Plug Load Assessment Guidelines

General Plug Load Assessment Procedure:

1. Inventory plug load equipment within the building:
   - Use the NREL data collection forms to develop an inventory of the plug load equipment.
   - Calculate active/on, suspended, and off power draws—using a kill-o-watt or similar device—for all computers and monitors within the building.
   - Install a modified surge protector and current transformer to establish the 24-hour load profile of a typical computer/monitor combination by recording an average amp draw every minute.
   - Write down plug load nameplate data.
2. Check computer power settings:
   - Determine the power settings of a series of desktop computers.
   - Check to see if the monitor turns off and the computer goes into standby mode after a predefined period of inactivity.

General Information:

- A typical desktop computer uses 80 W to 100 W when acitve.
- A typical laptop computer uses 20 W to 40 W when active.

Table 1. Average Monitor Power Consumption by Monitor Type and Size[1]

Monitor Type	Size (Inches)	Count	Off (Watts)	Deep Sleep (Watts)	On (Watts)
All Monitors	All	35	1	5	55
CRT	15	4	1	2	58
	17	5	1	2	61
	19	5	2	14	85
	21	5	1	7	95
LCD	15	9	2	2	20
	17	4	2	2	35
	18	3	2	3	54

Source: Lawrence Berkeley National Laboratory

[1] Roberson, J.; Brown, R.; Nordman, B.; Webber, C.; Homan, G.; Mahajan, A.; McWhinney, M.; Koomey, J. *Power Levels in Office Equipment: Measurements of New Monitors and Personal Computers.* LBNL-50508. Lawrence Berkeley National Laboratory. www.osti.gov/bridge/product.biblio.jsp?osti_id=799608. May 14, 2002.

Site Assessment Tools:

1. Use a kill-o-watt or similar device to measure plug load wattages of standard equipment.
2. Use a modified surge protector and current transformer to develop a 24-hour load profile.

Visit the University of British Columbia Department of Physics and Astronomy Web site to learn more about the power consumption of items commonly found in an office: www.physics.ubc.ca/sustain/Energy_Info.pdf

Table 2. Final Energy Savings Recommendations*—Plug Loads[2]

Component	Recommendations (for climate zones 1–8)
Computers—mix of desktop and laptop computers	Increase proportion of laptop computers to desktop computers for primary computer workstations to at least 67% of computers
Computers—servers, desktops, laptops, monitors, laser printers, copy machines, fax machines, water coolers, refrigerators	Use ENERGY STAR equipment
Computers—desktops, laptops	Apply power management software and activation across all computers
Computer monitors, portable HVAC (heaters, fans), other small appliances and chargers	Use occupancy sensor plug strips, or selected outlet occupancy sensor controls in conjunction with lighting control
Water coolers, coffee makers	Use timer switches set to turn off equipment during off-hours
Overall plug loads power density	**0.55 W/ft^2 (5.92 W/m^2)**

Source: Pacific Northwest National Laboratory

* Implementation of these energy measures could allow a new midsize office building to achieve 50% energy savings relative to a building that just meets ANSI/ASHRAE/IESNA Standard 90.1-2004.

[2] Thornton, B.; Wang, W.; Lane, M.; Rosenburg, M.; Liu, B. *Technical Support Document: 50% Energy Savings Design Technology Packages for Medium Office Buildings*. PNNL-18774. Prepared by Pacific Northwest National Laboratory for U.S. Dept. of Energy. www.pnl.gov/main/publications/external/technical_reports/PNNL-19004.pdf. September 2009.

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