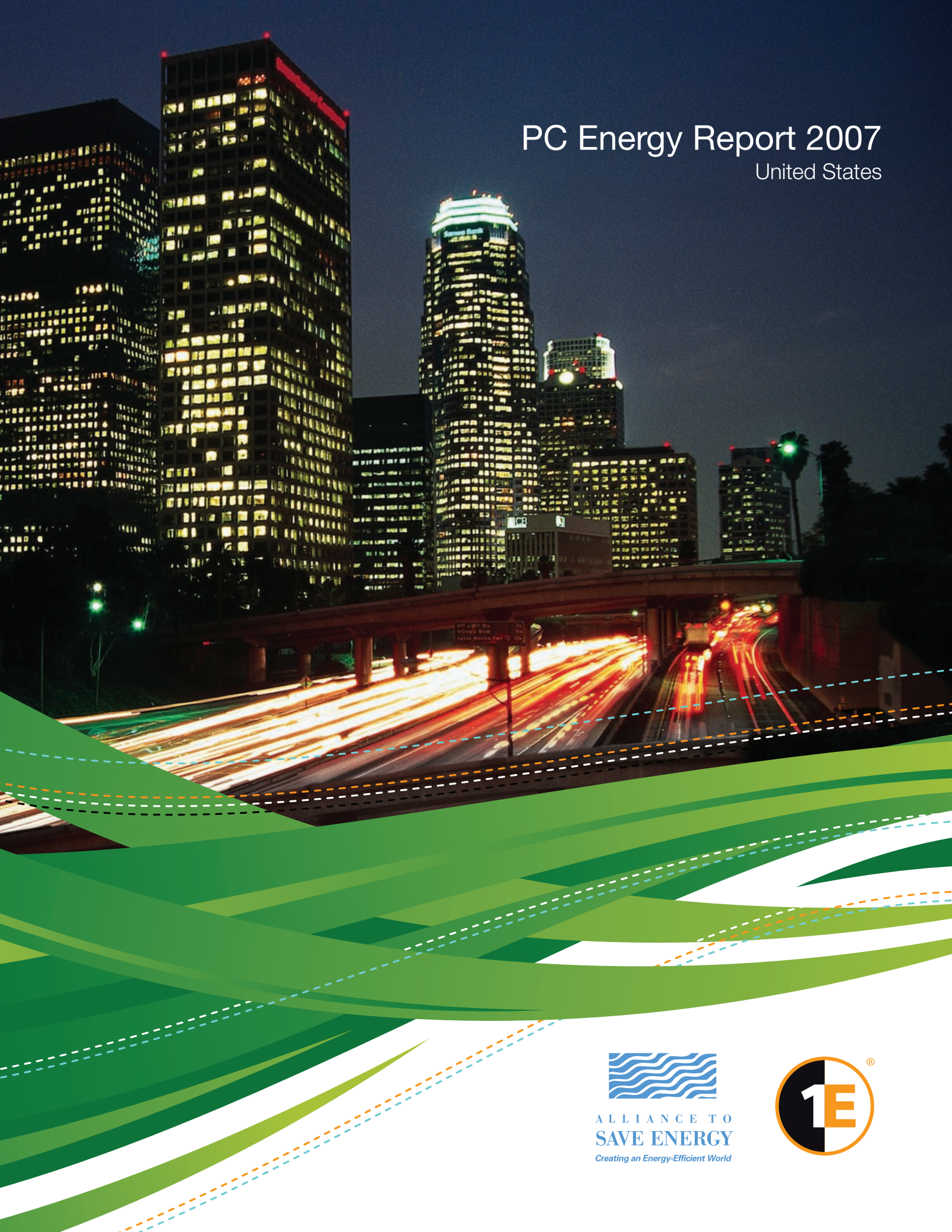


PC Energy Report 2007

United States



**ALLIANCE TO
SAVE ENERGY**
Creating an Energy-Efficient World



Wasting Energy While We Sleep

You wouldn't leave your television on all day while you are at the office, and yet, across the country, millions of work PCs are left on all night—wasting energy, costing owners millions in utility costs, and contributing to global climate change.

A mid-sized company wastes more than \$165,000 a year in electricity costs for computers that have been left on overnight.¹ By turning these computers off, an employer can keep more than 1,381 tons of carbon dioxide (CO₂) out of the atmosphere.² **Across the nation, this adds up to more than \$1.72 billion dollars and almost 15 million tons of CO₂.**³ Few problems match an impact so large with a solution so simple.

A computer uses energy even when it appears to be idle. Reducing that waste can help businesses reduce costs and prevent tons of damaging greenhouse gases from being emitted into our atmosphere.

Ideally, everybody would shut down their PCs at the end of a working day. Research we have commissioned from Harris Interactive® shows that this doesn't always happen. Some people assume their IT departments need their

The simple step of shutting computers down each night can save a 10,000-PC enterprise more than \$165,000 a year in energy costs.

machines to be left on overnight in order to deploy security patches and software updates. Others believe an on-board “sleep” or “hibernation” mode kicks in, which isn't usually the case. And an alarming number of people admit that they just don't care.

To help companies and organizations gain tighter control of their energy consumption, **software solutions and service provider 1E teamed up with the Alliance to Save Energy (ASE) to examine PC power usage in the American workplace.** In this report, you will find current statistics on

energy usage and CO₂ emissions, alongside our research on behavior in American workplaces, i.e. whether employees are shutting their PCs off at the end of the day, why, and why not.

You will also learn about power management tools used by large private and public sector organizations, which save energy during the day and overnight through centralized control over power usage of corporate PCs.

It is evident from the findings of this report that worker apathy and insufficient business systems are the cause for wasting a tremendous amount of energy, and that government programs to address this waste are still in their infancy.

Fortunately, there are tools available to make a difference right now.



Sumir Karayi
Chief Executive Officer, 1E

Summary of Key Findings

- 104 million office PCs:** As of April 2007, 145,800,000 Americans have full-time jobs.⁹ According to the survey conducted by Harris Interactive® on behalf of 1E,¹⁰ 72 percent of all employed adults¹¹ regularly use a PC for work purposes at their jobs. Combining these findings suggests that **more than 104 million workers reach the end of the work day with a PC to shut off—or not to.**
- On all night:** Of those 104 million employed adults who regularly use a PC at work, **as many as 60 percent (62.4 million) don't always shut them down at the end of the day.**¹² Twenty percent (20.8 million) “never” shut down.¹³
- Millions in the balance:** From 1E's May 2007 poll, which revealed that 50 percent of PC users have “hibernation” or “sleep” modes enabled,¹⁴ we can assume that **companies across the U.S. are wasting \$1.72 billion¹⁵ to supply power to PCs that are not always shut down.** This figure is based on a conservative estimate of 14.5 hours (9.00–6.30 working day) for the overnight period with the assumption that computers have no power management features enacted. Under this scenario, a single company with 10,000 PCs wastes more than \$165,000 a year.¹⁶ One large financial institution that worked with 1E determined that shutting PCs down every night saves \$3 million a year in electricity costs alone.

Each year, a company with 10,000 PCs wastes:
1.91 million kWh ⁴
\$165,000 in utility costs
1,381 tons of CO ₂ emissions
Each year, the nation's work PCs waste:
19.82 billion kWh ⁵
\$1.72 billion in utility costs
14.4 million tons of CO ₂ emissions ⁶

Assumptions: 9.5-hour workday, 60% of PCs left on overnight⁷, 8.68 cents per kWh⁸.
- More power, more CO₂:** Over the course of a year, generating the power to leave a computer on overnight creates 920 pounds of CO₂.¹⁷ If 60 percent of the country's work PCs are used this way—and 50 percent use “hibernation” or “sleep” mode—then **14.4 million tons¹⁸ of carbon dioxide is being pumped into the atmosphere each year, needlessly.** Preventing that amount of CO₂ from reaching the atmosphere would have roughly the same impact as taking 2.58 million passenger cars¹⁹—more than exist in the entire State of Maryland (2.48 million²⁰)—off the road entirely.

Shutting down PCs can prevent this energy, financial, and environmental waste.
- Into the woods:** It takes between 60 and 300 trees to absorb the yearly CO₂ emissions generated by a single PC left on 24 hours a day.²¹ **That means it would take between 1.24 and 6.24 billion trees to absorb the emissions caused by the nation's office computers that are never shut down.**²²

Of those 104 million employed adults who regularly use a PC at work, as many as 60 percent (62.4 million) don't always shut them down at the end of the day.

Putting PC Waste into Context

While the United States does not have a nationwide policy for energy savings or carbon dioxide reductions, political momentum for action is gathering. Several state, regional, and federal programs have already set conservation goals. **Business managers need to focus on when—not if—this tide of change will require them to act.**

Federal rules under consideration

- In April 2007, “The Energy Efficiency Promotion Act” (S.1115) was introduced in the U.S. Senate with bipartisan sponsorship. It includes a mandate to reduce energy consumption in existing federal buildings by 30 percent by 2015 - a requirement that agencies are already acting on. If the senate bill is passed, new and renovated federal buildings would need to be “carbon neutral” by 2030.

State programs

- California’s Global Warming Solutions Act requires the state to reduce global warming emissions, including carbon dioxide, to 1990 levels by 2020.
- A bill before the Texas legislature would require the state’s Department of Information Resources to use power management software for state computer networks and personal computers.
- New York’s State Energy Plan calls for the reduction of the state’s carbon emissions to 5 percent below 1990 levels by 2010 and to 10 percent below 1990 levels by 2020.
- In Maryland, a 2001 executive order requires energy use in state buildings to fall 15 percent by 2010, using 2000 levels as a baseline.
- Utah has set a goal of improving statewide energy efficiency 25 percent by 2015.

Multi-jurisdictional efforts

- Through the Regional Greenhouse Gas Initiative, Northeastern and Mid-Atlantic states have agreed to reduce regional carbon dioxide emissions of fossil-fired electric generating units, (25 Megawatts and larger) down to 1990 levels by 2014, and to achieve a further 10 percent reduction by 2018.
- In August 2001, New England governors and Eastern Canadian premiers created a Climate Change Action Plan to reduce greenhouse gases to 10 percent below 1990 levels by 2020.

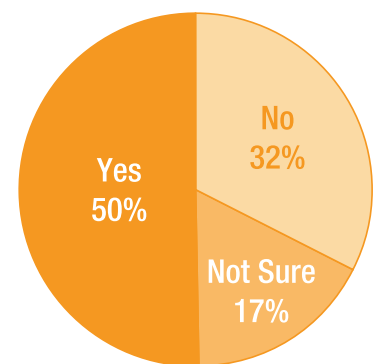
What about Energy Star?

Computers with the Energy Star certification are required to use 15 Watts or less of electricity—less than 10 percent of the average machine’s peak demand—but only when they enter a low-power “sleep” or “hibernation” mode.

However, **the Energy Star program doesn’t require PCs to be shipped with hibernation settings activated.** Some users never configure their machines to “sleep” during idle periods; some deliberately leave their machines in active mode so they can receive overnight software and security updates; and others confuse screen-saver programs—which actually draw considerable amounts of energy—with energy-saving “sleep” modes.

In 1E’s May 2007 poll, **only half (50 percent) of the employed adults who regularly use a PC at work said a “hibernation” mode was activated on their machines. Seventeen percent didn’t even know.**

Is hibernation activated on your PC?

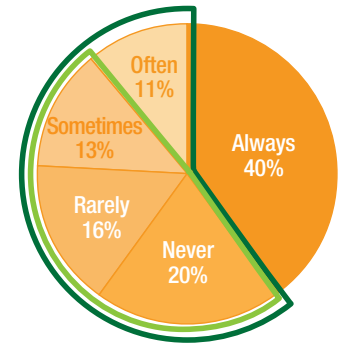


Worker Attitudes Behind the Waste

A centrally controlled system for PC shut-down wouldn't be necessary if workers shut down every computer, every night. The survey Harris Interactive conducted for 1E found this isn't happening in most of today's offices.

Among employed adults who regularly use a PC at work:

- 49 percent “never” “rarely”, or “sometimes” shut down their PCs at the end of the day
- 11 percent “often” do
- 40 percent “always” do



49% do not regularly shut down
60% do not always shut down

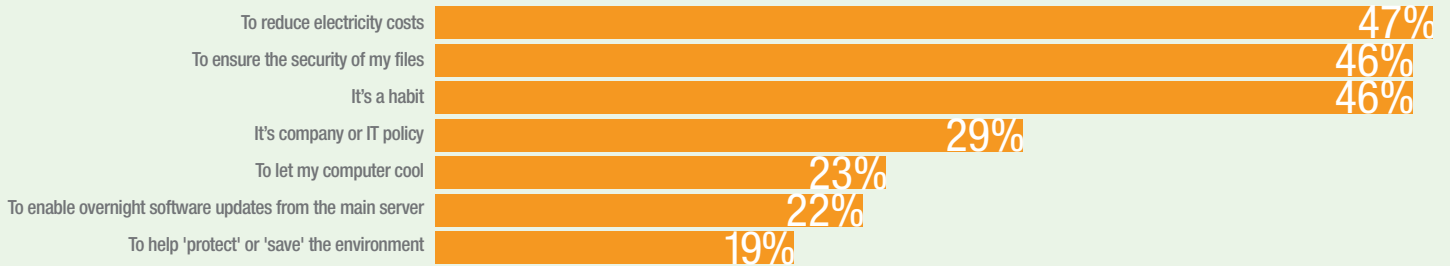
Asked whose responsibility it should be to save energy in the workplace, 28 percent of PC users said it should be down to management or the IT department. More than half (53 percent) said they were not at all concerned about their companies' carbon footprints, indicating that effecting change in “shut down” practices at the behavioral level might yield disappointing results.

The survey asked those who don't always shut down their PCs, *why* they don't:

Reason for leaving PC on overnight ²³	In fact...
“To enable overnight software updates from the main server” (31 percent)	Advances in power management software let network administrators perform software and security updates whenever they're necessary.
“It's company or IT policy to leave it on” (23 percent)	People who believe this may be misinformed—few companies have this policy, and ones who do are reevaluating it.
“My computer goes into hibernation or sleep mode” (31 percent)	Hibernation modes aren't active as often as people think.
“It takes too long” (20 percent)	A PC shut down with power management software can be up and ready to go the next morning with companion “wake up” applications.
“I don't think it's important” (10 percent)	Wasted energy, higher utility bills, and extra pollution make it important.

Analysis of Employee Behavior

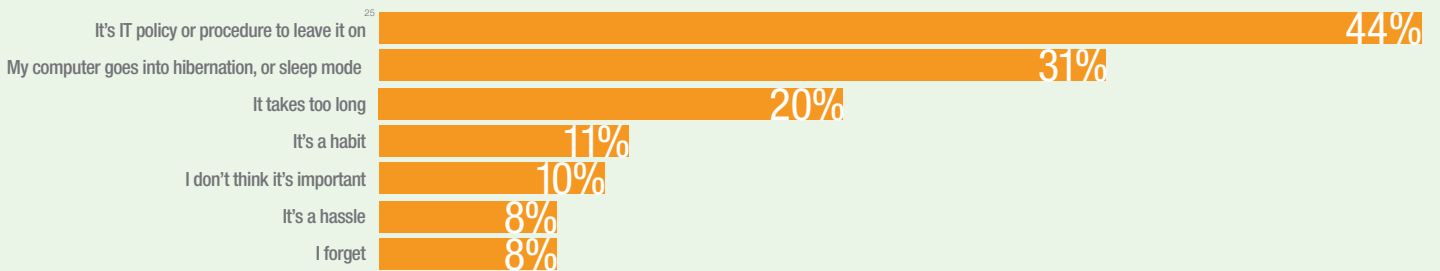
Why do you always shut down your PC when you have finished working for the day? (Multiple responses allowed)



Base: Employed adults who regularly use a PC and always shut down (n = 561).²⁴

More than two in five employees who *don't* shut down cite IT policy and procedure as a reason. In other words, they believe the IT department doesn't want them to shut down their PCs.

Why don't you always shut down your PC when you have finished working for the day? (Multiple responses allowed)



Base: Employed adults who regularly use a PC and do not always shut down (n = 760).²⁶

Savings for Business

No company likes to waste money. On the surface, the financial impact of 24-hour computer power consumption may seem insignificant compared to traditional concerns such as payroll, supply, and rent—but the waste is actually substantial.

- Energy costs—typically 10 percent of the corporate technology budget—could rise to as much as 50 percent in the next few years.²⁷
- **Power management software can reduce a PC's power consumption by 80 percent, allowing companies to save between \$25 - \$75 per desktop PC.**²⁸ Beyond automated “shut down,” power savings are derived during the day by automating monitor shut-down after a period of inactivity.
- At 8.68 cents per kWh, **a typical PC left on overnight wastes \$55.13 a year.** That's more than \$165,000 for a 10,000-PC enterprise that leaves 60 percent of its machines on, and \$1.72 billion for the 60 percent of work computers that may be running across the country each night unnecessarily.
- Turning off PCs, with their heat-intensive power supplies, will also reduce the load on air conditioning equipment, leading to even more energy savings.

Of course, there is no such thing as a “typical” company. Utility rates, work hours, equipment types, makes and models, and use patterns all vary from one workplace to another. To find out how much energy a specific enterprise can save using power management software, vendors offer tools such as 1E's Online Energy Savings Calculator. (<http://www.1e.com/softwareproducts/costcalculator.aspx>.)

Turning off every work computer in the United States every night would save as much CO₂ emissions as taking every car in the state of Maryland off the road.

About the Survey

The survey cited in this document was conducted online within the United States by Harris Interactive on behalf of 1E between May 10 and May 14, 2007 among 2,915 adults (aged 18 and over). This online survey is not based on a probability sample and therefore no theoretical sampling error can be calculated.

Figures for region, age within gender, education, household income and race/ethnicity were weighted where necessary to bring them into line with their actual proportions in the population. The data was also weighted to be representative of the U.S. population of adult computer users on the basis of the amount of time spent using a computer (hours per week).

With a pure probability sample of 2,915, one could say with a ninety-five percent probability that the overall results would have a sampling error of +/- 3 percentage points. Sampling error for data based on the sub-samples of employed adults (n = 1,712), employed adults who regularly use a PC for work purposes at their job ("PC users", n = 1,321), and PC users who do not always shut down their PC (n = 760) may be higher and would vary. However, that does not take other sources of error into account.

About 1E

1E provides software and services solutions that enable enterprises to implement world-class IT infrastructures. 1E solutions leverage System Center technologies to help clients operate highly automated server and desktop deployment and management systems. Key benefits include increased operational agility and reduced costs through consolidation of infrastructures and reduced power consumption.

1E is a specialist provider of power management and energy savings solutions. Our concern for the environment was the catalyst for the development of our NightWatchman® software solution. Since its inception 8 years ago, NightWatchman has been continuously refined and developed to offer customers a robust and proven PC power management solution.

1E currently has solutions deployed to more than 7 million seats across 850 enterprises in 36 countries. 1E is a Microsoft Gold Certified Partner and has been named Microsoft EMEA's Premier Windows Management Partner. Customers include Allstate Insurance, Blue Cross, British Airways, HSBC, Microsoft, Nestlé, Reed Elsevier, SAB-Miller, Syngenta and the U.S. Air Force on behalf of the Pentagon.

About NightWatchman®

NightWatchman from 1E manages and controls the PC power states for corporate users who require flexible settings for working and out-of-office hours. It enforces power profiles, "sleep" and "hibernate" modes and when required can even save data, close applications safely and then shut down PCs. The solution provides accurate reporting on cost and energy savings.

NightWatchman has been designed to empower large organizations to significantly reduce their energy costs and quickly improve their environmental and corporate social responsibility credentials by enforcing corporate power policies and energy savings schemes. NightWatchman also enables critical patches and updates to be successfully installed across an entire enterprise network—as and when required.

About NightWatchman and SMSWakeUp™

NightWatchman and SMSWakeUp together form an energy savings and patch management solution. NightWatchman enforces corporate energy policies. It also saves documents and safely closes applications before shut down in order to apply security patches and updates. SMSWakeUp remotely turns on PCs at the start of the working day, or when needed for patching.

Now in its 5th generation, SMSWakeUp is a comprehensive and proven solution for ensuring all PCs are powered-on, ready for a fast and successful deployment of new software or critical patches with enterprise wide coverage. SMSWakeUp is implemented on numerous large and highly secure networks and has additional features to minimize peak rate power costs and network congestion. Together the solutions provide comprehensive reporting to show success rates, energy savings and IT management information.

For more details on NightWatchman and SMSWakeUp please visit www.1e.com.

About the Alliance to Save Energy

The Alliance to Save Energy is a coalition of prominent business, government, environmental, and consumer leaders who promote the efficient and clean use of energy worldwide to benefit consumers, the environment, economy, and national security. To achieve this goal, the Alliance leads worldwide energy-efficiency initiatives in research, policy advocacy, education, technology deployment, and communications that impact all sectors of the economy. It also provides vision and activism through its board of directors, which includes leaders from business, government, the public interest sector, and academia. More information is available at <http://ase.org/>.

About Harris Interactive

Harris Interactive is the 12th largest and the fastest-growing market research firm in the world. The company provides innovative research, insights and strategic advice to help its clients make more confident decisions which lead to measurable and enduring improvements in performance. Harris Interactive is widely known for *The Harris Poll*, one of the longest running, independent opinion polls and for pioneering online market research methods. The company has built what it believes to be the world's largest panel of survey respondents, the Harris Poll Online. Harris Interactive serves clients worldwide through its offices in the United States, Europe and Asia, its wholly-owned subsidiaries Novatris in France and MediaTransfer AG in Germany, and through a global network of independent market research firms. More information about Harris Interactive may be obtained at www.harrisinteractive.com.

¹ Mid-sized company = A company with 10,000 PCs;

Calculation:

- 6,000 PCs (60 percent of PCs are not shut down) x .5 (half of computers not shut down have sleep or hibernation activated) = 3,000 PCs.
- At \$0.0868 per kWh (source: U.S. Energy Information Administration, see note 6 below), 635.1 kWh x 3,000 PCs = \$165,380.

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² Calculation:

- 1 kW generates 1.45 lbs of CO₂ emissions (source: Tufts University Climate Initiative).
- 1 PC wastes 635.1 kWh x 1.45 lbs or 920.89 lbs of CO₂ emissions per year.
- 6,000 PCs x 0.5 PCs in hibernation or sleep = 3,000 PCs.
- 3,000 PCs waste 920.89 x 3,000 or 2,762,670 lbs, or 1,381.335 tons, of CO₂ emissions per year.

³ First Calculation:

- One PC uses 0.12 kW (source: Tufts, as cited in note 1 above).
- 0.12 kW x 14.5 overnight hours = 1.74 kWh per PC per day; x 365 = 635.1 kWh per PC per year.
- 635.1 kWh @ \$0.0868 per kWh = \$55.13 per PC per year.
- 50 percent of 62.4 million PCs = 31.2 million PCs
- 31.2 million PCs x \$55.13 per year = \$1,720,056,000.

Second Calculation:

920.89 lbs (per PC) x 31.2 million PCs = 28,731,768,000 lbs. 1 ton = 2,000 lbs, so x = 14,365,884 tons of CO₂.

⁴ Calculation:

- One PC uses 0.12 kW (source: Tufts University Climate Initiative, <http://www.tufts.edu/tie/tci/pdf/Computer%20calculations.PDF>).
- 0.12 kW x 14.5 overnight hours = 1.74 kWh per PC per day; x 365 = 635.1 kWh per PC per year.
- Of a company's 10,000 PCs, as many as 6,000 are on all night (source: Harris Poll, see note 5 below).
- 6,000 PCs x 0.5 PCs in hibernation or sleep = 3,000 PCs.
- 3,000 PCs x 635.1 kWh = 1,905,300 kWh.

⁵ Calculation:

- One PC uses 0.12 kW (source: Tufts University Climate Initiative, <http://www.tufts.edu/tie/tci/pdf/Computer%20calculations.PDF>).
- 0.12 kW x 14.5 overnight hours = 1.74 kWh per PC per day; x 365 = 635.1 kWh per PC per year.
- Of a company's 10,000 PCs, as many as 6,000 are on all night (source: Harris Poll, see note 5 below).
- 62.4 million PCs (total not shut down) x 0.5 (half of PCs use hibernate or sleep) = 31.2 million PCs.
- 31.2 million PCs x 635.1 kWh = 19,815,120,000 kWh.

⁶ Calculations for column 2 of this table mirror the ones for column 1 using 32.1 million PCs as the base instead of 3,000.

⁷ 1E survey conducted by Harris Interactive in May 2007. 60 percent of employed adults who regularly use a PC for work at their job do not always shut down their PC when they have finished working for the day.

⁸ U.S. Energy Information Administration, "Average Retail Prices of Electricity, 1960-2005" (table). Accessed at <http://www.eia.doe.gov/emeu/aer/txt/ptb0810.html>.

⁹ <http://www.bls.gov/news.release/pdf/empst.pdf>.

¹⁰ 1E survey conducted by Harris Interactive in May 2007.

¹¹ For the purposes of this survey, employed adults were defined as U.S. adults age 18 and over who are employed full-time and/or part-time and/or self-employed (n = 1,712).

¹² 1E survey conducted by Harris Interactive in May 2007.

¹³ 1E survey conducted by Harris Interactive in May 2007.

¹⁴ http://www.microsoft.com/smallbusiness/resources/technology/hardware/do_you_need_to_turn_off_your_pc_at_night.mspx.

¹⁵ Calculation:

- One PC uses 0.12 kW (source: Tufts, as cited in note 1 above).
- 0.12 kW x 14.5 overnight hours = 1.74 kWh per PC per day; x 365 = 635.1 kWh per PC per year.
- 635.1 kWh @ \$0.0868 per kWh = \$55.13 per PC per year.
- 50 percent of 62.4 million PCs = 31.2 million PCs.
- 31.2 million PCs x \$55.13 per year = \$1,720,056,000.

¹⁶ Calculation:

- 6,000 PCs x 0.5 PCs in hibernation or sleep = 3,000 PCs.
- 3,000 x \$55.13 in wasted costs = \$165,390.

¹⁷ Calculation:

- 1 kW generates 1.45 lbs of CO₂ emissions (source: Tufts, see note 3).
- 1 PC wasting 635.1 kWh per year (see note 7 left) generates 635.1 x 1.45 or 920.89 lbs of CO₂.

¹⁸ 920.89 lbs (of CO₂ per PC) x 31.2 million PCs = 28,731,768,000 lbs. 1 ton = 2,000 lbs, so x = 14,365,884 tons of CO₂.

¹⁹ "Why TXU's Plan is a Bad Idea." Environmental Defense Fund, September 6, 2006. Accessed at:

- <http://www.environmentaldefense.org/article.cfm?contentID=5440>. Calculation:
- The above-cited report equates 78 million tons of CO₂ with the annual emissions of 14 million passenger cars.
- This corresponds to a ratio of 5.5714 tons of CO₂ per car per year.
- Using this ratio, the PC power management savings of 14.352 million tons of CO₂ equates to 2.576 million cars.

²⁰ "Highway Statistics 2003: State Motor Vehicle Registrations" (table). U.S. Department of Transportation, Federal Highway Administration. Accessed at <http://www.fhwa.dot.gov/policy/ohim/hs03/htm/mv1.htm>.

²¹ <http://www.tufts.edu/tie/tci/excel%20and%20word/COMPUTER%20BROCHURE.doc>.

²² Number of PCs "never" shut down (20.8 million) x 60; 20.8M x 300.

²³ Reasons listed in this table are a small selection of total reasons provided by respondents who don't always shut down their PCs.

²⁴ Selected responses shown.

²⁵ This percentage is a "net" combination of the following two responses, which appear on the previous page: "To enable overnight software updates from the main server" (31 percent); "It's company or IT policy to leave it on" (23 percent).

²⁶ Selected responses shown.

²⁷ http://www.businessweek.com/technology/ceo_tipsheet/2007_5.htm.

²⁸ Energy Star calculator, a program created by the U.S. Environmental Protection Agency (http://www.energystar.gov/index.cfm?c=small_business.sb_calculate).



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