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Features

Five tips for low-energy business computing
Energy efficiency isn't just for the data center. Here's how to save some greenbacks by powering down out front.

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First, the data center dialed back its power consumption. Now it's the front office's turn.

Concerned about soaring energy costs, IT organizations have begun to make significant changes to the way their data centers are powered and cooled. But many IT departments haven't yet looked at saving energy by targeting the rest of the company's IT equipment.

That's short-sighted, say IT organizations that have been down this road. The reason -- data centers may use more power per square foot, but as a percentage of total power consumption, it's office equipment that's the big kahuna.

"Office equipment has become more highly featured and powerful than ever before, but there's an energy cost to that," says Katherine Kaplan, who manages the Environmental Protection Agency's Energy Star consumer electronics and IT initiatives.

"If you look at overall power consumption, you're seeing almost double for computers and monitors than for data centers," says Jon Weisblatt, senior product manager, power and cooling initiative at Dell.

Verizon Wireless is one company that is saving plenty of green by going green. Earlier this year, the wireless carrier deployed NightWatchman power management software from 1E that puts desktop computers and monitors in offices, stores and call centers into power-saving mode after a period of inactivity, overriding any personal settings. Another 1E product, SMSWakeup, automatically "wakes up" those machines after hours to deliver patches and updates, shutting them down again when the process is complete. "It saved us [money] just turning computers on and off on demand," says CIO Ajay Waghray.

But Waghray didn't stop there. He also replaced 7,000 PCs with power-sipping Sun Ray thin clients from Sun Microsystems in Verizon's call centers and migrated to LCD monitors companywide (a process that's still ongoing). Replacing nonmanaged PCs in 10 call centers with 7,000 managed thin clients cut energy use for that equipment by 30%, says Waghray. He estimates that the two initiatives combined have cut front-office power consumption by US$900,000 a year.

To Waghray, going green is good business. The projects were good for customer service -- off-hours patching and the more-reliable thin clients improved uptime and reduced trouble-ticket volumes by 50%. "Just do business to make things more efficient, simple and customer focused, and green becomes a very important factor," he says.

There were an estimated 900 million desktops in use worldwide in 2006, according to IDC. Even if all of those units were Energy Star 2006 compliant, they would still consume 426 billion kWh of power annually.

If all of that equipment met the 2007 Energy Star 4.0 specification, it would cut power consumption by 27% over 2006 Energy Star levels, according to Marla Sanchez, principal research associate at the Lawrence Berkeley National Laboratory in California. That would save 115 billion kWh -- enough to power all of Switzerland for nearly two years -- and cut greenhouse gas emissions by about 178 billion lbs.

To do your part to reduce some of those emissions -- and save your own company some dough -- by following our five tips on saving resources and increasing the efficiency of front-office equipment.

1. Do an energy audit

It's hard to know where you stand if you don't first measure the efficiency of the equipment you have.

Fortunately, doing a power audit of ordinary office equipment is less complicated than auditing your data center. A simple, inexpensive meter that fits between the target device plug and the outlet can measure both current loads and cumulative power consumption over time.

If you select a device with a typical usage pattern -- say, a laser printer that gets an average-for-your-office workout each day -- you can multiply the results across the total population of similar equipment to quickly estimate total power consumption. From there, all you need to do is multiply use in kilowatt hours by your local electricity rates and you've got a baseline for savings.

Meters range from the simple to the advanced. P3 International's Kill A Watt or Sea Sonic Electronics Co.'s Power Angel are both simple to use and inexpensive.

More advanced units, such as the Watts Up Pro from Electronic Educational Devices, store data and include software for downloading and graphing that data to show watts, volts and kilowatt-hour consumption over time, giving a more accurate picture of power use.

When the facilities staff at Farmer's Almanac publisher Gieger Brothers in Lewiston, Maine, did an initial power audit, it became "a driving force behind initiatives to get power consumption down," says Joe Marshall, business systems analyst and software specialist at the firm. The audit revealed computer equipment was consuming nearly as much power after hours as it was during the day.

After you've audited energy use, the next step is to audit your internal processes to ensure that equipment is being used in the most energy-efficient manner, says Robert Aldrich, a senior manager specializing in energy efficiency at Cisco Systems. And once you have that process audit -- in other words, once you know how well you are doing human-behavior-wise -- the next step is to "kick the tires on technology" by taking a look at utilities such as power management tools, he says.

2. Adopt and enforce power management

"The biggest impact you're going to make in your overall computing environment is to get systems to go to sleep," says Dell's Weisblatt. For example, a laptop that uses 14 to 90 watts in full operation uses less than 1 watt in standby mode. Desktops consume even more, and a single CRT monitor may use upward of 90 watts.

Most companies, however, aren't managing power settings in a coordinated way, and many desktops don't have power management turned on at all.

Enhanced power management tools provided by system vendors aren't even installed in the baseline system image of many corporate PCs. "We do all this work to make [computers] optimized for power management, and we find big corporations go and make changes and deoptimize it," says Howard Locker, director of new technology at Lenovo.

The issue is that it takes IT extra work to integrate and test Lenovo's bundled software with the company's standard image, he says. Often, organizations don't want to take the time to do that.

Some corporations, however, are starting to get the message. Network administrator Keith Brown deployed LANDesk Software's LANDesk to manage -- and lock down -- power settings on all laptops, desktops and attached monitors at Gwinnett Hospital System in Lawrenceville, Ga.

Like 1E's SMSWakeUp, LANDesk takes advantage of Intel Corp.'s vPro Active Management Technology (AMT), a feature built into its vPro series processors that supports remote management. That allows LANDesk and similar tools to remotely turn on PCs, upload updates, and turn them off again. "It allows you to do 'out-of-band' management on desktops," allowing control even when machines are turned off, explains Brown.

For times when laptops are turned on -- that is, when they're being used by employees -- Lenovo recommends configuring the disk drive to spin down after five minutes of inactivity, the monitor to go blank at 10 minutes, and the machine to go into standby, or suspend, mode after 20 minutes.

Others, such as Amory Lovins, chairman and chief scientist at the energy efficiency think tank Rocky Mountain Institute, recommend even more aggressive settings. He suggests turning off monitors and spinning down the disk drive after just two or three minutes of inactivity.

Verizon's Waghray says he had no trouble enforcing power-saving settings. Machines power off at 12:30 a.m. and back on at 5:30 a.m. Desktop monitors and hard drives go into power-saving mode after two hours, while on thin clients the monitors and processors go into low-power mode after 20 minutes of inactivity.

At Gieger, things were different. While the company does centrally control power management settings, it has had to back off a bit. "There's been a little bit of pushback on that, so we're taking baby steps," Marshall says, noting that current monitor timeouts are set for one hour.

The problem for users is that recovery times vary. Getting back online from hibernate mode, where the system turns off and the system's state is saved to disk, can take up to 30 seconds. It takes just a few seconds, though, to recover from low-power suspend mode or for the monitor or disk drive to come back to life. Still, some users don't like to wait at all, says Marshall.

Every organization needs to find the right balance, managers say. "A few seconds of [wait] time for the average person is not going to be invasive," says Jorge Bandin, vice president of information systems and technology at hosted services provider Terremark Worldwide Inc. His company forces all PCs to go into sleep mode after 30 minutes of inactivity.

In a call center, where computers are in use all the time, sleep mode less of an issue, but even so, people aren't given a choice, says Waghray. When users step away from a console for more than a couple of minutes, the system is powered down and locked.

3. Dump those CRTs

Replacing older computers and peripherals with Energy Star-rated equipment can save both energy and space -- and the lower power consumption can significantly reduce cooling loads in office areas, further extending savings.

The place to start is with CRT displays.

"The biggest offenders are the monitors," says Brown. Most businesses have already begun phasing out CRTs in favor of more efficient LCDs, which use about one-third less power, but they still have plenty of CRTs waiting to go. Verizon Wireless accelerated its refresh cycle because doing so not only saved energy but freed up valuable desk space in its call centers, says Waghray.

Energy savings can add up. Brown estimates that Gwinnett Hospital System is already saving between US$30,000 and US$60,000 a year in electricity costs by replacing about 70% of its CRTs with LCD monitors and using automated power management tools.

4. Slim down the client

As for the desktop, look for equipment that is Energy Star 4.0 compliant. Previous Energy Star ratings looked only at

low-power modes, but "with this new version, we're comparing energy use while working," the EPA's Kaplan says. Computers that meet the standard consume 20% to 50% less energy than those that meet previous Energy Star standards, says Kaplan.

Compact PC models, such as Lenovo's ThinkCentre A61e desktop or Dell's Inspiron 531, are more efficient than standard desktops and save space as well as power (the A61e is about the size of a 3-inch-thick notebook binder). Compact PCs may use as little as half the power of a standard desktop, include Energy Star 4.0-mandated high-efficiency power supplies that are at least 80% efficient and include a low-speed fan that reduces noise levels.

Many businesses, including Jenny Craig, are moving to a Terminal Services or Citrix Presentation Server setup, which enables them to use easily managed thin client PCs on the desktop. Thin clients use less power and space, since they have no disk drive or fan, and the Windows session and applications run on the server.

For Jenny Craig, the noise factor was as important as energy savings when choosing Wyse Technology's thin clients. "When you throw 10 or 12 PCs into a front desk, you can't hear your customers anymore," says Alessandra Nicoletti, director of IT operations. So she moved the stores onto a Citrix Presentation Server back end and Java applications, and populated 484 Jenny Craig centers with thin clients from Wyse, which don't need a fan. Operating power consumption ranges from 6 and 35 watts, and power management settings can be locked and remotely managed.

While replacing PCs with thin clients does require adding servers on the back end that boost power requirements, the savings on the desktop more than make up for that, says Jeff McNaught, chief marketing officer at Wyse. With the 64-bit edition of Presentation Server running on the back end, 1,000 PCs can be accommodated on three 800-watt servers. That amounts to about 3 watts per client, he says.

Jenny Craig's system uses 90% less energy than the PCs it replaced. "We see it on the bills [for the centers]," Nicoletti says.

Waghray says thin clients had other benefits in Verizon Wireless' call centers, where equipment density is high and space is at a premium. "We have seen a reduction in cooling needs for the whole building," he says.

For all their energy-saving benefits, thin clients won't work in every case, such as for some graphics or compute-intensive applications. Northrup Grumman Corp.'s space technology sector is rolling out 3,000 thin clients and has tested 39 engineering applications. While most ran just fine, a few graphics-intensive ones didn't work, says Clayton Kau, vice president of engineering.

And other companies have encountered user resistance. Gwinnett Hospital System has dabbled in thin clients, but has stalled at around 100 terminals. "It hasn't always worked out as we had hoped," says Brown, noting that most employees pushed back, preferring to have a fully equipped desktop that runs their applications locally.

5. Print more efficiently

Desktops and laptops aren't the only area where IT can improve efficiency. Printers tend to be kept longer than PCs, but each year new models bring greater efficiencies.

With each generation of Hewlett-Packard Co.'s printers, for example, energy efficiency has increased by 7% to 15%, according to the vendor's statistics. Therefore, replacing units a few generations old with new, Energy Star-labeled models can cut energy costs by as much as 25%. Also, consumables packaging may be smaller with new machines, which means less waste to throw away.

New technologies are also improving efficiency. Last spring, for example, HP began replacing the fluorescent tubes used for photocopying with LEDs in some products. The technology uses 1.4 times less energy during copying and four times less power when idle, according to the company.

Printers are also getting smarter about when to go into low-power mode. Multifunction printers from Xerox, for example, monitor printer usage patterns over time to decide when to power down and bring the machines online.

Both Jenny Craig and Terremark Worldwide have configured printers to print double-sided by default. While using duplex mode doesn't save energy, it does avoid unnecessary utilization of paper, says Jorge Bandin, vice president of information systems and technology at Terremark. Duplex mode can cut paper consumption by up to 25%, says Dave Lombato, environmental lead for HP's LaserJet business.

While that won't cut the company's energy bill, it does cut down on paper costs as well as the energy and carbon emissions required to produce it. According to Forrester Research, pulp and paper manufacturing is the third biggest consumer of energy in North America, behind steel and chemicals.

Administrators can configure duplex printing across all printers, invoke power-saving modes or configure machines to shut down during specific evening or weekend hours using automation tools available from various printer vendors.

Consolidating and better managing printers, scanners and other peripherals also saves energy and money. According to Forrester, an individual copier, printer and fax machine can consume 1,400 kWh of power annually, while a multifunction printer (MFP) consumes half that.

Multifunction printer devices, which combing copying, printing, scanning and fax, offer additional efficiencies, making consumables management easier and saving space as well as energy. Consolidating just two devices into a single machine, for example, cuts energy consumption by about 40%, according to HP. Terremark uses MFPs in conjunction with j2 Global Communications Inc.'s eFax service, which routes incoming faxes to an e-mail in-box instead of to a printer.

But while MFP sales are growing at double-digit rates, many businesses still have an array of printers, copiers, scanners and fax machines that remain largely unmanaged. "For every MFP out there, there are [still] six or seven printers," says IDC analyst Keith Kmetz. By 2011, however, IDC expects the ratio to be closer to one to three.

While there's no one-size-fits-all solution for energy-efficient computing, the best options will be those that complement the business by simplifying processes, making staff more efficient and serving the customer better, says Verizon Wireless' Waghray.

While green isn't necessarily the goal, he says, it is a means to those ends. The best way to begin, he says, is to "start to think about [green computing] as something that's pretty much part and parcel of what you're doing anyway."

Power savings at the network level

When it comes to networking, power savings are more difficult to come by. In other words, sleep mode doesn't help much when the network never sleeps.

"If you want [your] YouTube video to come up in three seconds or less," quips Robert Aldrich, a senior manager specializing in energy efficiency at Cisco Systems, "the switches moving those packets have to be in always-on ready mode."

But he sees that changing. "By this time next year, any end devices we sell will have some sort of power-efficiency mode. That's a big initiative for us," he says.

Voice over IP and power over Ethernet (PoE) have also increased upfront office power demands by pushing power consumption from a central PBX out onto the desktop. An IP phone adds about 15 watts of power to each cubicle -- which adds up when you have 1,000 or more users. The PoE-enabled switches in the wiring closet also use more power than non-PoE models do.

Overall, however, a native VoIP system typically consumes less power than the digital PBX system it replaces, Aldrich says.

To save energy, move data, not people

Energy-efficient computers are good, energy-efficient people are even better. A green office is about more than using energy-efficient equipment: The application of information technology to support teleconferencing and telework can make both people and businesses more efficient.

Several hundred people employed with Cox Communications Inc.'s call center this year began working four out of five days from home. Using a browser and their own home computers, remote staff access a suite of applications hosted on a Citrix Presentation Server back end.

To access the system, call center workers download a browser plug-in and then authenticate to the system. "We can present the entire environment to any computer anywhere. We even stream content to employees for staff meetings," says Josh Nelson, vice president of information and network technology.

By rotating different teleworkers into the office on different days of the week, Cox has cut computer equipment and cubicle space needs, and avoided a building expansion.

Employees benefit, too: In an era of US$3 a gallon gasoline, they have taken to the voluntary program because it saves four commuting trips to the office each week and takes several hundred cars -- and the emissions they produce -- off the roads each day. "It's been quite impressive from a cost perspective [and] what it does for the environment," Nelson says.

Terremark Worldwide's hosting business requires employees to travel both globally and locally between facilities for everyday meetings. It recently deployed videoconferencing systems from Tandberg to tie together conference rooms between its facilities. Before, staff made regular trips between the main offices and its hosted data center facilities two hours away.

"It helped us avoid about 20% of the travel we were doing before," says George Bandin, vice president of information system and technology. "Just within our own facilities, it's a huge savings in fuel and time."

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