clearly state the requirements for (1) meeting Energy Star® power consumption guidelines and (2) Energy Star® functions to be enabled before products are shipped.**

Computers and Monitors

At present, cathode ray tubes (CRT) dominate worldwide markets. However, the active matrix liquid crystal display (LCD) monitor, first used predominantly in notebook computers, is now moving into the desktop computer market. Given the expected popularity and market growth of LCDs for computer displays, the life-cycle environmental impacts of LCD and CRT monitors should be considered. During their life cycle (from “cradle” to “grave”), CRTs use seven times more energy than LCDs. When looking only at the use phase of CRTs vs. LCDs, CRTs still use three times more energy than LCDs.

Whichever configuration your office may end up purchasing, require EPA Energy Star® compliance for energy use and sleep modes, active upon delivery and functional within the Local Area Network (LAN) environment or computers. This can save substantially on electricity use and costs and reduce greenhouse gases related to energy generation.

Suppliers of Energy Star® computers and monitors should:

- **Configure personal computers (PC) so they power down automatically to 30 watts or less after 15 minutes of inactivity.**
- **Configure PCs so they switch connected Energy Star® monitors into a low-power mode after 15 minutes of inactivity.**
- **Ensure that monitors are capable of entering the low-power mode when connected to a correctly configured PC. (Monitors cannot do this by themselves. This usually happens through a signaling protocol called Display Power Management Signaling [DPMS]).**
- **Configure models in which the PC and monitor are in the same casing to automatically switch to a low-power mode of no more than 60 watts after 15 minutes of inactivity.**
- **Ensure that the PC will be compatible with the purchaser’s network system (for example, Novell NetWare, Windows NT, LAN Manager) and will not disconnect from it when in low-power mode. To ensure compatibility, State agencies need to provide information about their specific network system to suppliers.**

Copiers

Copiers are a large energy consumer, which is reduced by the use of a sleep feature. Even when turned off, copiers continue to draw small amounts of power, up to 7 watts. The only difference in performance of copiers with sleep features is the time it takes to “wake up” the machine after periods of inactivity.

An Energy Star®-labeled photocopier should:

- **Have a low-power mode below 3.85 times the number of copies per minute. In other words, a photocopier that does 50 pages per minute should automatically power-down to below 200 Watts after 15 minutes of being idle.**
- **Automatically go into off-mode after an hour of inactivity, with wattage levels below 20 Watts**
- **Have a 30-second recovery time from low-power mode**
- **Enter a low-power mode after 15 minutes of inactivity**
- **Have a power-off mode that engages after 30 to 90 minutes of inactivity, depending on the copier speed**
- **Have power-down features activated when installed**

Laser printers and Inkjet printers

For laser printers, energy is used to produce the heat and pressure that affixes toner to paper; heat is also required during idling periods to maintain temperature. For inkjet printers, no heat or pressure is used for fusing. However, color inkjet printers (most of them are color now) use a fan and heat to dry the ink. The heat lamp is kept warm in standby mode. Even when idling, laser and inkjet printers consume between 30 and 35 percent of their peak power requirement. Since many printers are idle for long periods of time, it is often in this mode that the most electricity is consumed. Many printers continue to draw small amounts of power, up to 7 watts, even when turned off.

Energy Star® compliant printers should:

- **Power down to 15-45 watts when not in use**
- **Have power-down features activated when installed**

Materials Efficiency

The goal of achieving *materials efficiency* in the procurement of electronic equipment is a part of a much larger effort by industry to more efficiently use material resources (for example, timber, minerals, metals, plastics, and glass). This in turn promotes sustainable use of our ecosystems' natural capital and prevents excess resource depletion, waste, and pollution.

General principles of materials efficiency include the following:

- **Designing all goods and services to require much less virgin material.**
- **Creating policies that promote and support materials conservation, recovery, and efficiency.**
- **Developing creative strategies for materials efficiency and waste prevention in homes, businesses, and institutions.**
- **Recovering the maximum amount of materials from the waste stream.**
- **Fostering a robust economy for secondary (recovered) materials.**

These principles may be applied to environmentally preferable electronics procurement policies, which encourage procurement of products that minimize packaging, employ features that extend the products' lifetime, use less paper and other raw materials, use recycled components in their construction, and promote environmentally responsible end-of-life management.

Reduced packaging

Packaging is often the initial source of waste a product generates once it enters the market. To minimize this type of waste, packaging should be kept to a minimum and composed of recycled materials. For guidance, contact your agency's recycling coordinator.

Discuss with suppliers some or all of the items below:

- **Goods and materials should have packaging that adequately protects them, but is not excessive.**
- **Crates, pallets, and, if feasible, boxes and cartons should be reusable and not contain heavy metal inks; internal cushioning should be made out of recyclable material.**
- **Request packaging to be made from recycled content that meets or exceeds all federal and State recycled-content guidelines (currently 35 percent postconsumer for all corrugated cardboard).**

- **Packaging should minimize the use of difficult-to-recycle materials unless recycling services for these materials are available and accessible to your organization.**
- **Packaging should minimize or eliminate the use of disposable containers.**
- **When negotiating a purchase, request that suppliers take back their product packaging for reuse or recycling.**

Extending product lifetime

Many electronics manufacturers are designing equipment now with replaceable parts so that the unit can be upgraded and repaired rather than replaced. Also consider that if a computer works well, it may not need to be upgraded physically but only require a software upgrade. Ergonomics of computer workstation equipment is an important consideration, because employees will not want to continue using a design that is uncomfortable.

Ask for the following features in the electronic equipment's design to extend equipment's life:

- **Microprocessors, memory, internal storage, and other subsystems that can be upgraded.**
- **Modular designs that allow for easy installation and service of hardware or memory upgrades .**
- **Latches or snap construction that enable quick access to internal components and do not require special tools for removing or replacing parts or batteries.**
- **Ample slots for expansions and additional components.**

Reducing Materials Use

The design of office equipment, particularly copiers and printers, should be considered in the procurement stage to reduce paper usage and to reduce paper storage and mailing costs. Copiers that have automatic duplexing capability help save paper by as much as 40 percent. Most mid- and higher-speed analog models and nearly all digital models have automatic duplex capability as a standard feature. Some manufacturers offer duplexing capability as an option on lower-speed copiers.

Some design features to ask for from vendors, to improve the efficiency of duplexing and reduce paper usage:

- **Enabled duplex capability in all photocopiers.**
- **Digital copier technology, which saves paper with multi-page printing on a single sheet of paper and offers improvements in paper-handling technology (reduces jams and misfeeds).**
- **Copiers with efficient duplex output speed so users will realize very little difference in the time it takes to make single-sided versus duplex copies.**
- **Copiers that use recycled paper reliably without warranty being affected.**

In 1998 the first computer that uses 100% recycled resin (PC/ABS) in all major plastic parts was introduced.

Increasing Recycled Content of Components or Materials

A very large ecological impact associated with computers and other electronic equipment results from the devices' resource intensiveness. While there are not large amounts of materials in each individual computer, the sheer number of computers being produced and sold – combined with their rapid obsolescence – means a vast amount of resources are used. Each computer or peripheral contains many components and materials that require high levels of manufacturing.

Request your bidders to provide:

- **Products with recycled-content materials (preferably postconsumer content) in the plastic components such as the CPU, housing, and keyboards of electronic equipment.**
- **CRT glass made of recycled materials.**

Designed for Ease of Recycling and Reuse at the End of Life

When conducted properly, recycling computer materials and components and removing and/or reducing and treating the hazardous components conserves resources and reduces environmental/public health threats. Computers, televisions, and other electronic scrap contain valuable materials and components that are technically recyclable. The problem is the lack of both collection incentives and recycling infrastructure. The high cost of materials collection, handling, and processing is also an impediment to recycling.

The infrastructure for domestic electronics recycling is still developing. Further, obtaining access to the valuable materials that are contained in electronic waste—especially metals like copper or gold—is difficult. A variety of different plastics are used to make electronic equipment components. The type of plastic is usually not indicated on the equipment, creating a challenge for recyclers trying to recover and recycle the material. There are few U.S. recycling facilities that handle leaded glass, mixed plastics, and lead solder in circuit boards.

Manufacturers have been implementing design changes to facilitate reuse and recycling. Some equipment is assembled with fewer screws and fastener to allow for faster disassembly. Other efforts include marking the type of plastic and allowing space for expanding memory and other components to allow for extended life through replacement or reuse of parts.

When purchasing all electronic equipment, consider asking for:

- Use of materials in the equipment that can be easily identified and recycled, employing available recycling infrastructures.
- Take-back clauses in leasing agreements or purchase contracts that specify that the vendor make every attempt to assure recycling of the plastic, metal, and glass resulting from processing obsolete equipment.
- Take-back clauses that request the vendor to document that it will recondition or remanufacture certain components for reuse or recycle the equipment.

In California, estimates of computer recycling range from 5 to 15 percent, compared with a 42 percent rate for overall solid waste and a 70 percent rate for major appliances like refrigerators, washing machines, and dryers. With more than 10,000 computers and TVs becoming obsolete every day, California households are stockpiling over 6 million CRTs.

Toxics Reduction

Procurement policies that are established up front may minimize the possibility of toxic substances entering the waste stream during the manufacture, use, reuse, and disposal phases. This provides a feedback loop to manufacturers while providing incentives for design for recycling, disassembly and longevity, and the inclusion of reduced toxic materials in the manufacturing process.

Manufacturer's Practices (Reduced Toxic Materials in Manufacturing)

Electronic equipment—especially products that include CRTs, printed wiring boards, mercury switches, capacitors, and batteries —contains persistent, toxic materials such as mercury, lead, cadmium and chromium, all of which can pose a threat to the environment if they are not managed carefully. A typical 17-inch desktop color monitors contain about 2.5 pounds of lead. Lead and cadmium are used in circuit boards; lead oxide and barium are found in monitor CRTs; mercury is found in switches and flat screen monitors; brominated flame retardants can be found on printed circuit boards, plastic casings and cable insulation; and polyvinyl chloride (PVC) is a soft plastic used in cables and wires (producing dioxin when burned, due to the presence of chlorine).

In addition, the operation of office equipment requires the use of batteries with heavy metals (e.g., lead, cadmium, lithium, or silver), as well as toner cartridges and waste ink cartridges that contain toxic substances.

The current production of computers typically results in the use of thousands of toxic chemicals, including solvents, process gases, heavy metals, and acids.

To minimize the introduction of toxic substances during the use of electronic equipment, specify up front that:

- **A return service will be provided for reusing or recycling used toner cartridges (from laser printers and fax machines).**
- **Inkjets have the following features:**
 - **A print head separate from ink cartridges.**
 - **level indicators (if you generate a lot of color printing).**
 - **Capacity for draft printing (with inkjets, this saves ink while increasing print speed).**

Electronic waste has become one of the fastest growing and most toxic waste streams in the industrialized world. The National Safety Council predicts that over 315 million computers in the US will be obsolete by 2004.

In October of 1996, the International Standards Organization released a set of international standards for environmental management called ISO 14000. Compliance with ISO 14000 may indicate greater corporate awareness of and adherence to environmentally responsible practices, including product manufacture.

TCO is another labeling effort developed in Sweden, but used internationally, that indicates a product that has a much reduced burden on the environment during all life cycle phases.

End-of-Life Management Issues

A growing number of computer manufacturers and distributors are responding to the environmental and financial interests of their customers by offering to take back their equipment at the end of its service life. Currently, a limited but growing number of computer processing companies in California offer local opportunities for computer equipment vendors to process equipment they take back.

A vendor may seek to charge an up-front fee or incorporate the cost of disposal or recycling into the purchase cost of the equipment. Or, there may be a credit if there is remaining market value in the item. This will vary case by case. If your contract does not include a take-back or trade-in service, consider the cost your organization will face for proper disposal and recycling as part of the cost of the equipment.

Consider requesting:

- **Take-back clauses from the vendor, trade-in credit on a purchase, or a lease on the equipment.**
- **Assurance of the *environmentally responsible* recycling or disposal of electronic equipment they take back for recycling. For example, the vendor should provide documentation of final disposition, particularly the lead from the monitor's cathode ray tube (CRT) and batteries.**

Electronic Equipment Emissions

Pollutant emissions from electronic equipment are another consideration. When operating (and in stand-by mode), laser printers can emit VOCs, ozone, formaldehyde, respirable particles, and other substances that contribute to poor indoor air quality. Also, copiers emit ozone from electrically charged corona wires used in the imaging system, which increases with temperature and double-sided copying.

To minimize equipment emissions, request that:

- **Copiers and laser printers have low ozone emission specifications and/or come with an activated carbon filter.**
- **The regular servicing of copiers includes charging electrodes and activating carbon filters.**

Recent tests on new printers, conducted by Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), showed relatively high VOC emissions and for old printers, relatively high ozone and respirable particles.

MODULE II: USE GUIDELINES

This Module provides information technology (IT) staff with options for improving the efficient operation of electronic equipment. IT staff will gain an understanding of product features and operating procedures that impact efficiency of use and extend product productivity. The main environmental concerns during the use phase of office electronic equipment include paper usage, proper management of expendable components (e.g., toner cartridges) and energy consumption. This Module outlines considerations associated with the use of this equipment and introduces measures to implement to minimize the costs and environmental impacts of using electronic equipment.

Checklist: Use of Electronic Equipment

Promote Energy Efficiency

- Activate Energy Star® settings.
- Turn equipment off when not in use.
- Designate batch printing jobs.
- Use dot matrix printers (rather than laser) for draft jobs.

Promote Materials Efficiency

- Encourage limiting photocopying through use of use of e-mails and e-mail attachments, intranets and network file sharing, electronic conferencing, electronic slides, flip charts, and overheads.
- Enable and require duplex copying.
- Use recycled paper in printers, copiers, and fax machines.
- Minimize disposal of floppy and compact disks by using rewritable CDs, reusing disks, and networking.
- Ensure that employees are aware of all recycling policies and opportunities.

Promote Toxics Reduction

- Ensure that operating equipment is in well-ventilated rooms.
- Ensure that all equipment is serviced and maintained regularly to ensure efficiency and no escape of fumes from chemicals.

Energy Efficiency

Personal computers are a significant consumer of power in commercial offices. While individual computers do not have high energy demands compared to other office equipment, the large number of computers and their extended hours of operation result in a level of energy consumption that may be lessened considerably by simple changes in office policy.

To help keep energy usage down:

- **Activate energy savings functions**
 - Users sometimes have to turn Energy Star® features on themselves.
 - Windows NT (version 4.x and earlier), does not recognize power management, so configuration must be done in the system BIOS.
- **Check whether certain screen savers will prevent the machine from going into the “sleep” mode.**

- **Monitor on and off times of equipment:** If possible, turn computers, monitors, and printers off at the end of the workday.
- **For printing activities, designate set times of the day for batch printing.**
- **If available, use a dot matrix or impact printer rather than a laser printer for draft printouts.**

Materials Efficiency

Paper

Printing words and images on paper may seem like one of the more environmentally benign things your agency does, but that isn't necessarily the case. As one begins to examine the life-cycle of printed matter – from the growing conversion of natural forests to monoculture plantations, through the various chemical processes involved with printing – the environmental impacts are not insignificant.

Moreover, the cost of paper use is often overlooked. The cost of paper itself, about a half-cent per sheet, is deceptively small when compared to the cost of a printed page processed by electronic office equipment, which includes toner, the use of a copy machine or printer, and the cost of machine maintenance. Thus, the printed page typically costs five to 10 times as much as the cost of paper alone.

Steps that an office may take to reduce the use of paper are as follows:

- **Reduce images when photocopying and printing**
 - Use two-up (two pages printed on one side) and two-sided printing
 - Many word processing and presentation preparation applications can print two, four, or more “pages” on each output page
- **Avoid printing images**
 - Send internal reports electronically or on disk.
 - Replace individual fax confirmation sheets with a fax summary that records many transactions on one sheet.
 - Use the office intranet and shared drives to the greatest extent possible, by placing databases, manuals, meeting minutes, internal phone books, newsletters, and other common documents there, so staff can access them electronically.
 - Use data compression software for storing large quantities of data electronically, rather than on paper.
 - Disable the function in printers to print test pages when printers are turned on.

Educate staff on the importance of paper-use reduction through:

- **Duplexing when photocopying.**
- **Filing documents electronically.**
- **Printing email messages only when necessary.**
- **Using lighter copy paper; there are some applications for which 16 lb. paper is appropriate, particularly those unlikely to be duplexed (such as fax machine output).**
- **Use recycled content paper meeting the State Agency Buy Recycled Campaign (SABRC) mandate of 30 percent postconsumer content (PC).**

“Half-used” paper has an image on one side (from a printer, a copier, or outdated letterhead), but has a clean second side. Half-used paper is ready for a second life through “reuse”. Some people think that using half-used paper will damage the output device, but many people have reported successfully using half-used paper routinely. When reusing paper, avoid paper that is folded, torn, or dirty, and be sure to take off any staples, paper clips, or Post-Its®.

- **Using scrap paper whenever possible**
 - Fax machines are a good candidate for half-used paper as they almost never have duplexing units and fax output is almost always strictly for internal use
 - If there are several laser-printers in an office, one can be designated as a ‘draft’ printer and always be stocked with half-used paper
 - Some copiers and some printers can have a tray devoted to half-used paper

Extending Product Lifetime

Regular maintenance of electronic equipment is important to prolong the life of computers, printers and copiers, and thus to delay the cost of disposal and/or recycling. Computers and printers are relatively sensitive instruments that must be kept free of dust and moisture and away from light and heat. If a computer works well, upgrade components rather than buying a whole new computer. It is often possible to upgrade a machine and extend its life simply by changing software, installing a larger hard drive, adding a zip drive, memory upgrades, hardware changes and bios updates. Additionally,

- **Computers should be moved as infrequently as possible.**
- **Laptops should be treated with extra care, since laptops tend to have shorter lifespans with their frequent movement and potential for abuse.**
- **Do not force copiers or printers if there is a paper jam or other problem.**
- **Make sure that there is enough ventilation for all electronic equipment.**
- **Employees should be aware of the machine’s design capacity and not exceed it.**
- **A waste management policy should be implemented for your office’s information system, since a computer’s memory will slowly get clogged by drafts and unused files – such a policy will enhance the performance and life of PCs.**
- **Ensure that employees are trained on equipment operating and troubleshooting or have access to assistance with these matters.**
- **Develop a robust, friendly file management system with backup procedures, to help minimize the number of things that users feel must be printed or copied onto multiple disks.**

Repair (and upgrade) of laptops is more difficult than desktop clones, due to the tendency of particular brands to have proprietary components. There is therefore still a high turnover and waste of computer hardware given the popularity of laptops.

Toxics Reduction

The regular use of electronic equipment in an office environment has the potential to produce many waste streams, some of which are hazardous. Used consumables, such as toner cartridges, have the potential to be a major part of the waste stream from a typical office. Finding ways to reuse, and recycle these components has become part of the overall trend in the efficient use of electronic office equipment.

- Waste ink cartridges not only contribute plastic to landfill waste, but also contain toxic substances and heavy metals that can accumulate in the environment.
- Copiers and laser printers are also a source of VOCs, ozone, formaldehyde, respirable particles and other substances that contribute to poor indoor air quality.
- Rechargeable batteries are used in a variety of electronics office equipment. Up to 50 percent of the weight of a Nickel-Cadmium (Ni-Cd) battery consists of cadmium. Because of cadmium’s extreme toxicity, recycling of all Ni-Cd batteries is essential.
- Discarded floppy disks and compact disks (CDs) are an enormous waste issue. Where floppy disks could be reused in theory (with a few companies reclaiming never-sold software disks and reformatting them), most software CDs are non-rewritable and simply end up in landfills.

To minimize these waste streams, implement the following policies:

- **Replace carbon filters in laser printers and copiers regularly, as indicated by the manufacturer’s specifications**
- **Control of ozone emissions can be assisted with regular servicing of copiers (e.g., charging electrodes, activating carbon filters, etc.)**
- **Ideally the copier should be placed in a dedicated room or a large area with adequate ventilation of six room fresh air changes per hour**
- **Recycle used cartridges—many suppliers of cartridges will pick up used ones**
- **Use rewritable CDs as a “low waste” tool for storing data from regular backups**
- **Reuse 3.5” disks over again**
- **Use reusable products instead of disposable ones**
 - **Use rechargeable batteries instead of single-use batteries**
 - **Use refillable toner and ink cartridges**
- **Recycle depleted rechargeable batteries—check the Rechargeable Battery Recycling Corporation’s (RBRC) Web site for a collection site nearest your office at www.rbrc.com/consumer/uslocate.html**

The California Integrated Waste Management Board (CIWMB), working in cooperation with Recycle Free, has two contracts for printer cartridge recycling, for non-mandatory use by all State Agencies and Offices.

See www.recyclefree.com/registrationciwmb.html

MODULE III: END-OF-LIFE MANAGEMENT GUIDELINES

This module provides information for business services officers and surplus property managers responsible for managing equipment for which the organization no longer has a use. A number of options for management of used electronic equipment are available, including donation or sale for reuse, recycling of all or part of the equipment, recovery of valuable materials from the used equipment, and disposal as waste materials, as directed by the property control officer. Many times, the ease of implementing these options is tied directly with the decisions made at the procurement stage about various environmental attributes. For example, take-back clauses and leasing agreements remove much of the responsibility from office management for the environmentally responsible recycling and disposal of this equipment.

Checklist: End-of-Life of Electronic Equipment

- Submit a completed Property Survey Report (Form 152) for approval by the Department of General Services (DGS) before managing electronic equipment in *any* way (including recycling, sale, trade-in or external reuse) (Appendix D)
- Refer to the State Administrative Manual (SAM) specifically Section 3520 for procedures on how to dispose of surplus property. (see <http://sam.dgs.ca.gov/default.htm>)
- If the equipment is recyclable, choose your recycler carefully or make sure that the company that is taking back your equipment emphasizes environmentally sound procedures and that it will provide you with documentation of the materials handled
- Under State law, discarded CRTs are hazardous waste and must be recycled (see www.dtsc.ca.gov/database/CRT_Recyclers/counties_map.html)
- Remove tags from electronic equipment and remove data from hard drives before transferring electronic equipment to DGS, trading it in or returning it to the vendor, or sending it to a for-profit organization, such as a recycler, a non-profit organization, or a refurbishing program, such as those sponsored by schools and correctional facilities.
- Deactivate cell phones before transferring to DGS or a third party

Property Survey Report Process/ Property Disposition Flow Chart

The proper management of electronic equipment is critical because (1) CRTs are a hazardous waste when disposed of in California and (2) State agencies are required by Assembly Bill 75 to implement programs to reduce the amount of waste they dispose. Although a cost savings may be realized by reusing electronic equipment, it is important that departments budget for the expense of recycling or other costs associated with various disposition options.

Often, agencies develop internal policies on equipment and surplus property disposition. In many state agencies, the business services officer (BSO) or similar position has the primary responsibility for managing surplus state equipment. In some organizations, the IT manager may take on the responsibility for electronic equipment. However, in all State agencies, the business services and IT staff should coordinate closely to properly manage electronic equipment.

The State Administrative Manual (SAM) governs how State agencies manage equipment and property. SAM section 3520, "Disposal of Personal Property and Surplus Personal Property" (Revised 9/91) specifically addresses surplus property management. DGS offers training on Surplus Property Management through the California Acquisition & Materials Management Institute (CAMMI).

In California, televisions and computer monitors (which contain CRTs) are a hazardous waste when disposed. Other electronic equipment, including cables, hard drives, copiers and printers, can be recycled. State agencies should make every effort to ensure that no electronic equipment is disposed of in their regular trash. Figure 2 is a flowchart for the basic process for managing electronic equipment. Part B of this module provides further detailed information about the process and the options available to State agencies for properly managing electronic equipment.

Steps in the Flow Chart for Managing Electronic Equipment

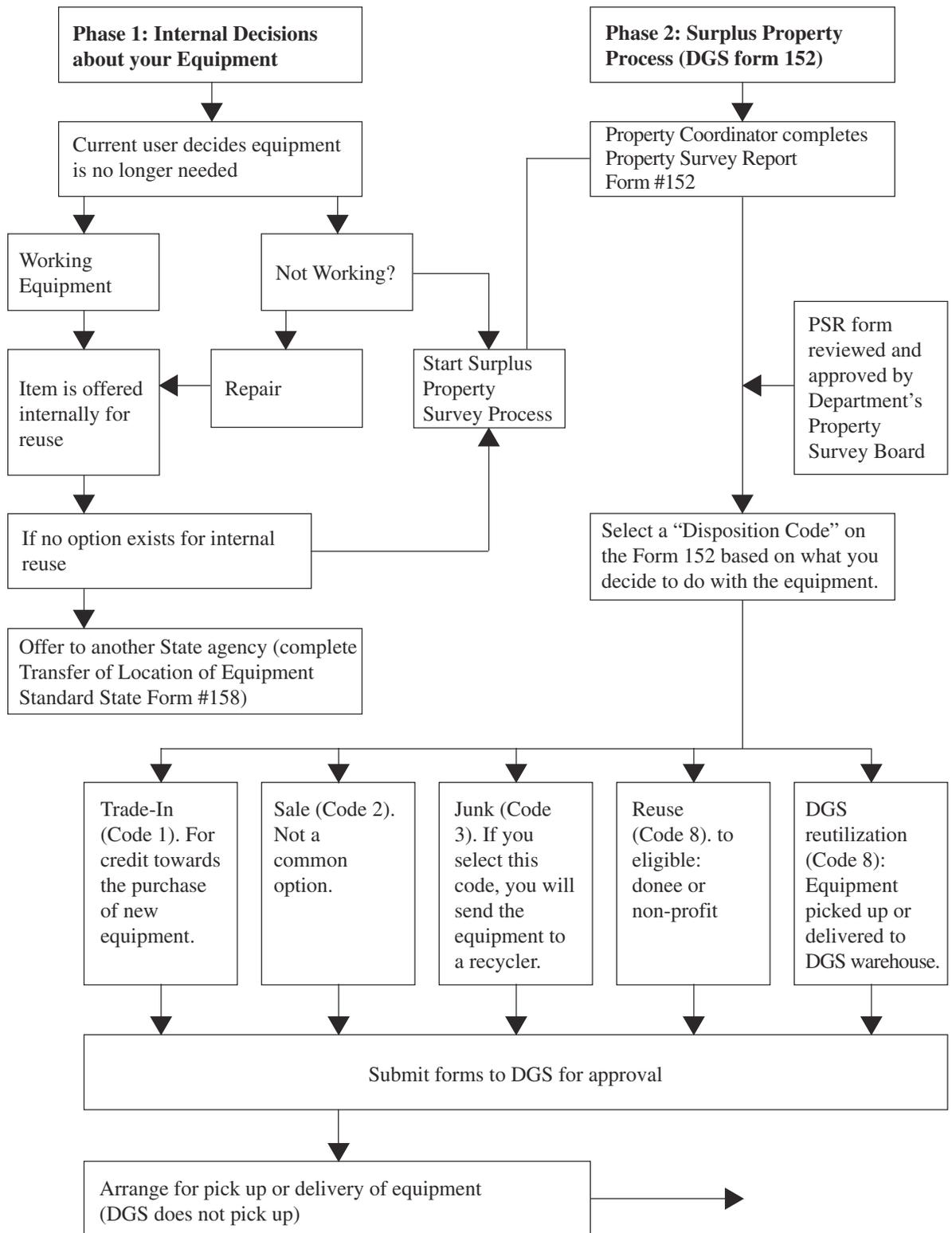
Phase I: Internal decisions regarding equipment

- a. Appropriate staff (such as IT or business services staff) needs to identify the electronic equipment as “surplus.”
- b. Appropriate staff determines if equipment works and if it can be reused internally. Depending on your organization’s equipment resources, you may decide to keep the equipment on reserve. You may need the equipment in the near future for new staff or to replace non-working equipment.
- c. If the equipment is offered to another State agency, a Transfer of Location of Equipment Standard State Form #158 (Appendix C) must be prepared whenever it is proposed to transfer equipment between state agencies.

Phase 2: Surplus Property Process (DGS form 152)

- a. Once it is determined that the equipment cannot be used (working or non-working), you then need to start the process of designating it as surplus property. Your organization may have an internal process and forms to complete. Check with IT and business services staff on any internal policies and procedures.
- b. A Property Survey Report (PSR) Standard State Form #152 (Appendix D), must be submitted for approval prior to the disposition of any State-owned personal property (including electronic equipment) regardless of the acquisition value or if the property was recorded or capitalized for accounting purposes. Disposition includes recycle, sale, trade-in, discarding or turning the property over to the Property Reuse Program or a non-state entity (such as a recycler).
- c. Select the appropriate disposition code on the Form 152 (definitions in Appendix E). The disposition code you select, along with the information you provide in the box labeled “reasons for proposed disposition of each item”, determines what happens to the equipment. This is the point where you decide if the equipment should be salvaged for parts, sent to an organization for reuse, sent to DGS warehouse or to an electronics recycler.
- d. First, you are encouraged to find the most productive use for equipment. If the equipment still works, reuse by an outside organization is the desired option. There are nonprofit organizations authorized to accept State equipment for reuse and refurbishing as well as an authorized donee list of agencies and organizations eligible to receive state equipment. (Appendix F)
- e. Non-working equipment should be assessed to determine if it can be repaired by a refurbisher. If the equipment cannot be refurbished, it should be recycled either through DGS or by an electronics recycler (see part C of this module).
- f. Your organization’s Property Survey Board reviews and approves the forms before they are submitted to DGS.
- g. Submit forms to DGS. Usually you can fax the Form 152 or 158 to DGS for review. During this step, DGS may determine that the disposition code you selected is not the appropriate option. If this happens, DGS will change the code and provide instruction on how to manage the equipment.

Figure 2. Property Survey Report Process/ Property Disposition Flow Chart



- h. Get DGS Approval of disposition. DGS will sign the form and return it to you.
- i. Arrange for pick up or delivery of equipment.
- j. DGS will retain original copies of approved Standard State Form 152 and 158 in a suspense file pending final disposition of the property.

Environmentally Sound Recycling (Use of Certified Recyclers)

In March 2001 the Department of Toxic Substances Control (DTSC) reaffirmed that equipment containing CRTs, such as televisions and computer monitors, cannot be disposed of in landfills. CRT recyclers may be identified by county at www.dtsc.ca.gov/database/CRT_Recyclers/counties_map.html.

For all damaged or nonworking electronic equipment, find a recycler who can handle that type of equipment, and develop a memorandum of understanding for this recycler to process this equipment. Contact DGS or access www.ciwmb.ca.gov/electronics/Collection/ for the California Integrated Waste Management Board's Electronic Product Management Directory, which is a list of electronics recycling facilities in California. Even inoperable, some equipment may still have a salvage value.

Resolutions for dealing with electronic waste throughout the State of California

As of April 2002, over 20 cities and counties have acted to require manufacture responsibility, and retailer take-back, or have begun to plan other means to address the problem with electronic wastes until the California Legislature acts to address the issue. Appendix E lists cities/counties and local agencies that have adopted resolutions.

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GLOSSARY

BIOS	Basic Input Output System. Software built into all computers to control the basic operation of keyboard, screen and hard disk. It runs when the computer is switched on and loads the operating system from the hard disk.
CD	This term is loosely applied when describing a variety of formats, from the production audio and data disks to the rewritable versions, write once (CD-R) or write many “re-writable” CDs (CD-RW). The standard CD disk can hold about 650 MB of data on a single disk.
CFC	Chlorofluorocarbon. Formerly used in huge quantities as coolant and propellant in spray cans.
CPU	Central processing unit, an older term for processor and microprocessor, or the central unit in a computer containing the logic circuitry that performs the instructions of a computer’s programs.
CRT	Cathode ray tube. The active component of monitors and TVs, the CRT is a bell-shaped glass tube with electron “guns” at one end and a viewing screen at the other.
DGSn	California’s Department of General Services
Digital Copier	Not necessarily connected to a computer or computer network, digital copiers incorporate the electrostatic imaging process, but differ from analog copiers in the way in which original images are scanned or transferred from a computer (if connectivity is possible). Digital scanning allows for many varieties of image manipulation, including mirror imaging, negative/positive reversal, and multiple-set production from a single scan.
DTSC	California Department of Toxic Substances Control
Electronic Equipment	computers, monitors, servers, printers, copiers, fax machines, televisions and related office equipment.
Energy efficiency	minimizing the consumption of energy, which in turn minimizes associated environmental impacts.
Energy Star®	A voluntary partnership between the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers. Partners help promote energy-efficient products by labeling products with the Energy Star® logo and educating consumers about the unique benefits of energy-efficient products.
EOL	End of life of the electronic equipment, when it is no longer of use to the organization.
EPA	U.S. Environmental Protection Agency
Halogenated flame retardant	a flame retardant having a halogen-carbon bond. A halogen is one of the chemical elements of the group containing fluorine, chlorine, bromine, iodine and astatine.
HCFC	Hydrochlorofluorocarbon. Used as replacement for CFC.
Inkjet	A type of printer that sprays dots of ink onto paper to create an image. Offers a less expensive alternative to laser printing, especially for color printing.
ISO 14000	The ISO 14000 series is a set of environmental management standards developed by the International Organization for Standardization (ISO). The ISO 14000 standards are designed to provide an internationally recognized framework for environmental management, measurement, evaluation, and auditing. They do not prescribe environmental performance targets, but instead provide organizations with the tools to assess and control the environmental impact of their activities, products, or services.

IT	Information technology. Includes matters concerned with the furtherance of computer science and technology, design, development, installation, and implementation of information systems and applications.
kWh	kilowatt-hour (3.6 Mega Joules). An energy measure equivalent to a thousand watts consumed or generated in one hour. A 1000-watt light bulb operating for one hour would use one kilowatt hour. The unit on which the price of electrical energy is generally based.
LAN	Local area network, referring to a local network that connects computers located on the same floor or in the same building or nearby buildings.
LAN Manager	LAN operating system developed by Microsoft which runs on top of Operating System/2 and recently Windows NT.
Laser printer	A popular and cost-effective type of printer, particularly good for high-quality monochrome text printing. Laser printers work by using a laser to charge a metal drum electrostatically in the pattern of the required output. The charge affects whether the toner (powdered ink) sticks to the drum or not, and the remaining toner is pressed onto the paper as it passes over the drum.
LCD	Liquid Crystal Display. The most common application of liquid crystal technology is in liquid crystal displays. An LCD consists primarily of two glass plates with some liquid crystal material between them. There is no bulky picture tube. This makes LCDs practical for applications where size (as well as weight) are important. Liquid crystal displays are designed for temperature ranges between 0° - 50°C (32° to 122°F).
Materials efficiency	minimizing the consumption and processing of materials, which in turn minimizes associated environmental impacts such as reducing waste generation and natural resource consumption.
Montreal Protocol	An international agreement to drastically reduce CFC production, the protocol was adopted in Montreal in 1987.
MOU	Memorandum of Understanding
Network operating system	An operating system designed so that a network of Personal Computers and MacIntosh computers can be linked together and provide central administration of files and devices. Except for serving files, the processing is not done by a central server or computer but by the machine on the desktop.
Novell NetWare	A network operating system offered by Novell.
PC	Personal computer
Procurement	The acquisition of goods and services.
PVC	Polyvinyl chloride, a plastic composed 43 percent of oil products and 57 percent of salt as raw material.
Take-back clause	Refers to a clause in a procurement contract where the manufacturer or designee accepts a return of the product at end-of-life. Who pays for transportation of the product may be situation-specific.
Toxics	Materials hazardous to the environment and/or to human health.
VOC	Volatile organic compound.
W	Watt
Windows NT	The most advanced version of the Windows operating system, Windows NT is a 32-bit operating system that supports pre-emptive multitasking. There are actually two versions of Windows NT: Windows NT Server, designed to act as a server in networks, and Windows NT Workstation for stand-alone or client workstations.

MANAGEMENT MEMO

SUBJECT: PROCUREMENT OF ENERGY EFFICIENT PRODUCTS	NUMBER: 01-14
REFERENCES: PUBLIC CONTRACT CODE SECTION 10307	DATE ISSUED: 7/20/2001 EXPIRES: UNTIL RESCINDED/SUPERSEDED ISSUING AGENCY: DEPARTMENT OF GENERAL SERVICES

Background

California's current electrical energy crisis makes it imperative that state agencies purchase energy efficient products in order to conserve electrical power and natural gas, reduce peak power consumption, lower energy costs to state agencies, provide market leadership and support energy efficient purchasing by local jurisdictions, schools, and universities.

The DGS Directive on Purchasing Energy Efficient Products

The Federal Energy Management Program (FEMP) of the U.S. Department of Energy (DOE) publishes product efficiency recommendations for many energy-consuming products. These recommendations are available on the web for viewing and downloading at: <http://www.eren.doe.gov/femp/procurement/begin.html>. Currently, the FEMP has recommendations for the following product categories:

Office Technologies: Computers, Monitors, Printers, Copiers, and Fax Machines.

Lighting Technologies: Fluorescent Tube Lamps, Fluorescent Ballasts, Industrial HID Luminaires, Downlight Luminaires, Fluorescent Luminaires, Compact Fluorescent Lamps, and Exit Signs.

Commercial/Industrial Equipment and Appliances: Air or Water-Cooled Electric Chillers, Air Conditioners, Heat Pumps, Boilers, Ice Cube Machines, Clothes Washers, Motors, Distribution Transformers, Centrifugal Pumping Systems.

Construction Products: Residential Windows, Roof Products.

Residential Equipment and Appliances: Room Air Conditioners, Dishwashers, Refrigerators, Clothes Washers, Central Air Conditioners, Gas Furnaces, Electric Water Heaters, Gas Water Heaters, Air Source Heat Pumps.

Water Saving Technologies (which save energy used to pump, heat and treat water): Faucets, Showerheads, Toilets, and Urinals.

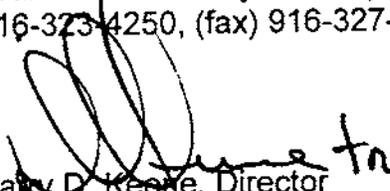
Where FEMP recommended standards are available, all state agencies shall purchase only those products that meet the recommended standards. All products displaying the Energy Star® label meet the FEMP standards. A

purchase of an Energy Star® labeled product automatically complies with this directive. The Energy Star® labeling program is a partnership between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).

This directive applies to all purchases of energy consuming products, including those made using delegation authority, statewide contracts, multiple award schedules (CMAS), small business preferences, state price schedules, master agreements, Western States Contracting Alliance (WSCA) contracts and CAL-Card. For energy consuming products where there are no FEMP recommended standards, agencies shall purchase products that conserve electrical power and/or natural gas to the maximum extent possible.

Exceptions to this directive must be approved in writing by the Department of General Services Procurement Division's Sustainability Program Manager (see contact information below) prior to issuing a contract or purchase order.

The DGS Procurement Division's Sustainability Program Manager is Jim Byers. He is available to assist you with your energy consuming product purchases at (voice) 916-323-4250, (fax) 916-327-7195 or Jim.Byers@dgs.ca.gov.



Barry D. Keone, Director
Department of General Services

MANAGEMENT MEMO

	NUMBER: 01-16
SUBJECT: STATE AGENCY REQUIREMENTS REGARDING PREVENTIVE ENERGY MANAGEMENT	DATE ISSUED: AUGUST 1, 2001 EXPIRES: WHEN RESCINDED
REFERENCES: MANAGEMENT MEMO 01-05	ISSUING AGENCY: DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION

The State of California is facing an unprecedented period of electricity shortages. The Department of General Services is taking the lead role in alerting State agencies when immediate action is required to reduce electrical energy demand to reduce the likelihood of emergency actions such as rolling blackouts. Management Memo 01-05 lists demand reduction actions that State agencies are to take in the event of an energy emergency. This memo can be found at <http://www.dgs.ca.gov/energy>. When emergency notifications or updates are sent by DGS, they also include specific references to where departments can find information regarding steps to take to reduce energy use.

This memo addresses three procurement actions to be implemented by State agencies related to procurement and implementation of information technology (IT) hardware and software in order to provide reduced energy requirements and more effective power management capabilities on a long-term basis:

- (1) Purchase equipment that is sized to meet realistic business needs; i.e., do not purchase equipment with unnecessary additional capacity and corresponding additional energy consumption,
- (2) Purchase equipment that is Energy Star compliant, and
- (3) Purchase software that supports implementation and administration of power management features.

This Management Memo specifically focuses on LAN-based office computing equipment (computer, computer monitors, laser printers, inkjet printers, scanners, etc.) and any other standard "office technology" equipment (e.g., fax machines, copiers, etc.). However, these same principles apply in general to all IT-related purchases (servers, network devices, etc.)

PURCHASE EQUIPMENT THAT MEETS REALISTIC BUSINESS NEEDS – Unneeded capacity usually translates into unnecessary energy consumption

Organizations are sometimes inclined to purchase equipment with expandability or redundancy capabilities beyond what is realistically required for the intended use of the equipment. For example, mid-tower or full size desktop computer systems often have extra drive bays and motherboard bus slots (e.g., PCI) to allow the installation of additional disk drives, video cards, sounds cards, etc. Of course, these systems must have larger power supplies (e.g., 225 W) to accommodate the additional load that would be introduced if all drive bays and slots were populated. Due to the increasing levels of component integration, more and more "devices" are being integrated onto the computer motherboard, which provides fully adequate performance for standard office computing needs along with reduced power needs (e.g., 90 W power supply) due to the reduced use of separate components such as video cards, sounds cards, etc. For perhaps 90% to 95% of all

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desktop computer systems there is never the need to install additional disk drives or PCI or similar cards. Consequently, 90% to 95% of the computers purchased within organizations should be the Mini CPU-type system with power supplies of less than 100 W. Of course, the actual proportion of expandable (5%) and non-expandable (95%) systems in use or procured for use in an organization must be based upon the specific business needs for that organization.

This same caveat concerning sizing equipment to meet realistic business needs applies to the purchase of all IT-related equipment, including computers, monitors, printers, etc.: **Carefully assess your office IT equipment needs and purchase the level of processing capability and expandability needed to meet realistic business needs within the expected life of the equipment.**

Related to the issue of equipment capacity is the issue of shared versus dedicated equipment, or network-attached versus directly attached devices. The use of network-attached peripheral devices such as printers, scanners, etc., provides the immediate benefits of reduced energy consumption due to reduced amounts of equipment, and the long-term benefits of more effective management of technology through network-based technology management software. Except for those circumstances in which there are actual requirements related to security, equipment capability, or convenience that cannot be met with the use of network-attached and shared devices, **all devices such as printers, scanners, copiers, fax machines (e.g., fax servers), and multifunction devices should be purchased and implemented as network-attached, shared devices.**

In general, whenever there is the option of shared versus dedicated equipment, the use of shared equipment is preferred unless it fails to meet a specific and actual business need. An obvious example of "shared" equipment is the use of a KVM switch (Keyboard, Video, Mouse) to allow access to multiple servers via a single monitor-mouse-keyboard. For example, eight servers connected to an eight-port KVM switch with a single monitor-mouse-keyboard would eliminate the energy required to support seven (7) monitors, reducing overall energy use by the eight servers by approximately 50%.

PURCHASE EQUIPMENT THAT IS ENERGY STAR COMPLIANT

Energy Star is a government/industry partnership designed to help businesses and consumers save money and protect the environment by selecting products from manufacturers who participate in this voluntary labeling program designed to identify and promote energy-efficient products. Energy Star was introduced by the U. S. Environmental Protection Agency (EPA) in 1992. In 1996, EPA partnered with the U. S. Department of Energy to promote the Energy Star label, with each agency taking responsibility for particular product categories. More recently, Energy Star has expanded to cover new homes, most of the building sector, residential heating and cooling equipment, major appliances, office equipment, lighting, consumer electronics, and more product areas.

The equipment of particular relevance for this Management Memo includes computers, monitors, printers, fax machines, copiers, scanners, and multifunction devices. Virtually all major manufacturers in each of these equipment categories offer Energy Star-compliant products. A primary feature of Energy Star-compliant products is the ability to automatically power down to a low energy "sleep" mode after some specified period of inactivity. This reduces the amount of energy consumed by the equipment. In some

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cases, Energy Star features offer additional benefits such as reduced "wear" (e.g., extends the life of scanner light sources). In all cases, the Energy Star features are designed to be compatible with the intended business use of the device (e.g., fax machines in "sleep" mode are immediately ready to respond to incoming fax calls; monitors in "sleep" mode take only about 10 seconds to "awaken", etc.).

More detailed information on the Energy Star program and listings of vendors providing Energy Star-compliant devices in each of these equipment categories can be found at <http://www.energystar.gov/>.

Whenever there is an Energy Star-labeled device available in the equipment category for which purchases are anticipated, then State organizations shall specify and purchase Energy Star-labeled equipment.

Per the current requirements for Energy Star 'labeling', equipment shipped by the vendor should have power management features implemented as the default. More importantly, **when a computer system is put into service on an end-user's desktop, the final software configuration of the computer system must have the relevant power management features activated.**

The table below provides some examples of energy usage by type and size of equipment, and the expected energy reductions during "sleep" mode operations. These are worthwhile guidelines for understanding which devices consume the most electrical power in a typical organization, and for determining potential benefits from the use of Energy Star-compliant equipment.

Device Type	Active Use (Watts)	Power-manage (Watts) ¹
Pentium Computer	45	25
Laptop Computer	15	3
15" Monitor CRT	75	5
20" Monitor CRT	120	5
15" Flat Panel LCD Display	35	5
Fax Machine	35	15
Inkjet Printer	15	5
Laser Printer	140	90

¹ Based upon values reported in the "User Guide to Power Management for PCs and Monitors", Bruce Nordman, Mary Ann Piette, Kris Kinney, Carrie Weber. Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, January 1997.

STATE ADMINISTRATIVE MANUAL

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PURCHASE SOFTWARE THAT SUPPORTS ENHANCED ADMINISTRATION AND IMPLEMENTATION OF POWER MANAGEMENT FEATURES

Successful implementation of effective power management features requires the use of both hardware and software capable of supporting power management. To ensure that the State continues to improve the capability to manage electrical energy consumption by IT equipment, all installed software products must operate with and not negatively impact the hardware-based power management capabilities of IT equipment, where applicable.

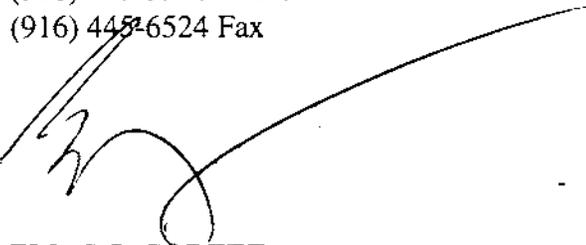
In order to more effectively monitor, control, and adjust the advanced power management configurations on individual desktop computer systems and other network-attached devices, automated network management toolsets should be purchased and implemented (if not already done) to allow centralized administration of the power management settings for network-attached devices (e.g., desktop computers, printers, etc.).

Information Technology managers within State organizations must have the capability to adjust power management features to meet the needs of reduced energy consumption, and to ensure that power management settings are not tampered with or made inactive. Ultimately, this must be accomplished through the use of automated toolsets; hand-configuring individual desktop computers is an important short-term strategy for enabling power management features, but it does not provide a long-term solution.

INQUIRIES AND FURTHER INFORMATION

We hope that these recommendations will assist you in making procurement decisions that will maximize the potential for long-term energy reductions related to the use of IT equipment. Please direct all press inquiries and questions regarding this information to:

Department of Information Technology
Attention: John Correia
801 K Street, Suite 2100
Sacramento, CA 95814
(916) 445-5900 Voice
(916) 445-6524 Fax



ELIAS S. CORTEZ
Chief Information Officer/Director
State of California/Department of Information Technology

PROPERTY TRANSFER REPORT

STD. 158 (REV. 7/2000)

ENTERED ON PROPERTY RECORDS BY *(Signature)*



FROM <i>(Department, Unit, or Office)</i>	LOCATION <i>(Address)</i>	DATE	DOCUMENT NUMBER
TO <i>(Department, Unit, or Office)</i>	LOCATION <i>(Address)</i>	CHECK TRANSFER TYPE <input type="checkbox"/> INTRA-DEPT. (SAME FUND) <input type="checkbox"/> INTER-DEPT. (SAME FUND) <input type="checkbox"/> BETWEEN FUNDS	
CONTACT PERSON	TELEPHONE NUMBER		

LINE	ARTICLE	EQUIPMENT NUMBER	ORIGINAL PURCHASE DATE	QUANTITY	TOTAL
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

REASON FOR TRANSFER

APPROVED BY PROPERTY SURVEY BOARD (A MINIMUM OF TWO SIGNATURES IS REQUIRED)	SIGNATURES	DATE SIGNED
	1. 	
	2. 	
	3. 	
REVIEWED BY DEPARTMENT OF GENERAL SERVICES	4. 	
RECEIVED THE ABOVE ITEMS FOR DELIVERY AS DIRECTED HEREIN	TRUCK DRIVER 5. 	
I HAVE RECEIVED THE ITEMS ABOVE	PROPERTY CUSTODIAN 6. 	UNIT OR OFFICE

Record as of disposition data (lost, stolen or destroyed property—record as of the date such determination was made).

Authority is requested to dispose of the following State property:

FUND OWNED BY

RETURN TO: REPORTING DEPARTMENT/AGENCY ATTENTION DOCUMENT NUMBER

RETURN ADDRESS IMS CODE DATE

CITY ZIP CODE REPLACEMENTS: SEE PURCHASE ESTIMATE NUMBER

CONTACT PERSON TELEPHONE NUMBER ATTACHED

ITEM-DESCRIPTION, MODEL NUMBER, SERIAL NUMBER, ETC.	STATE IDENT. NO. (1)	DATE PURCHASED	ORIGINAL COST	LOCATION (CITY)	PRESENT CONDITION	DISP. CODE*	PRICE OFFERED (2)	PRICE RECEIVED (3)	RECEIPT NUMBER
1.									
2.									
3.									
4.									
5.									
6.									
7.									

(1) PROPERTY TAG NUMBER OR VIN NUMBER FOR VEHICLE (2) DO NOT OBTAIN BIDS ON TRADE-INS. ESTIMATE PRICE OFFERED (3) AMOUNT ALLOWED IF TRADED IN OR SOLD

EXPLANATION-REASONS FOR PROPOSED DISPOSITION OF EACH ITEM

***DISPOSITION CODE**

- 1. TRADE-IN
- 2. SALE (INCLUDING JUNK SALE)
- 3. JUNK - VALUELESS
- 4. LOST**
- 5. STOLEN**
- 6. DESTROYED (AS BY FIRE, ETC.)**
- 7. TO BE SALVAGED
- 8. PROPERTY REUTILIZATION-GENERAL SERVICES, SURPLUS PROPERTY

DEPARTMENT OF GENERAL SERVICES REVIEW NOT REQUIRED

**IF LOST, STOLEN OR DESTROYED, REFER TO SAM SECTION 8643 FOR INSTRUCTIONS.

APPROVED BY PROPERTY SURVEY BOARD	CERTIFICATION OF DISPOSITION	REVIEWED BY DEPT. OF GENERAL SERVICES
<p><i>(A minimum of two signatures is required)</i></p> <p>The above statements regarding state property are true and correct; culpable negligence (check appropriate box)</p> <p><input type="checkbox"/> was <input type="checkbox"/> was not</p> <p>involved in loss, theft, or damage; the disposition proposed is best for the public interest.</p> <p>SIGNATURE _____ DATE SIGNED _____</p>	<p>The above described property was disposed of as follows: <i>(specify if no consideration was received)</i></p> <p>MANNER OF DISPOSAL _____</p> <p>DISPOSAL DATE _____</p> <p>SIGNATURE (Officer Supervising Disposal of the Property) _____ TITLE _____</p>	<p>FOR DGS REVIEW, SEND TO: Department of General Services State Agency for Surplus Property NORTH 1706 National Drive Sacramento, CA 95834 SOUTH 701 Burning Tree Road Fullerton, CA 92833</p> <p>FOR DISPOSITION OF VEHICLES AND MOBILE EQUIPMENT, SEND TO: Department of General Services Office of Fleet Administration 802 O Street Sacramento, CA 95814</p>
1. SIGNATURE _____ DATE SIGNED _____	SIGNATURE _____ TITLE _____	SIGNATURE _____ DATE SIGNED _____
2. SIGNATURE _____ DATE SIGNED _____	SIGNATURE _____ TITLE _____	SIGNATURE _____ DATE SIGNED _____
3. SIGNATURE _____ DATE SIGNED _____	SIGNATURE _____ TITLE _____	SIGNATURE _____ DATE SIGNED _____

(DO NOT USE HALF SHEETS OR STAPLES)

Appendix E

DGS Property Survey Report (Form 152) disposition code definitions

The codes used below are use to indicate the preferred disposition of property. A brief description of each code is included to provide clarification.

1. **Trade-in:** Receive benefit for equipment/product (can be a benefit other than just money, such as an energy rebate).

2. **Sale:**

Not recommended by DGS/Surplus.
Requires complete following of "public auction rules".
Time consuming.

3. **Valueless:**

Donation.
Scrap (no landfilling).
Recycle dealer.

4. **Lost, stolen, destroyed:** As described

5. **To be "cannibalized":** Property is to be used for needed parts. After being cannibalized (used for parts), designation becomes Code 3.

6. **Recycled-donation:** State Agency directly sells or donates to recycler or scrap dealer (see www.ciwmb.ca.gov/Electronics/Collection/)

7. **Donation to nonprofit:** State agency directly donates to approved nonprofit

8. **Property reuse program:**

Property delivered to DGS for determination.
Property has value.
Has recycle value.
Can generate revenue.
Value to community/related nonprofits.
Avoids land-fill disposal.

9. **Donation to computer refurbishing program (contact DGS for a list of eligible nonprofits available by county)**

Computers for Schools (located in Chico)
State Department of Corrections institutions with computer refurbishing programs.
Community Colleges

Appendix F: Cities/Counties That Have Adopted Resolutions to Manage Electronic Waste

1. City and County of San Francisco
2. County of Sonoma
3. County of Del Norte
4. County of San Benito
5. City of Santa Ana
6. County of Santa Cruz
7. City of Rialto
8. City of Modesto
9. City of Apple Valley
10. City of Milpitas
11. City of Davis
12. City of Santa Barbara
13. City of Richmond
14. City of Costa Mesa
15. City of Avenal
16. County of Humboldt
17. City of Santa Cruz

Other Local Agencies That Have Adopted Resolutions:

1. Ventura County Council of Governments
2. Salinas Valley Solid Waste Management Authority
3. Mojave Desert Solid Waste Management Authority
4. Santa Clara County Solid Waste Commission
5. Sonoma County Waste Management Agency



INTEGRATED
WASTE
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CALIFORNIA DEPARTMENT OF GENERAL SERVICES
