Encouraging Personal Green IT through an End-User Survey

Climate Savers Computing Initiative at the University of Michigan

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Executive Summary

Recognized by scientists, politicians, and business leaders as one of the greatest environmental challenges, energy management has recently prompted a coalition of businesses, government and academic institutions, and non-profit organizations to form the Climate Savers Computing Initiative which promotes “green” IT practices in industry and university settings. These practices include things like applying energy-saving settings, using shared printers and double-sided printing, which reduce waste and conserve computing-related energy. The University of Michigan became one of the founding members of CSCI in 2007, when Google co-founder Larry Page asked Michigan’s president Mary Sue Coleman if she would like to lend her support. Since she accepted, the University of Michigan has been proactive in the initiative as a small group of student and professional volunteers work to develop a Green IT departmental certification process, which will allow individual university departments to achieve various levels of recognition for environmental best practices. Departments practicing energy-efficient and non-wasteful computing will be recognized, and those that need to improve their practices will receive instruction on how to do so.

Our group of four undergraduate students joined this team with the goal of contributing in any valuable way to the development of the certification program; we assisted in editing a green IT checklist that is required for certification and, after recognizing a gap between IT professionals and end-users in the initial checklist, created an individualized survey to be completed by faculty and staff, as well as developed education and outreach tools to accompany our survey. We conducted individual research on the following topics: the emerging green IT movement, the environmental impact of

energy reduction, creating green IT environments, and developing effective behavioral interventions to support our recommendations for the CSCI Departmental Certification Team.

This report relates the progression of our coalition and offers advice to the Michigan CSCI team. We feel it is important for CSCI to bridge the gap between IT professionals and end-users by striving for complete departmental participation in the certification process. By pairing improved individual competence and efficacy with efficient technology, departments will be able to most effectively meet CSCI's energy saving goals. We propose the implementation of our personal survey within the existing certification process. This will provide feedback to departmental IT units and create awareness among faculty and staff.

Introduction

Energy reduction is a necessary priority of the sustainability movement. Recognized by scientists, politicians, and business leaders as one of the greatest environmental challenges, energy management has recently sparked the formation of a coalition of businesses and institutions in the form of the Climate Savers Computing Initiative (CSCI), which promotes "green" IT practices in industry and university settings. Green IT encourages the use of sustainable computing technology and best practices that reduce carbon emissions and waste, such as double-sided printing and energy-saving settings. The University of Michigan is taking a leading role as one of the first universities in the nation to join the CSCI partnership. Here, a small group of student and professional volunteers are working to develop a Green IT certification process which will allow individual university departments to achieve various levels of recognition for environmental best practices. Our group of four undergraduate students joined this team with the goal of contributing in any valuable way to the development of the certification program; here, we relate the progression of our coalition and offer final advice to the Michigan CSCI team.

Environmental Impacts

When focusing on environmental sustainability, we recognize that innovation and technology are essential in developing and implementing new solutions that can provide sustainable development. Information technology, and specifically computing, is continuously changing our lives and improving efficiency. At the same time, the

growing use of computers on campus has caused a dramatic increase in energy consumption, putting negative pressure on the university's budget as well as the environment. Each year more and more computers are purchased and put to use, but it's not just the number of computers that is driving energy consumption upward. The way that we use computers also adds to the increasing energy burden. Research has revealed that many personal desktop computers nationwide are needlessly being left on continuously. Every time computers or lights are left on we are wasting electricity. Most of our electricity is generated from burning fossil fuels such as coal and natural gas, which also emits pollutants such as sulfur, methane and carbon dioxide into the air. These emissions are known to cause respiratory disease and other health problems, as well as smog, acid rain and the biggest environmental challenge we face today, global climate change. According to the EPA, the process of generating electricity is the single largest source of emissions for the United States, and accounted for 33 percent of emissions for all sources in 2006.

Computers are among the most commonly used electronic devices because people employ them every day for work, research, entertainment, shopping, and even balancing their checkbooks. It is important to understand how they affect our environment, especially since computers account for a relatively large portion of our energy consumption. An APS study of energy use summarizes the following typical annual power requirements for office equipment. The average desktop uses 55 watts, monitors need 75 watts, a laser printer requires 60 watts, fax machines average 35 watts and copiers range from 115 to 310 watts (aps.com). Many average desktop PCs are very inefficient and waste nearly half the power drawn from an outlet as heat. Ninety percent

of desktops do not even utilize power management settings which account for additional energy waste. At 8.68 cents per kWh, a typical PC left on overnight wastes approximately $55 a year (climatesaverscomputing.org). The amount of energy being wasted through poor computing practices is an astounding global occurrence.

At the University of Michigan there are over 30,000 computers and an estimated 40,000 other devices on campus (assuming that 70 percent of these devices are personal computers). An additional 2,000 computers are estimated to be operating under the College of Engineering. The energy needed to heat, cool, light, and power the more than 30.6 million square feet of building space at the University of Michigan is substantial. The University spends around $4.8 million on electricity to power computers and other office equipment each year and is responsible for emitting 65,160,000 pounds of carbon dioxide (sustainable.umich.edu). These alarming numbers have gained a good deal of concern which has initiated several efforts across the university's campus to not only cut energy consumption but also to increase recycling and other environmental practices.

As the demand for newer, faster and better technology increases, fortunately so does its efficiency. Information from an IBM publication breaks down the savings comparing an old desktop with a new desktop. An old desktop PC requires 200 watts plus 80 watts for a 17 inch monitor, using a total of 280 watts. If this computer were left on 24 hours a day for a full year it would cost roughly $235 per year to operate. With increasing energy rates, the cost of running the old PC could easily grow to be anywhere from $300 to $600 a year. A *new* desktop PC requires 100 watts plus 30 watts for 17 inch LCD monitor only, totaling only 130 watts. If this computer were left on 24 hours a

day for a full year it would only cost approximately $110 a year to operate (climatesaverscomputing.org).

Over the course of a year, generating the power to leave a computer on overnight creates 920 pounds of CO_2. If 60 percent of the country's PCs are used this way—and 50 percent use "hibernation" or "sleep" mode—then 14.4 million tons of carbon dioxide is being pumped into the atmosphere each year (climatesaverscomputing.org). Preventing that amount of CO_2 from reaching the atmosphere would have roughly the same impact as taking 2.58 million passenger cars off the road. It would take between 60 to 300 trees to absorb the yearly CO_2 emissions generated by a single PC left on 24 hours a day. That means it would take between 1.24 and 6.24 billion trees to absorb the emissions caused by the nation's computers that are never shut down (climatesaverscomputing.org). Clearly this energy usage is not necessary, and adversely affects our pocketbooks and our environment.

The Emerging Green IT Movement

Although universities like Michigan are beginning to examine ways to lower their computing-related energy consumption, the green IT movement itself began in businesses. With more and more business being conducted online, and the rise in energy prices, many businesses have started to pay more attention to how much computing-related energy they consume. For a company, making energy-reducing computing decisions is just good business, since it translates into a smaller electricity bill. IT companies have begun to recognize a trend towards greener computing, and now offer other businesses services aimed at reducing their computing-related energy consumption.

Companies, from Forrester to Dell, now offer services from online Green IT Baseline Calculators to energy efficient products (http://www.greenituk.com/GRN09001forrcalc.php). One company that is leading the way in green computing is IBM. IBM offers a service similar to Michigan's Departmental Certification Program, although IBM brings in a third party, Neuwing Energy, to do energy-usage assessments. IBM helps companies figure out how much energy their computers are using, and then offers them services such as low-energy devices to help reduce their consumption. Neuwing Energy performs an initial assessment before energy efficient practices have been implemented, and then a follow-up assessment to measure how much energy their clients have saved (http://www-03.ibm.com/press/us/en/pressrelease/22513.wss).

Although the end environmental result of reduced energy consumption is reduced emissions, a business's decision to switch to greener computing is often money-driven. The message that money is the bottom line resonates throughout IBM's reports and plans. In a report to prospective clients, IBM introduces their project by saying, "The more energy efficient your data center, the more able your company is to compete in a business environment where energy is becoming more and more expensive" (IBM). The environment is mentioned as a reason to reduce energy consumption, but mostly in terms of improving a company's environmental *image*. There are certainly organizations that function outside of this philosophy, such as Costco or Interface (Senge). These are companies with visionary leaders who work to revolutionize the way their company treats the environment, but such businesses seem to be the exception rather than the rule.

Although universities function like businesses in many ways, they differ in their amount of social and environmental responsibility. For a university, producing well educated, socially aware students ought to be the bottom line, not money. What students learn in college, they will carry with them for the rest of their lives. As a result, universities have a responsibility to promote sustainable practices such as green IT within their classrooms, and throughout the campus. Universities ought to be encouraging their faculty, staff and students to implement green computing practices not only as a way to save money, but as a way to encourage the computer-users of tomorrow to be mindful of the environmental impacts their computing choices have.

Climate Savers Computing Initiative

CSCI is a division of the World Wildlife Fund's (WWF) Climate Savers program, through which companies pledge to voluntarily reduce their carbon emissions. In 2007, Google and Intel started CSCI as a way to focus part of the program on green IT and to help companies in the Climate Savers program decrease their carbon footprint by scaling back their computing-related energy use. The main purpose of the CSCI is to promote green computing practices, specifically the development and adoption of smart technologies that can both improve the energy efficiency of computers and reduce the energy consumed when computers are in an inactive state. The goal of the initiative is to cut power consumption by computers by 50% by 2010, which is equivalent to 54 million tons of CO_2 per year by 2010 (climatesaverscomputing.org). Such a reduction would also be equivalent to removing 11 million automobiles from the road, eliminating 20 coal-fired power plants from the planet, or planting 25,000 square miles of trees. Participants

could collectively save $5.5 billion in energy costs by committing to purchasing energy-efficient computers and servers, and to promoting energy-saving computing practices within their companies.

Research from CSCI reveals some surprising findings by adopting some of their best practices for computing. For every 1,000 PCs that begin using aggressive power management, computer users could save an average of $7,200 per year, which is equal to keeping approximately 118 tons of carbon dioxide from being emitted into the atmosphere. Power management software can reduce a PC's power consumption by 80 percent, allowing companies to save between $25 and $75 per desktop PC. (climatesaverscomputing.org).

The majority of CSCI's members are businesses, but several universities have also committed to the initiative. Here at the University of Michigan, we could produce substantial environmental and economic effects by reducing our computing-related energy consumption. Conservatively, if the University of Michigan were to reduce its energy consumption by just 10 percent, it would not only save the university $500,000 per year, but also have the environmental equivalent of saving over 335,000 gallons of gasoline, preserving over 20 acres of forest, or taking 540 cars off the road (climatesavers.umich.edu). Currently, the University of Michigan estimates its annual carbon emissions from computing to be equivalent to burning 3.4 million gallons of gasoline. The mission of the Climate Savers Computing Initiative at the University of Michigan goes beyond the national CSCI foundation's goals to improve computing efficiency and to implement power management tools. CSCI at the University of Michigan addresses IT environmental issues such as individual computing practices and

data/server impacts, with the goal to make green computing practices the norm on campus as well as influence other universities and the IT industry. In addition to executive sponsor John King, and the Core Project Team (Bill Wrobleski, Joan Witte, Roxy Block, MaryBeth Stuenkel, Carrie Stefanski, Lynnette Foley), CSCI at Michigan relies volunteers from almost every school in campus. CSCI is technically a two-year project here at Michigan, but there are hopes that many of the programs being developed during those two years will remain on campus after the program's completion date in 2010.

As part of the CSCI, the University of Michigan has begun to develop a Departmental Certification Program in order to assess which departments are practicing energy-efficient computing, and which could be making more progress. The certification process begins when a representative from the department's IT staff completes an online "Green IT Certification Checklist". The checklist is a survey that asks questions about green IT awareness, wise purchasing, power conservation, recycling, and server room configuration. Each question is awarded a point value based on the difficulty of the particular practice and impact on the environment. Once the survey has been scored, the department is certified as a bronze, silver or gold department, in terms of its green IT practices. Departments may also fail to be certified at all, if they answer "no" to any required question such as, "Does your department share energy-saving information and materials with your faculty and staff?" The CSCI Departmental Certification Team will provide suggestions for how to improve to those departments which fail to achieve gold certification. Departments with silver or gold certification will receive certificates to display in their main offices as a way to commemorate their achievement, raise green IT

awareness by making the certification process visible, and to foster a healthy sense of competition between the departments.

Our Contribution

Our group joined the Michigan CSCI team with vague goals of improving the existing checklist during its pilot stages and potentially working with a particular department as it worked through the certification process. As we began attending the team's weekly meetings, however, we soon realized that the checklist was essentially complete and would only need some final polishing. Our project scope widened as we searched for additional ways to contribute to the certification process.

Looking through the existing checklist, all of our group members had questions regarding IT jargon that we had not encountered as university students. What, for example, does "server room configuration" mean? We had a hard time getting these new terms straight, and an even harder time imagining how anyone other than an IT professional could answer the certification questions. However, all university members, from IT professionals to history professors use computers and therefore contribute to the campus carbon footprint. A certification process that could be completed entirely by a department's IT staff, without any consultation with the rest of the department members, seemed to leave a gap between IT professionals and end-users.

A real life example described to us by our project sponsor, MaryBeth Stuenkel, helped us to see the gap between IT staff and faculty even more clearly. MaryBeth is an IT professional, and she provided the faculty and staff in her department with motion-sensing power strips. The motion-sensing strips are intended to save energy, because

they can turn off any equipment plugged into them if there is no motion in the room (presumably, because the faculty or staff member has left). On the original green IT checklist, MaryBeth would be able to answer "yes" to the question, "Does your department have motion-sensing power strips?" However, MaryBeth noticed that very few people in the department had actually taken the time to plug their electronics into the new power strips. MaryBeth's department would have gotten points towards certification, although there were no real energy savings being achieved, since department members were not using the energy-saving equipment.

In order to allow faculty and staff outside of the IT department to have a voice in the certification process, we developed an individual survey to be completed by the end-computer users. Asking all individuals within a department to pause and consider questions about their computing habits will raise green IT awareness throughout the whole department, and not just among IT professionals. By engaging the entire faculty and staff of a department in the certification process, we intend to have a more powerful influence in the departmental computing environment.

The individual survey assesses the computing habits, attitudes and awareness levels of the department's faculty and staff. We feel that it is important not only to understand how department members are using computing equipment, but also to measure how these end-users value the environment in relation to saving money or saving time. Questions regarding end-user values will help IT staff plan the most effective strategies for creating change within the department by appealing to what matters most to the faculty and staff—whether it is saving money, protecting the environment or creating a positive environmental image for the department. The survey

is also intended to be used as an additional resource for IT staff to gauge the depth of the effectiveness or possible problems resulting from their efforts. Answers will allow IT staff to monitor whether or not faculty and staff have paid attention to any IT awareness raising efforts, or if they are utilizing any energy-efficient products that have been provided. It is also our hope that answering a question such as, "Do you turn off your computer before you leave work?" will force department members to give more thought to simple computing habits such as turning their computers on and off.

Within the survey itself we have included links to PDFs that provide additional information about best computing practices. These will act as easily accessible educational tools that teach procedural knowledge and dispel myths about computer energy usage. We have created a total of five PDFs addressing the issues of green printing, applying energy-saving settings, recycling on campus and dispelling myths about computer energy consumption. The PDFs are all one page long, so that they can be easily printed out and hung up in a department to remind faculty and staff of green IT best practices. The short length also increases the likelihood that they will actually be read, since participants may not be willing to invest the time to read a very long text. Our PDFs as well as a copy of our survey are attached to this report.

Further piloting of the end-user survey will be necessary to test its reliability and validity before it is fully integrated into the certification process. Our initial administration of the survey to Phil Ray, the manager of the School of Natural Resources & Environment IT Services, indicates that the most difficult barrier to including this new step may be motivating faculty and staff to take the time to complete the checklist online. However, we kept the survey as short as possible, while still including all of the relevant

questions, in order to ensure that it will not take unnecessarily long to complete. IT professionals as well as departmental faculty and staff are understandably busy, and receive numerous e-mails a day urging them to participate in various events occurring throughout campus. Because of the large number of e-mails, many often go unread, or the information within them is ignored. Perhaps a way around this issue would be to urge the IT staff to send out the e-mail requesting departmental participation twice, so that the e-mail receives more exposure. The subject line also ought to include a word such as "important" or "urgent", to encourage faculty and staff to take the content of the e-mail seriously.

Promoting Green Electronics and Software Purchasing

The University of Michigan will need to change its purchasing behavior for CSCI to meet its goal of reducing energy usage. The departmental certification process addresses the issue of responsible purchasing by awarding points to departments who purchase Energy Star or EPEAT-rated equipment. These certification systems exist to provide consumers with products' environmental performance. Energy Star was initiated in 1992 by the United States Environmental Protection Agency (EPA) to address global warming through consumer-level emissions reduction. Since partnering with the United States Department of Energy, Energy Star has increased its certification program to include building materials, utilities systems, home appliances, office equipment, and even traffic signals. At its inception, computers and monitors were the first products to undergo certification. Energy Star recognize computing products that manage energy effectively at all intensities of use: active, standby, and sleep. Energy Star advertises itself

as a means of saving energy costs and reducing greenhouse gas emissions. According to its 2007 achievements report, Energy Star helped Americans save $16 billion on utility bills, and reduce their greenhouse gas emissions by 40 million metric tons.

Another certification program, Electronic Product Environmental Assessment Tool (EPEAT), also aims create informed purchasing decisions and set new standards for industry consciousness. Unlike Energy Star, EPEAT is focused solely on computers and monitors. Having been specifically developed for institutional-scale purchasers, its suggestions are especially useful to universities. EPEAT considers a large set of environmental criteria in eight categories: reduction/elimination of environmentally sensitive materials, materials selection, design for end of life, product longevity or life cycle extension, energy conservation, end of life management, corporate performance, and packaging. Because of this comprehensive criteria, products with EPEAT certification save institutions from costs of energy, disposal, but also remove a portion of the environmental footprint associated with manufacturing and transporting.

These certification programs, however, only rate hardware efficiency, and do not require manufacturers to have control over the switching between different usage modes. In this regard, computers with the most efficient sleep mode would be inefficient if their user ignored them.

While Microsoft and Apple, the primary operating system providers, have integrated easily manipulated energy saving utilities into their software, these are not always effective at an institutional scale. The large number of computers at the University are controlled at a departmental level. Through departmental and campus network interfaces, computing environments are managed as a homogenous unit. This means, IT

professionals are responsible for making sure that all of the computers under their jurisdiction have the correct programs and are routinely updated. One software package being considered by CSCI, BigFix, offers a comprehensive utility for managing network-wide energy savings. Software updates and security patches are installed remotely rather than locally by individual users or IT professionals. This is convenient and cost efficient. Costs are averted by minimizing IT departments and maximizing the efficiency of hardware.

We recommend that CSCI urge departments who answer "no" to the checklist question about to aligning purchasing decisions with recommended Energy Star and EPEAT products to do so. Because these certifications are updated frequently to raise the bar for new technology, the University's computing environment will always have energy efficient devices. The university's energy use and cost can be reduced by 50 percent or more by using Energy Star equipment. Computers and monitors that are Energy Star rated can power down to about 15 percent of their maximum power usage. Printers as well as fax machines power down to approximately 15 to 45 watts and can save over 60 percent on annual energy costs (aps.com). In addition to providing efficient hardware, it is important that departments invoke software to effectively manage their computing environments. We support CSCI's decision to integrate software utilities, such as BigFix, into departmental networks. This will allow for the most effective implementation of software updates and energy management with the least effort from individual users.

Creating Behavioral Change

To achieve university-wide environmental sustainability in terms of computing-related energy use, it is not enough that IT professionals provide faculty and staff with energy-efficient equipment. Sustainability depends upon global adoption of an environmentally-conscious mindset that permeates all facets of life; even efficient technology can be wasteful if it is used incorrectly. It is for this reason that our group proposed a green IT checklist to be completed by any department members, including administration, professors, and other staff members. The survey will give IT staff an idea of what kind of values the department's faculty and staff have (saving money, protecting the environment etc.), and it will also suggest to individuals that they ought to re-consider their normal way of computing. We conducted a review of organizational psychology literature that could assist the CSCI team in producing and maintaining department-wide behavioral change; here, we report our findings.

Most people become defensive when their personal belief systems are challenged, and are unlikely to change long-held mentalities simply because they are told to do so. Conceptual change is best achieved when individuals have the opportunity to practice new behaviors and receive assistance and feedback. The Green IT program could be improved by modeling specific practices, such as double-sided printing, and allowing participants to build self-efficacy through practice. Individuals must be convinced that traditional frameworks of consumption are unsustainable and must evolve into conceptual sets involving sufficiency, sustainable consumption, and efficiency. The Green IT team should use concise messages when attempting to convince faculty and staff of the benefits of environmental computing practices (Gregoire, 2003).

It is imperative that behavioral interventions be appropriate to the audience's current knowledge; participants may be discouraged from adopting a durable behavior if, for example, they attempt a new behavior before learning it sufficiently (Slater 1999). The Green IT team should work to increase issue awareness and discussion before encouraging faculty and staff to change computing behavior. Initial messages can simply disseminate information and provoke discussion with simple but attention-grabbing posters or PDFs. General information sessions will help the Green IT program introduce departments to the problems of energy consumption and material waste. Later messages should be repeated, such as through the use of situational cues or prompts (Slater, 1999). Reminders to use environmental IT practices may then come in the form of stickers on computer monitors that remind users to shut down all electronics at the end of the workday.

The Green IT program may benefit from well-designed brochures to spread information throughout departments. The text of these pamphlets must be organized in a logical order that connects new information to previous knowledge. Headings and transitional phrases also help readers navigate new concepts. Information will be more readily recalled if text is related to nearby visual elements, such as a picture or graph on the same page. The "take-home" points of the brochure should be highlighted with contrasting font colors and bold or italicized words (Whittingham et al., 2008). People are more likely to engage in new behaviors if they have well-formed intentions. The intention formation process involves creating scripts or plans for future behavior, considering the consequences of alternative behaviors, and personally committing to a course of action (Bagozzi & Yi, 1989). The Green IT program can facilitate intention

formation by including an open-ended section in its departmental survey. For every question to which the individual has answered, "I plan to adopt this behavior," there should be a follow-up space in which to explain or formulate concrete plans.

Individuals use personal interpretations of peer norms as a standard against which to compare their own behavior. Descriptive norms, or tangible environmental signals of what behaviors are most common, and injunctive norms, or the behavioral expectations and values explicitly communicated by one's community, must be used together in behavioral interventions (Schultz et al., 2007). For example, the Green IT program could offer feedback that shows how a particular department's energy use compares to the average departmental energy use on campus (thereby providing a descriptive norm) and then a message of approval or disapproval, depending on whether the energy use is below or above the norm, respectively (thereby providing an injunctive norm). CSCI could make the data collected through the Green IT checklist and the end-user survey (or at least the certification levels) available to the public so that departments could compare their practices to other departments on campus.

Behavioral skills training requires adequate time for individuals to practice and habitualize new actions. Evidence suggests that extended training programs which offer more time for initial learning and role-playing than do "rule-of-thumb" length programs allow for much more durable behavior change (Cole, 2008). The Green IT Certification program must, particularly in the early stages of program development, ensure that faculty and staff are receiving adequate training time when learning new skills such as double-sided printing. A summary of our recommendations to CSCI follows.

Recommendations to CSCI for producing department-wide behavioral change:

-Allow faculty and staff adequate time to practice specific tasks such as double-sided printing during the awareness-raising phase.

-Use concise messages when attempting to convince faculty and staff of green IT benefits.

-Produce brochures to spread information about green IT throughout departments.

-Facilitate intention formation by including an open-ended section in the departmental survey for the individual to explain plans to adopt new behaviors.

-Make information available to departments that would allow them to compare their own energy use to other departments' energy use.

Recommendations CSCI can make available to IT professionals to produce department-wide behavioral change:

-Work to increase awareness and discussion before encouraging faculty and staff to change computing behavior.

-Allow faculty and staff adequate time to practice skills such as double-sided printing.

-Continue to remind department members of green IT practices through signs like stickers on computer monitors reminding users to shut down at the end of the day.

Conclusion

We feel it is important for CSCI to include complete departmental participation in the certification process. By pairing improved individual competence and efficacy with efficient technology, departments will be able to most effectively meet CSCI's energy saving goals. We propose the implementation of our personal survey within the existing certification process. As a requirement for any level of certification, the personal survey should be distributed by the IT department to all faculty and staff. Points should be awarded based on what percentage of the department fills out the survey; for example, if less than 50% of the department completes the survey, 1 point would be added to their green IT checklist score, if 50-74% completes the survey, 2 points will be awarded, if 75-

90% completes the survey, 3 points will be awarded and if more than 90% completes the survey, 4 points will be awarded. In order to achieve a gold certification, we suggest that departments be required to have at least a 50% completion rate. The data from the survey will be collected by CSCI and then distributed in an easy-to-read format to the IT department staff. The IT department can use this information to gauge how effective their green IT efforts have been, and where improvements need to be made. We also suggest that CSCI make our PDFs available directly from their homepage, so that they are accessible at any time, and not just while someone is completing the end-user survey.

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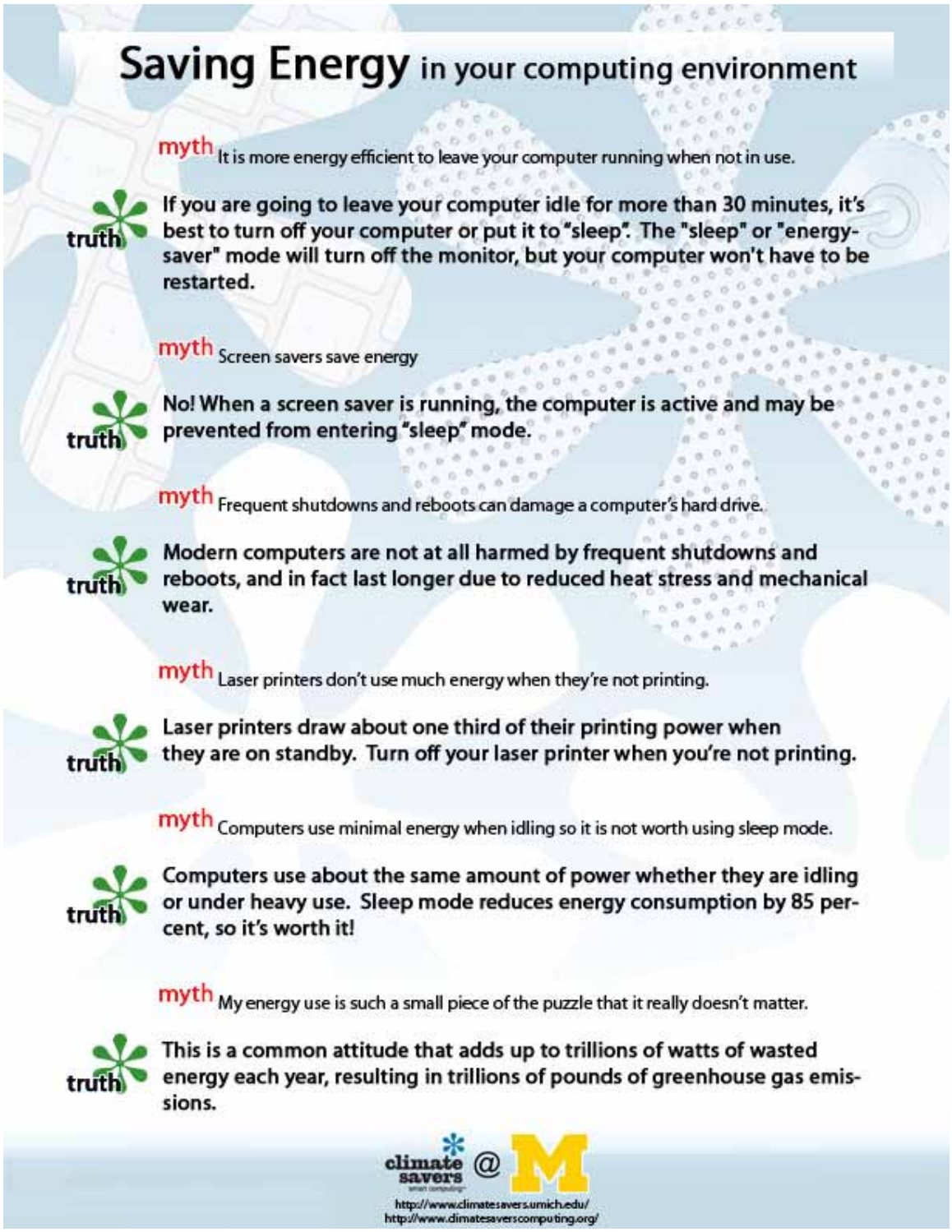
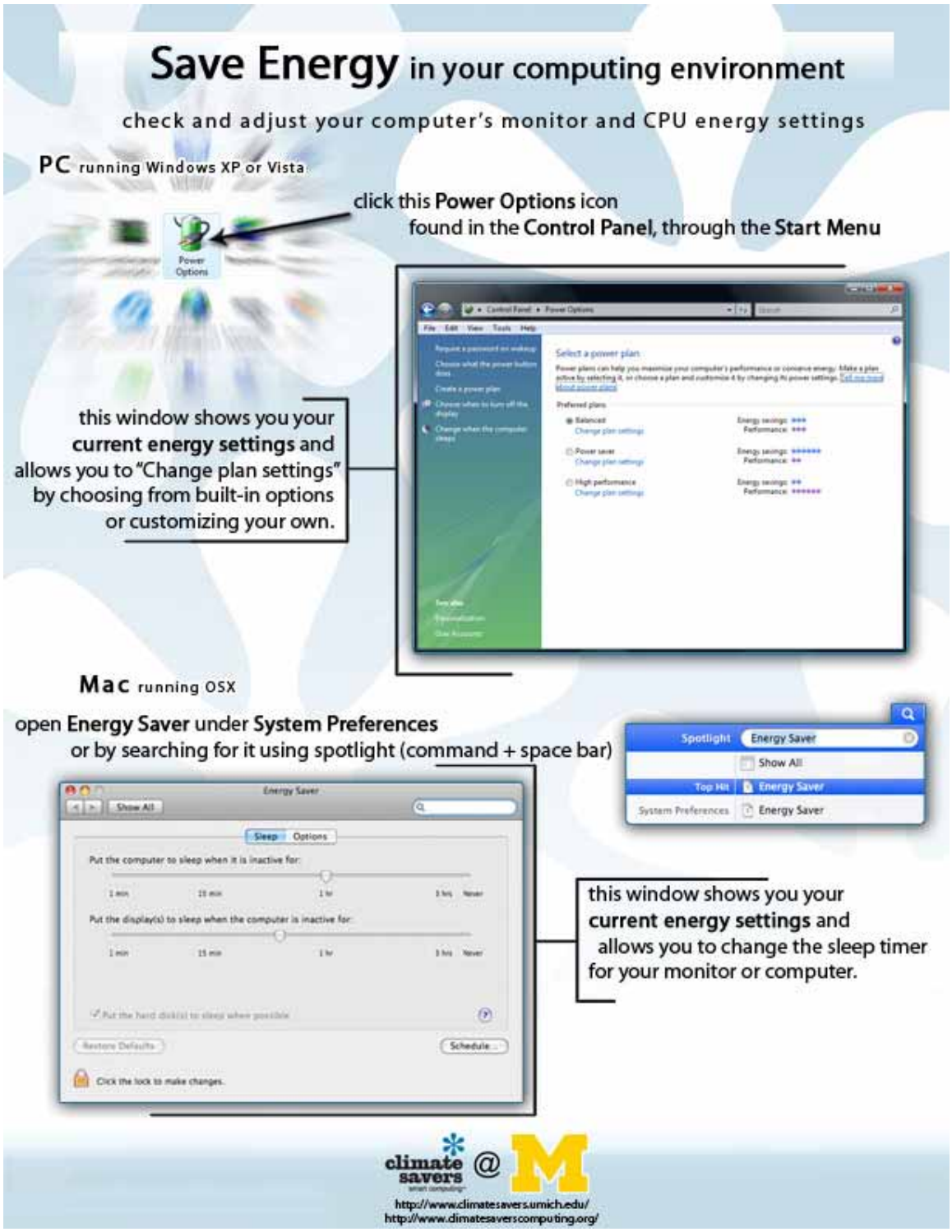

Saving Energy in your computing environment
myth It is more energy efficient to leave your computer running when not in use.
truth If you are going to leave your computer idle for more than 30 minutes, it's best to turn off your computer or put it to "sleep". The "sleep" or "energy-saver" mode will turn off the monitor, but your computer won't have to be restarted.
myth Screen savers save energy
truth No! When a screen saver is running, the computer is active and may be prevented from entering "sleep" mode.
myth Frequent shutdowns and reboots can damage a computer's hard drive.
truth Modern computers are not at all harmed by frequent shutdowns and reboots, and in fact last longer due to reduced heat stress and mechanical wear.
myth Laser printers don't use much energy when they're not printing.
truth Laser printers draw about one third of their printing power when they are on standby. Turn off your laser printer when you're not printing.
myth Computers use minimal energy when idling so it is not worth using sleep mode.
truth Computers use about the same amount of power whether they are idling or under heavy use. Sleep mode reduces energy consumption by 85 percent, so it's worth it!
myth My energy use is such a small piece of the puzzle that it really doesn't matter.
truth This is a common attitude that adds up to trillions of watts of wasted energy each year, resulting in trillions of pounds of greenhouse gas emissions.
climate savers @ M
http://www.climatesavers.umich.edu/
http://www.climatesaverscomputing.org/


Save Energy in your computing environment
check and adjust your computer's monitor and CPU energy settings
PC running Windows XP or Vista
click this Power Options icon
found in the Control Panel, through the Start Menu
Power Options
this window shows you your
current energy settings and
allows you to "Change plan settings"
by choosing from built-in options
or customizing your own.
Mac running OSX
open Energy Saver under System Preferences
or by searching for it using spotlight (command + space bar)
Spotlight
Energy Saver
Show All
Top Hit
Energy Saver
System Preferences
Energy Saver
Energy Saver
Show All
Sleep
Options
Put the computer to sleep when it is inactive for:
Put the display(s) to sleep when the computer is inactive for:
Schedule...
Click the lock to make changes.
this window shows you your
current energy settings and
allows you to change the sleep timer
for your monitor or computer.
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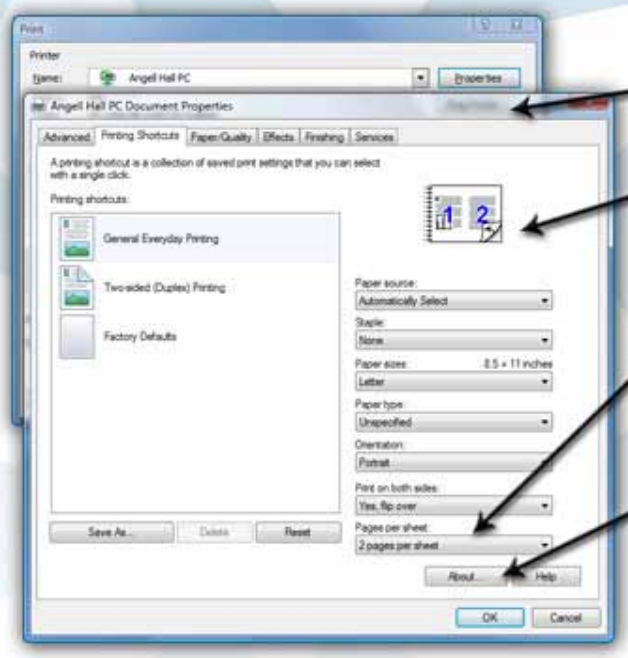
Print Wisely in your computing environment

a guide for Double-sided and "2-up" printing

PC running Windows XP or Vista



in the **Print** menu, select **Properties**

this preview of your current layout will update automatically

for **double-sided** printing, change this field from "None" to "Yes, flip over"

for **2-up** printing, change this field from "1 page per sheet" to "2 pages per sheet"

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Print Wisely in your computing environment

you can save electricity and paper by adopting these habits

share printers

If your department has shared printers, consider using these instead of having a personal printer. If your department has not yet consolidated printers, encourage your IT staff to think about it

turn off your personal printer

If you must have a personal printer for business reasons, unplug it when it is not in use.

only print what you need

For example, avoid printing unnecessary e-mails, and only print final copies.

print double-sided and/or two pages per sheet ("2-up")

This is an easy way to dramatically scale-back your paper consumption!

narrow your margins

If it does not conflict with your report style, narrower margins can help you fit more words on fewer pages.

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Thank you for taking your time to complete this survey for the Climate Savers Computing Initiative. *Your department is in the process of certifying your computing environment*. With the answers you provide, we will be able to help your IT department achieve certification.

What is green IT? Examples include shared printers, double-sided printing, energy-saving settings, and best-use practices that eliminate waste and reduce energy consumption.

HABITS

Do you use a shared printer or your own, personal printer?

- ☐ Shared Only
- ☐ Shared Usually
- ☐ Both Equally
- ☐ Personal Usually
- ☐ Personal Only

Do you print double-sided?

- ☐ Always
- ☐ Most of the Time
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

Do you read documents (email, PDF, Word) on your computer rather than print them?

- ☐ Always
- ☐ Most of the time

- [ ] Sometimes
- [ ] Rarely
- [ ] Never

Do you turn off your computer monitor? (Select all that apply)

- [ ] Yes, during the day when not in use
- [ ] Yes, when I leave work
- [ ] Never

Have you ever changed your computer's current energy-saving settings?

- [ ] Yes, to sleep/standby sooner
- [ ] Yes, to sleep/standby later
- [ ] No

Which of these things do you recycle at work? (Select all that apply)

- [ ] CDs/DVDs
- [ ] Floppy Disks
- [ ] Batteries
- [ ] Packaging materials
- [ ] Paper

TECHNOLOGY

What kind of a computer do you use at work?

- [ ] Laptop
- [ ] Desktop

If your department has provided you with energy-saving products (motion-sensing power strips, double-sided printing), do you use them?

- Yes
- No
- They have not been provided, but I would use them

AWARENESS

Do you know your department's IT representative and how to contact them?

- Yes
- No

My department has made an effort to improve green IT awareness and education.

- Strongly agree
- Slightly agree
- Neither agree nor disagree
- Slightly disagree
- Strongly disagree

I make conscious efforts toward using green IT practices.

- ☐ Strongly agree
- ☐ Slightly agree
- ☐ Neither agree or disagree
- ☐ Slightly disagree
- ☐ Strongly agree

ATTITUDES

	Strongly Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Strongly Disagree
I consider **energy-efficiency** important.	☐	☐	☐	☐	☐
I consider **saving money** to be important.	☐	☐	☐	☐	☐
I consider **saving time** to be important.	☐	☐	☐	☐	☐
I consider **protecting the environment** to be important.	☐	☐	☐	☐	☐
I consider **my department's environmental reputation** to be important.	☐	☐	☐	☐	☐

Thank you for completing this survey. Your responses will help your IT staff get a better understanding of how effective their green IT efforts have been and where they can improve. You

may have questions about how to perform these best practices, or why these practices are environmentally friendly. Please leave any additional comments or questions in the textbox below.