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Managing Army Plug Load Equipment Energy Use: *Workstation Computer Systems*

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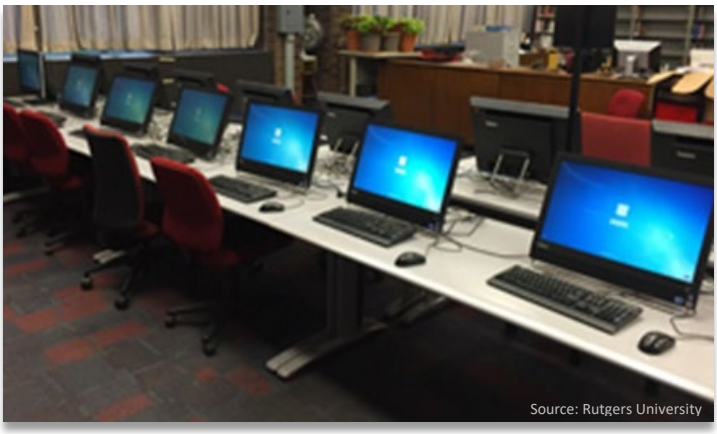
Managing Army Plug Load Equipment Energy Use: *Workstation Computing Systems*

Overview

Improvements in computing system security updates and purchasing policies could save the Army as much as 85 million kWh and $5 million per year when applied to the Army's more than one million computers. This represents the largest and highest-priority plug load energy- and cost-saving measure identified by a recent study focused on Army buildings.[1]



Source: Rutgers University

Savings Potential

Computer workstation equipment consumes 27% of the total energy of all plug load devices within the studied buildings. Examination of device-level loads over both occupied and unoccupied periods reveals clear strategies to reduce energy use without impacting mission.

Enable Power Save Settings. Army Regulation 25-1 specifies that IT equipment, including computers, must be turned off or enter a low-power (sleep or hibernate) mode after 30 minutes of inactivity (15 minutes for monitors). Results from this study, however, indicate that higher priorities override the consistent implementation of these regulations. Detailed device-level power monitoring data highlight a persisting conflict between energy and cybersecurity policies, confirming reports that computers are typically left on to facilitate the timely processing of system upgrades and security patches. Enabling computers to receive these important updates on schedule without disabling power saving settings can save the Army over 31 million kWh of electricity, valued at more than $2 million per year just within the four relevant building categories evaluated in this study. Extending this to the more than one million computers across the Army would save 85 million kWh and $5 million each year.

The Army CIO, G-6, and ARCYBER/NETCOM should coordinate to establish and implement a robust, sustainable, and consistent update procedure across all workstation computing systems to ensure a strong cybersecurity posture while supporting sound energy policy. A suitable wake-on-LAN or similar approach to enable timely system updates should be implemented to allow computers to enter low-power mode each evening and weekend, and during any period of sufficient inactivity.

Further, set all monitors to enter low-power standby mode (typically < 0.5W of power) after 15 minutes of inactivity, centrally managed by NEC policy administration. Active image screen savers should not be allowed as a substitute for sleep mode. Educate users about the impacts of monitor display settings on energy use and eye health. A typical monitor uses 3x the power at the highest brightness setting than at the lowest. A large LCD monitor using 60W at 50% brightness can vary from to 50W to 90W between 25% and 75% brightness. Depending on ambient lighting, lowering monitor brightness can also reduce user eye strain.

Computing System Best Practices

Personal computers, monitors, speakers, and uninterruptible power supply (UPS) devices are the most abundant category of plug load equipment within Army buildings and rank second in energy use of all the assessed categories. Recommendations for reducing energy use include:

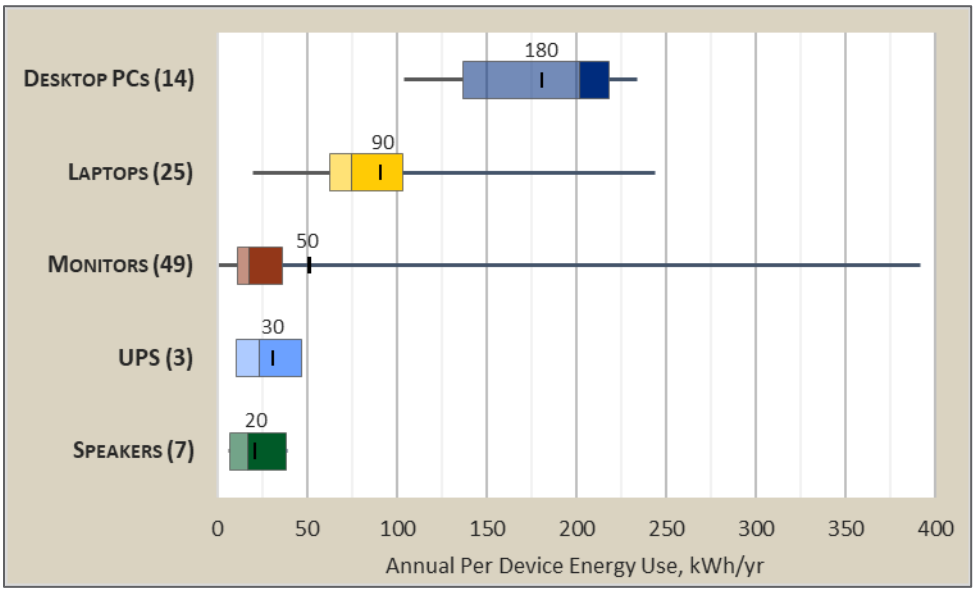
- Establish a consistent and robust computer system security update process that allows computers to wake on demand to avoid conflict with existing energy policy
- Reinforce IT energy policy and strengthen automated NEC administrator control of computer, monitor, and peripheral power-saving settings
- Update purchasing policies to encourage the use of laptop computers, which consume half the electricity as comparable desktop units, and evaluate thin client workstations for future applications
- Discourage the use of workstation UPS devices except as required for more critical systems (built-in batteries allow laptops to ride through short-duration power disruptions).

Purchasing Policy: Prioritize Laptops over Desktop Computers. Laptop or notebook computers are more energy efficient than comparable desktop devices. Results from the study show that on average, Army desktop computers use twice the energy of laptops (180 kWh/yr vs. 90 kWh/yr). Most desktop computers were also connected to a small UPS, which adds another 10-45 kWh/yr to protect from data loss during a power outage. Policies to encourage the purchase of laptops wherever applicable would save 5.7 million kWh and $340K per year (within Administration General Purpose buildings alone).

The ability of laptop batteries to manage short-term power disruptions and negate the need for UPS devices would increase savings and benefit data security. Virtual desktop technologies, such as thin and zero clients, provide networked access to applications and data from a centralized server. These emerging technologies offer additional potential for more efficient computing technology, while enabling improved power and cybersecurity management.

Equipment Energy Use

The energy use of computer equipment evaluated in the study is highlighted in the chart at the right. The typical operating load for desktops is between 50 and 70W, and 20–40W for laptops. Observed idle power is 20W for desktops and just over 9W for laptops; sleep mode would reduce each by 95%. Given the high idle time, an effective power management approach can cut the annual energy use in half for each type of system. Most monitors use between 20–60W when active and exhibit better sleep compliance, yet higher use outliers contribute to a 38% overall reduction potential.



Distribution of annual energy use for personal computing equipment. Vertical lines and values indicate average consumption. The interface of horizontal bars highlights the median between 2nd and 3rd quartiles. Numbers in parentheses are the number of devices monitored for each type.

Resources:

- Army Regulation 25-1
- ENERGY STAR: Put Your Computers to Sleep

About the Study

This fact sheet highlights best practices and savings opportunities for common plug load equipment identified by a study to examine their operation and energy use in typical Army buildings. The findings are intended to raise awareness, inform policies, and encourage actions to drive savings. This is one of four fact sheets that present recommendations offering significant savings to the Army, as well as other organizations. Additional detail regarding the study methods and results may be found within the technical report.

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[1] **Characterizing Plug Load Energy Use and Savings Potential in Army Buildings. PNNL-29914. December 2022.**

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