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### PURPOSE

This document provides a list of actions and steps that federal agencies and facilities can take to improve the operation and maintenance of their electronic equipment.

### INTRODUCTION

Operation and maintenance activities encompass a variety of electronics issues, including: energy conservation and efficiency; efficient use of imaging equipment; and extending product life.

Improving operation and maintenance of electronic equipment can result in numerous benefits, including:

1. Reduced energy consumption.
2. Reduced resource use.
3. Increased recycling rates.
4. Keeping viable equipment out of the waste stream.
5. Reduced demand for new electronic products.
6. Maximizing product life and lifecycle environmental and cost benefits.

**IMPORTANT NOTE:** The activities outlined in this document are divided into those required by statute or Executive Order, and those that are recommended as best practices. The steps provided are suggested to help federal agencies and facilities achieve each activity. However, particular steps may not be necessary, possible, or practical at your organization. The Federal Electronics Challenge (FEC) encourages all federal agencies and facilities to consider their existing IT operation and maintenance policies, procedures and directives when reviewing and implementing these steps.

For the purposes of this document, “electronic equipment” includes common office equipment, including:

- o Computers desktops and notebooks/laptops
- o Monitors
- o Imaging equipment, including: copiers; printers; scanners; facsimile (fax) machines; digital duplicators; mailing machines, and multifunction devices or products (MFDs or MFPs) <sup>1</sup>
- o Handheld electronics, including cellular phones, personal digital assistants (PDAs), and pagers

Federal agencies and facilities may apply these principles to other electronic equipment in their office environment, as they see fit.

### ENERGY CONSERVATION AND EFFICIENCY



**Purchase or lease electronic equipment that is ENERGY STAR® qualified; Federal Energy Management Program (FEMP) designated; and Electronic Product Environmental Assessment Tool (EPEAT®) registered.**

*Why?*

- Required by the Energy Policy Act of 2005; Energy Independence and Security Act of 2007; Federal Acquisition Regulation (FAR) Part 23; and Executive Order (E.O.) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.

*How?*

1. Find energy efficient electronic equipment.
  - a. ENERGY STAR, FEMP, and EPEAT maintain lists of products that meet their standards or specifications.
  - b. The U.S. General Services Administration (GSA), Defense Logistics Agency (DLA) and many private vendors label these products in their print and online product catalogues.

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<sup>1</sup> This definition aligns with the ENERGY STAR specification for imaging equipment.

2. Require energy efficient electronic equipment in acquisition and procurement documents.
  - a. Include requirements for ENERGY STAR qualified, FEMP designated, and EPEAT-registered electronic equipment. Sample procurement language is available online from these programs and in FAR Part 52.223.
3. Develop or update purchasing policies, procedures and guidance, to require acquisition of energy efficient electronic equipment.
4. Track annual purchases and leases of energy efficient electronic equipment for necessary reporting:
  - a. Agency Strategic Sustainability Performance Plan (SSPP)
  - b. Office of Management and Budget (OMB) Energy and Sustainability Scorecard
  - c. FEC Annual Reporting Form

### Resources

- ENERGY STAR Products website:  
[http://www.energystar.gov/index.cfm?c=products.pr\\_find\\_es\\_products](http://www.energystar.gov/index.cfm?c=products.pr_find_es_products)
- FEMP Products website:  
[http://www1.eere.energy.gov/femp/technologies/procuring\\_eeproducts.html](http://www1.eere.energy.gov/femp/technologies/procuring_eeproducts.html)
- EPEAT website: <http://www.epeat.net/>
- GSA Advantage! website: <https://www.gsaadvantage.gov/>
- DLA website: <http://www.dla.mil/>



### **Enable ENERGY STAR power management features.**

#### Why?

- Required by E.O. 13514.

#### How?

1. Gather information about electronic equipment that must be power managed (computer desktops, notebooks/laptops and monitors).
  - a. Determine the hardware, software and network configurations in use at your organization.
  - b. Understand remote management needs (for software patches, updates, and teleworkers).
  - c. Identify exceptions for mission-critical or sensitive equipment.
2. Investigate implementation options for local and/or network power management.
  - a. ENERGY STAR provides information on free, open-source, and commercial software solutions.
  - b. ENERGY STAR also provides free technical assistance for power management implementation.
  - c. Use the information gathered in step 1 to design a power management implementation scheme that works for your organization.
3. Activate power management.
  - a. Ensure that ENERGY STAR features are enabled on hardware products prior to distribution to users.
  - b. Deploy software solutions (see step 2) to implement power management settings; OR manually enable ENERGY STAR settings on existing hardware.
  - c. Consider a gradual phase in of power management; many users will not notice a difference and adjustments can be made as problems arise.
4. Track and maintain power management settings.
  - a. Develop and use a system to check and reset power management settings, as needed.
  - b. Some software solutions may automate this process and provide reporting functions.
  - c. Facilities relying on manual implementation of power management features may need to administratively lock-down or routinely check and reset these settings.
5. Develop or update IT operation and maintenance policies, procedures and guidance, to ensure continued power management.

6. Track power management compliance for necessary reporting:
  - a. Agency SSPP
  - b. OMB Energy and Sustainability Scorecard
  - c. FEC Annual Reporting Form

### Resources

- ENERGY STAR Power Management website: <http://www.energystar.gov/powermanagement>
- FEC's *Enabling ENERGY STAR® Power Management Features*: <http://www2.epa.gov/fec/enabling-energy-star-power-management-features-1232013>
- FEC's *Sample Language for Power Management and Powering Down Policies*: <http://www2.epa.gov/fec/sample-policy-and-guidance-language-power-management-and-powering-down-6262012>
- The State Electronics Challenge's *Power Management for Computers and Other Office Equipment: A Best Practices Resource Guide*: [http://stateelectronicschallenge.net/pdf/sec\\_computer\\_power\\_management\\_guide%20.pdf](http://stateelectronicschallenge.net/pdf/sec_computer_power_management_guide%20.pdf)



**Turn off/power down electronic equipment at the end of each work day and/or over weekends and holidays.**

### Why?

- Recommended to save energy and in some cases, enhance security.

### How?

1. Gather information about electronic equipment that can be turned off/powered down.
  - a. Determine the hardware, software and network configurations in use at your organization.
  - b. Understand remote management needs (for software patches, updates, and teleworkers).
  - c. Identify exceptions for mission-critical or sensitive equipment.
2. Investigate implementation options for local and/or network powering down.
  - a. Require or request that users turn off their electronic equipment at the end of the day.
  - b. Provide users with power strips/surge protection devices for universal shut-off and to prevent phantom load.
  - c. Investigate software solutions that power down machines across a network, especially if security is a concern.
3. Implement turn off/power down policies or practices.
  - a. Notify users of requirements or requests to turn off electronic equipment, and distribute power strips/surge protectors.
  - b. Deploy software solutions for automatic powering down.
4. Track turn off/power down compliance.
  - a. Develop and use a system to check compliance with user controlled turn off policies and practices.
  - b. Utilize reporting functions in software solutions, if available.
5. Develop or update IT operation and maintenance policies, procedures and guidance, to require or recommend turning off/powering down of electronic equipment.

### Resources

- FEC's *Sample Language for Power Management and Powering Down Policies*: <http://www2.epa.gov/fec/sample-policy-and-guidance-language-power-management-and-powering-down-6262012>

## EFFICIENT USE OF IMAGING EQUIPMENT



**Enable duplexing (double-sided) features on imaging equipment and connected computers.**

### Why?

- Required by E.O. 13514.

### How?

1. Gather information about electronic equipment that can and must be set to duplex (imaging equipment, computer desktops, and notebooks/laptops).
  - a. Determine the hardware, software and network configurations in use at your organization.
  - b. Most commercial imaging equipment has duplex capability as a standard feature or optional accessory.
  - c. Some types of ENERGY STAR qualified imaging equipment are required to have duplex features standard.
2. Investigate implementation options for local and/or network setting of automatic duplexing.
  - a. Check with imaging equipment manufacturers and vendors to learn about how to automate duplexing features of their products.
  - b. Use the information gathered in step 1 to design a duplexing implementation scheme that works for your organization.
3. Activate automatic duplexing.
  - a. Ensure that duplexing features are enabled on hardware products prior to distribution to users.
  - b. Deploy software solutions (see step 2) to implement duplexing settings; OR manually enable duplexing settings on existing hardware.
4. Track and maintain duplexing settings.
  - a. Develop and use a system to check and reset duplexing settings, as needed.
  - b. Some software solutions may automate this process and provide reporting functions.
  - c. Facilities relying on manual implementation of duplexing features may need to administratively lock-down or routinely check and reset these settings.
5. Develop or update IT operation and maintenance policies, procedures and guidance, to ensure continued automatic duplexing.
6. Track automatic duplexing compliance for necessary reporting:
  - a. Agency SSPP
  - b. OMB Energy and Sustainability Scorecard
  - c. FEC Annual Reporting Form

### Resources

- ENERGY STAR Products website:  
[http://www.energystar.gov/index.cfm?c=products.pr\\_find\\_es\\_products](http://www.energystar.gov/index.cfm?c=products.pr_find_es_products)



### **Streamline acquisition and use of imaging equipment.**

### Why?

- Recommended to save energy and natural resources, and reduce paper and ink/toner purchasing and waste.

### How?

1. Purchase or lease multifunction devices or products (MFDs or MFPs) instead of individual imaging machines.
  - a. MFDs/MFPs can perform two or more imaging functions through one machine. For instance, a printer/copier/fax machine is an MFD/MFP.
2. Minimize local imaging equipment and maximize networked imaging equipment.
  - a. Instead of providing individual printers for users who print sensitive information, consider implementing a PIN code system for a network printer. Users can send sensitive documents to the network printer and the printer will spool the job until the user enters their PIN code at the printer.

3. Evaluate Managed Print Services (MPS)
  - a. MPS provides outside management of imaging equipment needs – including hardware, supplies, service, technical support and reporting.
  - b. MPS delivers supplies when needed, reducing stockpiling; provides technical and service support, increasing productivity and reducing frustration; and may result in significant cost savings.

### Resources

- FEC's *How to Print a Confidential Document Using a Pin Code*: <http://www2.epa.gov/fec/how-print-confidential-document-using-pin-code-6262012>
- Check with imaging equipment manufacturers and vendors to learn about their MPS offerings.



### **Reduce resource use by imaging equipment.**

#### Why?

- Recommended to reduce paper and ink/toner purchasing and waste.

#### How?

1. Promote electronic alternatives to paper documents:
  - a. Post electronic copies of meeting and project materials on the internet or intranet.
  - b. Develop and encourage the use of electronic forms.
  - c. Store records electronically.
  - d. Utilize electronic document sharing and editing features.
2. Promote efficient printing/copying by encouraging:
  - a. Use of duplex features.
  - b. Reductions in color printing.
  - c. Use of draft print quality for non-critical printing.
  - d. Printing of individual pages instead of whole documents.
  - e. Printing text without graphics.
  - f. Reductions in document margin size, line spacing, and font types/sizes.
  - g. Condensing large print or presentation slides onto fewer pages.
  - h. Use of the Print Preview function to print only the pages needed.

## EXTENDING PRODUCT LIFE



### **Extend the life of existing electronic equipment.**

#### Why?

- Recommended to potentially save resources and money.

#### How?

1. Properly maintain electronic equipment to prevent problems.
  - a. Update virus/spyware/malware protection and schedule regular scans to fix problems.
  - b. Apply operating system and software updates in a timely manner.
  - c. Control software installation and use.
  - d. Regularly check, fix and defragment hard drives.
2. Replace specific components instead of entire systems.
  - a. Replace broken or worn-out peripherals, such as cables, keyboards, and mice. Keep a small stock of these peripherals on hand to enable quick replacements.
  - b. Upgrade memory or hard drives instead of replacing entire computers or imaging products.
  - c. Keep working pieces of desktop systems. For instance, replace an obsolete desktop computer, but keep a working monitor to pair with the new computer.

3. Implement an internal “bumping” or “trickle-down” policy for electronic equipment.
  - a. Hardware that is obsolete for one application may be useful for a less sophisticated application.
  - b. Develop a network of IT professionals within your organization to facilitate information sharing and internal reuse.
  - c. Consult with your agency or facility property management official for information on proper disposition of used electronics both within and outside your organization.
4. Develop or update IT operation and maintenance policies, procedures and guidance, to require or recommend a four-year or more life-cycle for electronic equipment.
5. Track life-cycle extension for necessary reporting:
  - a. FEC Annual Reporting Form

### Resources

- FEC’s *Extending the Life of Electronic Equipment*: <http://www2.epa.gov/fec/extending-life-electronic-equipment-6262012>
- FEC’s *Sample Policy for Four-Year Refresh Cycle*: <http://www2.epa.gov/fec/sample-policy-and-guidance-language-electronic-equipment-refresh-cycles-6262012>



### Evaluate requests for new electronic equipment purchases.

#### Why?

- Recommended to potentially save resources and money.

#### How?

1. Assess each new electronic equipment request.
  - a. Develop and implement a system to evaluate new equipment requests: can existing equipment be upgraded; can other resources provide similar functionality; is the new product necessary?
  - b. Require a needs assessment or similar standard form for all new electronic equipment requests beyond scheduled technology refreshes.
2. Conduct economic analyses to clarify needs and identify cost savings.
  - a. Determine the life-cycle cost of the electronic equipment used by your organization.
  - b. Evaluate the relative costs of upgrade/repair and replacement options for different types of electronic equipment.
3. Ensure requests for new electronic equipment include requirements to help extend the product lifecycle.
  - a. Require electronic equipment that can be easily upgraded and repaired.<sup>2</sup>
  - b. Request an extended warranty.
  - c. Smaller imaging equipment products (generally used locally) can be problematic because they have a shorter lifespan and are costly to repair relative to replacement costs. Consider purchasing more robust and versatile network-based imaging equipment instead.
4. Develop or update purchasing and IT policies, procedures and guidance, to address requirements for new purchase assessments and life-cycle analyses.

### Resources

- FEC’s *Total Cost of Ownership Analyses for Information Technology Investments*: <http://www2.epa.gov/fec/total-cost-ownership-modeling-electronics-6192012>.
- FEC’s *Total Cost of Ownership Calculator Tool*: [http://www2.epa.gov/sites/production/files/fec/resources/tco\\_tool.xlsx](http://www2.epa.gov/sites/production/files/fec/resources/tco_tool.xlsx).

<sup>2</sup> EPEAT-registered electronic equipment must meet this requirement.





### **Examine alternatives to electronic purchases.**

#### *Why?*

- Recommended to potentially save resources and money.

#### *How?*

1. Limit the number of computers per user to one (either desktop or portable).
  - a. Provide infrastructure (e.g., docking station, peripherals) that allows users to utilize a portable computer at their office desk.
  - b. Provide and maintain a library of portable equipment that can be “checked out” by employees for off-site meetings, travel, or telework.
  - c. Evaluate leasing of electronic equipment or seat management. Leasing equipment or seat management may reduce the cost of electronic equipment acquisition, operation and maintenance, and disposal.
  - d. Set the technology refresh rate in the contract to four or more years.
  - e. Include contract or lease requirements for EPEAT-registered, ENERGY STAR qualified, and FEMP designated products; require power management of computers and monitors (if controlled by the contractor); and require environmentally sound disposition of used equipment.
2. Evaluate remote desktop solutions (e.g., thin client) to reduce hardware and software distribution to individual users.
  - a. Implement server-centralized/network-based software solutions for specific software applications that require special hardware and/or must be utilized at various locations.
  - b. Implement server-centralized/network-based software solutions for small facilities to reduce costs for individual’s hardware and software.



### **Plan for reuse, donation and recycling during operation and maintenance.**

#### *Why?*

- Recommended to better prepare for electronic equipment end-of-life management, and increase recycling rates.

#### *How?*

1. Update information about electronic equipment in use in asset management systems.
  - a. Enter data about upgrades and repairs of existing equipment, as they occur.
2. Consider the needs of recipients of your reused/donated electronic equipment.
  - a. Save instruction manuals and hardware driver diskettes/CDs/etc.
  - b. Keep track of transferable software licenses.
  - c. Consult with your agency or facility property management official for information on transfer of software.
3. Facilitate recycling opportunities that occur during electronic equipment operation and maintenance.
  - a. Provide for recycling of paper, toner/ink cartridges, and batteries.

## **EMPLOYEE EDUCATION**



### **Educate employees on how to improve operation and maintenance of electronic equipment.**

#### *Why?*

- Recommended to improve understanding and compliance among employees.



## Improving Operation and Maintenance of Electronic Equipment

Updated: 6/26/2012

### How?

1. Inform and educate employees on your agency's and/or facility's IT operation and maintenance policies, procedures and guidance.
  - a. The FEC provides posters that may be customized and posted in your facility.
  - b. Develop and maintain an internet or intranet site.
  - c. Provide internal training on how employees can assist in meeting electronics stewardship goals.
  - d. Send a memo to employees.
2. Notify employees of opportunity for outside training.
  - a. ENERGY STAR provides educational materials and training on-line.
  - b. FEC provides monthly educational webinars, which are open to any employees at a partner agency or facility.

### Resources

- ENERGY STAR Training Center: [http://www.energystar.gov/index.cfm?c=pt\\_univ.pt\\_univ](http://www.energystar.gov/index.cfm?c=pt_univ.pt_univ)
- FEC webinar schedule: <http://www2.epa.gov/fec/webinars-events>
- FEC Power Down Customizable Poster:  
<http://www2.epa.gov/sites/production/files/fec/resources/powerdown.ppt>
- FEC Double-Sided Customizable Poster:  
<http://www2.epa.gov/sites/production/files/fec/resources/double-sided.ppt>
- FEC Recycle Toner Cartridges Customizable Poster:  
[http://www2.epa.gov/sites/production/files/fec/resources/toner\\_cart.ppt](http://www2.epa.gov/sites/production/files/fec/resources/toner_cart.ppt)

### REFERENCES

The text of Executive Order 13514 is available at: <http://www.fedcenter.gov/programs/eo13514/>.

The FAR is available at: <https://www.acquisition.gov/far/>.

The text of federal legislation, including the Energy Independence and Security Act of 2007 and the Energy Policy Act of 2005, are available at: <http://www.gpoaccess.gov/uscode/>.

### CONTACT INFORMATION

If you have questions related to this resource or need other assistance with the Federal Electronics Challenge, please contact your Regional Champion: <http://www2.epa.gov/fec/technical-assistance>.

Visit the FEC online: <http://www2.epa.gov/fec/>

E-mail the FEC: [fec@epa.gov](mailto:fec@epa.gov)