Getting the Most Out of ENERGY STAR on Campus and the SUNY Fredonia Approach

Carol Sabo, PA Consulting Group, Saint Simons Island, GA
James Pepe, SUNY Fredonia, Fredonia, NY

ABSTRACT

Most campuses specify ENERGY STAR® computers, copiers, and printers but maximum savings are not being achieved because the energy savings features are not properly enabled or they are disabled by vendors, end-users, or information technology (IT) staff. In addition, many campuses are missing other opportunities to achieve significant savings in vending machines, compact refrigerators, task lights, and clothes washers. Even when campuses are alerted to potential savings opportunities and there is minimal capital investment, there is inertia in moving forward and implementing recommended measures for some campuses. The objective of the paper is to discuss what needs to be done to ensure campuses achieve maximum benefits from ENERGY STAR equipment used on campus and what else should be done for a campus-wide plug-load efficiency policy.

This paper discusses barriers and some possible solutions and best practices in implementing plug-load efficiency measures based on actual experience working with more than 30 colleges throughout New York State. These were primarily projects completed for New York State Energy Research and Development Authority's (NYSERDA's) Energy $mart℠ Offices program, with two other projects for New York Power Authority (NYPA) and Long Island Power Authority (LIPA). The projects were all designed to estimate potential plug-load usage and energy savings opportunities and to recommend policies, programs, and other strategies to achieve those savings. The discussion is based on the experience of the program manager who has conducted projects at 30 campuses over the past 6 years. In addition, the customer or end-user perspective will be presented by the facilities manager of State University of New York (SUNY) Fredonia, one of the NYSERDA Energy $mart Offices participating colleges. The facilities manager has also played a lead role in promoting energy-efficiency through his involvement in the New York State and Eastern Regional Association of Physical Plant Administrators (ERAPPA). This paper includes the facilities managers' perspective on why recommended plug-load efficiency projects have not been implemented on some campuses and how to help ensure savings are achieved for plug-loads.

Introduction

While the office sector is the most computer-intensive sector, educational facilities are the second most computer-intensive sector. In that context, business and non-business plug-loads are major contributors to the growth in energy costs for administrative staff and faculty offices, residence halls, and classrooms on campus. These plug-loads include computers, copiers, printers, servers, refrigerators, washing machines, vending machines, task lights, space heaters, and other electronics that should be addressed in a comprehensive program. These business and non-business plug-loads can account for more than 20 percent of the electric use in administrative offices and residence halls. Overall, the estimated electric use for computers alone that were specifically identified through on-site equipment surveys averaged about 9 percent of the total campus electric use. These were based on the most recent 13 NYSERDA campus projects, as shown in Table 1.

Table 1. Average Annual kWh Electric Use

Benchmark Measures for Average Annual kWh Electric Use (n-13)	High	Average	Best/Low
Total Campus Electric Use (kWh) per Student Enrolled	10,256	5,416	**2,870**
Average Computer Electric Use (kWh) per Student Enrolled	479	346	**186**
Campus Computer kWh as a % of Total Campus Electric Use (kWh)	18.5%	8.9%	4.2%

The energy industry recognizes that office equipment and other plug-loads such as cold beverage vending machines offer significant savings opportunities. At the time of the plug-load project, SUNY Fredonia estimated they had about 4,000 computers being used on campus in staff offices, classrooms, computer labs, and residence halls. The average for all 4-year college projects was about 5,000 computers with University of Buffalo having 15,000 computers. ENERGY STAR qualified office and imaging products use 30-70% less electricity than standard equipment when power saving features are properly enabled.[1]

In 2007, there are new ENERGY STAR specifications for office and imaging equipment that will make it more difficult for computers, copiers, fax machines, mailing machines, multifunction devices (MFDs), printers, and scanners to earn the ENERGY STAR label. Prior to these new 2007 ENERGY STAR specifications, the NYSERDA Energy $mart Offices project team found that most of the computers and office equipment at the project sites qualified for the ENERGY STAR label. At the same time, the NYSERDA project team found that about half of the potential savings from ENERGY STAR computers and office equipment was not being realized because the power saver features were not properly enabled.

On a per-unit basis, cold beverage vending machines contribute one of the highest energy savings. ENERGY STAR qualified vending machines are reported to save as much as 1,700 kWh per year over a non-ENERGY STAR cold beverage vending machine. One campus, University of Buffalo, replaced 132 vending machines with ENERGY STAR models saving an estimated $20,000 each year. The issue is that other campuses are locked into vending machine contracts that will not expire for years and the decision-makers are reluctant to use vending misers on existing machines.

Most plug-load energy-efficiency programs that offer site analysis tend to focus on one or two major plug-loads such as computers and vending machines. In addition, many programs promote the procurement of energy-efficient equipment without ensuring the savings are achieved. NYSERDA's Energy $mart Offices is one of the few programs that is comprehensive in targeting all of the major plug-loads in addressing procurement strategies, power management options, and equipment operating policies. Despite the considerable savings identified by the project team, there are still barriers to implementing the program's recommended low-cost/no-cost measures.

[1] The ENERGY STAR program is a collaborative effort of the U.S. Environmental Protection Agency and the U.S. Department of Energy to promote energy-efficient products and practices. ENERGY STAR identifies and labels products that deliver the same or better performance as comparable models while using less energy and saving money.

This paper begins with a discussion of ENERGY STAR plug-load equipment and opportunities for additional plug-load savings. Next, the barriers to implementation of recommended measures are described along with some approaches that can be effective in reducing those barriers to achieving maximum energy-efficiency. The paper ends with the SUNY Fredonia case study and some practical approaches that campus facility managers can take to reduce plug-load electric use on campus.

ENERGY STAR Plug-Load Equipment

ENERGY STAR provides specifications and lists of qualifying ENERGY STAR plug-load equipment on the www.energystar.gov web-site. The NYSERDA Energy $mart Offices project addresses plug-load equipment that offers the most opportunity for savings on each campus. The on-site equipment survey conducted for each project includes ENERGY STAR qualifying equipment such as computers and monitors, printers, copiers, multi-function devices (MFDs), vending machines, water coolers, task lights, washing machines, and individual compact refrigerators. In most cases, newer office equipment (computers, copiers, printers, and MFDs) on campus meets the pre-2007 ENERGY STAR specifications. Prior to 2007, computers met ENERGY STAR specifications if they included the capability to enable low-power or "sleep mode." The Tier 1 specification for ENERGY STAR computers that went into effect in July 2007 is much more stringent in requiring:

- More energy efficient power supplies
- Maximum wattages for standby (off), sleep, and idle modes
- Power management features to be enabled and user education about these features

There were also considerable opportunities to replace inefficient units of non-business equipment with ENERGY STAR vending machines, task lights, and individual compact refrigerators on campus in common areas, staff offices, and residential halls. In addition, other ENERGY STAR electronics are found in significant quantities on campus including set-top boxes (cable modems), televisions, and external power supplies. Future ENERGY STAR specifications will likely address related major equipment such as enterprise servers.

Although ENERGY STAR equipment will provide significant savings opportunities, there is a need to address existing equipment that will not be replaced for several years. Computers, for example, are typically replaced no more often than every 3 years. Some campuses have 10-year contracts for cold beverage vending machines. In addition, there is an educational process that needs to happen to ensure these savings opportunities are maximized that should include a campus-wide mandate to use energy more efficiently. The NYSERDA Energy $mart Offices project team works with and uses the ENERGY STAR resources and tools to encourage campuses to take actions to significantly reduce their plug-load electric use.

NYSERDA's Energy $mart Offices Program

The NYSERDA program is designed to reduce electric costs for offices and educational institutions by encouraging best practices in procurement, power management, and operation of plug-load equipment. The project team members, led by PA Consulting Group, collect and analyze data on plug-load business and non-business equipment and operating practices to estimate energy use and potential savings for each site. The project team recommends low-cost/no-cost measures that include tested power management tools and control devices. To facilitate implementation, the PA team provides support to the project sites to develop energy-efficiency policies and programs that include staff education and outreach, student activities, policy directives, and procurement specifications. The PA team includes energy analysts and computer power

management consultants who take a comprehensive approach to assessing plug-load equipment savings opportunities.

The recommended approaches to reducing plug-load electric use to achieve **Energy $mart**[SM] Offices plug-load efficiency include a combination of short-term and long-term measures:

- **Purchase "best" ENERGY STAR equipment**: develop and enforce purchasing/leasing standards that specify the most efficient ENERGY STAR office equipment including computers, copiers, printers, task lighting, vending machines, water coolers, clothes washers, mini-refrigerators, and other plug-load equipment. Provide information and sample equipment specification to obtain bids on the most efficient ENERGY STAR equipment.
- **Power management:** ensure that all applicable ENERGY STAR® office equipment such as PC monitors (and computers where applicable), printers, and copiers are enabled to go into "low power" or "sleep mode" when idle for a specified time. Recommend optimal settings based on end-user group—administrative staff, faculty, students, and lab computer users.
- **Power off:** educate staff to turn off plug-load business equipment (PCs, monitors, printers, copiers, speakers, task lights) after hours and when not being used for several hours. Use timers to control the operating hours of other inefficient equipment such as large coffee makers that heat water 24 hours a day, water coolers that have hot and cold water taps, and other plug-load equipment. Promote the effective use of power strips to reduce electric use from phantom loads.

The project team meets with key staff on the campuses to collect data and to present the findings on plug-load savings opportunities. Whenever possible, the procurement group is represented. Despite the wealth of information on the ENERGY STAR website, the project team is often asked to follow up with example equipment specifications to replace older copiers or MFDs, washing machines, and vending machines. For many campuses, the replacement with ENERGY STAR equipment is tied to a future procurement. In that context, the project team seeks to identify plug-load energy savings opportunities that could be implemented immediately. In addition, the project team provides examples of policies, programs, and outreach materials that have been effective to reduce plug-load usage on other campuses.

Based on the most recent 13 campus projects completed in 2006-2007, the savings opportunities for all types of plug-loads typically average about 300 kWh annually per computer-user, as shown in Table 2.

Table 2. Annual kWh Plug-Load Savings Opportunities

Benchmark Measures for Plug-Load Savings Opportunities (n-13) 2006-2007 Projects	High	Avg.	Low
Average Annual kWh Use per Computer for all Computers	758	484	337
Average Annual Potential kWh Savings per Computer for Computers	417	221	117
Potential kWh Savings for Computers as a % of Total Computer kWh Use	68%	46%	34%
Average Annual Potential kWh Savings per Computer for Other Plug-Loads	176	95	71

Barriers to Implementing Plug-Load Efficiency Measures

Despite the opportunity to save close to 5 percent of the total electric use on campus with little or no capital investment, there are still a number of campuses that are slow in implementing plug-load efficiency measures. This is expected to change in New York State in response to the recently developed State University of New York Energy Conservation and Sustainability Implementation Plan. The plan established specific demand and energy reduction targets for the SUNY colleges. In addition, the project team is finding for recent projects that Information Technology (IT) staff more often have the capability to use existing network management tools to easily enable power management settings for computers and monitors on their networks. Some campus IT staff began making energy saving changes immediately after accompanying PA project team members on the equipment survey. Again, this is strong evidence that making ENERGY STAR equipment available alone is only a starting point to achieve the expected energy savings. There are barriers that need to be addressed by local programs to maximize energy savings. These barriers are discussed in more detail in this section.

Lack of Awareness of the Savings Benefits

The number one barrier to achieving plug-load energy savings is that campus decision-makers are still unaware of the significant savings opportunities. A number of the project coordinators, primarily facilities managers, are familiar with the ENERGY STAR program but they do not recognize all of the opportunities for their campus. The procurement staff were often not aware of the availability of equipment specifications and procurement language that they could use to order ENERGY STAR equipment. The Campus Auxiliary Services (CAS) group is typically responsible for decisions on vending machines across campus and clothes washers in residential halls but they usually did not know if their equipment meets ENERGY STAR specifications. The CAS staff rely on vendors that may or may not promote ENERGY STAR equipment. In all cases, the key decision-makers were not aware of the magnitude of the potential savings from replacing with ENERGY STAR equipment and operating them to maximize energy savings.

Solution. The PA project team conducted group information sessions and trained staff while conducting the on-site equipment survey. The results were presented to technical staff with specific findings from the equipment survey including the energy use and savings opportunities for various categories of plug-load equipment. Once the campus decision-makers were made aware of potential savings from the low-cost/no-cost plug-load equipment efficiency measures, they were usually very interested in moving ahead. Although calculators are available on the ENERGY STAR web-site to estimate savings from monitor and computer power management, some are too complex for the typical end-user. The PA project team does make effective use of the ENERGY STAR calculators to estimate savings specific to their campus. The ENERGY STAR tools are used in addition to calculators and data that were developed specifically for the NYSERDA Energy $mart Offices projects.

Myths and Technical Realities of Computer Power Management

Once the information barrier was resolved, the next major barrier to computer power management usually came from the IT staff. In some cases, the IT staff had run into a problem in the past, usually with older computers when they went into “sleep” mode. In other cases, there were some software compatibility issues that could be resolved with technical support. In rare cases, some computers had to be omitted because the issues could not be resolved. The ENERGY STAR web-site’s power management discussion (http://www.energystar.gov/index.cfm?c=power_mgt.pr_power_management) includes answers to many basic questions to support IT staff in implementing power management strategies on computers and

monitors. Even with those resources, there is a need to offer one-on-one technical assistance to ensure the IT staff can overcome any hurdles to implementation. EPA ENERGY STAR program contractors are available to provide some technical support for computer power management but the focus is usually on the larger facilities with 10,000 or more computers, which limits the number of campuses who can get assistance.

Solution. The NYSERDA project also had some limitations on the number of projects with a goal of targeting those campuses with over 5,000 computers. To allow some smaller colleges to participate, the PA project team organized projects to include multiple colleges in the same proximity. The team then conducted information sessions for multiple colleges at one location and scheduled back-to-back on-site data collection for multiple sites in the same geographic area. The PA project team included an expert in monitor and computer power management, who was able to address any complex technical issues related to software and hardware. Early on, the project team supported the use of free software tools that could be downloaded from the EPA ENERGY STAR power management section of their web-site including EZ-SAVE and EZ-GPO. The advantage of these tools was that power management settings could be consistently enabled on a large group of computers at one time. The team's power management expert also described other commercially available software tools such as Verdiem that provides additional network management data and capabilities. For more recent projects, the team found that the IT staff were typically aware of the concepts of monitor and computer power management. In addition, IT staff were already using network management tools to periodically "reimage" their computers and these images could include the power management settings for each group of computers..

Lack of Staff Resources

Facilities managers often wear many hats including that of physical plant administrator, energy manager, safety inspector, and maintenance person. In that context, they have little time to develop new initiatives on campus to reduce plug-load electric use. IT staff are also time-constrained in responding to client problems and maintaining high levels of reliability and security for the information system network—computer power management becomes a lower priority for them. ENERGY STAR is an education program that does not directly address staffing issues.

Possible Solutions. The NYSERDA Energy $mart Offices program is also an information and education program with limited resources to support implementation. At the same time, there is a need to find creative ways to address this problem. For many of the campuses, the potential annual savings from implementing all of the plug-load efficiency measures would cover the cost of an additional staff person, who could fill an energy manager position. The issue is that campuses are also seeing increased electric rates that may mask the achieved energy savings from the plug-load efficiency actions. Thus, the avoided energy costs may not be recognized that could be allocated to hire an energy manager position and acquire additional savings. Another approach is to provide funds to hire students or temporary help to assist the facilities staff and the IT staff to implement measures. Using faculty and student resources would work particularly well for campuses that include engineering and IT curriculums. In three of the NYSERDA projects, students were used to help collect data and were taught to analyze the results under the supervision of PA project team members.

Organizational Hurdles

The college campus is a complex management structure that requires buy-in and action from many different groups to successfully implement plug-load efficiency programs and policies. To implement these measures, facilities managers must work closely with information technology (IT), campus auxiliary

services, residence life, Residential Energy Services Network (ResNet) staff, faculty, students, procurement, communications, and administrative staff, to name a few key groups. For those campuses that have active sustainability committees that encompass these factions, there is a greater likelihood that comprehensive plug-load efficiency programs will be developed and implemented. Otherwise, those who are most interested in energy-efficiency—facilities and energy managers—do not have all the data and the capabilities necessary to enable the power management settings on campus computers without involving the IT staff. In addition, facilities managers must work with campus auxiliary services to procure ENERGY STAR clothes washers and vending machines. One issue is that the college may be informed and request ENERGY STAR equipment but the vendors and suppliers are not always cooperative in meeting that demand. Finally, any programs that target plug-loads in residence halls have to involve residence life.

Solutions. The NYSERDA Energy $mart Offices program encourages representation from all of the key decision-making groups early in the project. The PA project team works with the facilities manager to schedule an initial group presentation to explain the program followed by interviews of staff from the key functions before beginning the on-site data collection. In presenting the results, the PA project team encourages the project coordinator at the campus to invite key decision-makers from all important groups on campus. The PA project team recommends the development of a sustainability committee if one does not exist, and provides examples of colleges that have been most effective in using these committees. The PA program process helps to get buy-in from the various groups, but may entail as much as 3 visits to the campus. In addition, there is still a need to develop a program that targets the vendors and suppliers of equipment on campus that includes vending machines and clothes washers to facilitate the installation of ENERGY STAR equipment.

Misplaced Incentives

Another major barrier is that outside of the facilities manager, who often has responsibilities for managing energy costs, there is no direct incentive to groups such as information technology (IT) to implement policies and procedures to save energy costs. If the IT staff saves $100,000 a year in energy costs by fully enabling the power management settings on campus computers, they do not typically get credit for those savings in their IT budget. A significant portion of the identified plug-load savings (typically at least two-thirds) for the campus will not happen though unless the IT director signs off and approves IT staff time to implement power management strategies on the network computers.

Possible Solutions. Any solutions to the incentive issue must be endorsed by the top level of management for the university. A recent article on the BusinessGreen website[2] suggests that IT should be made responsible for the energy bill associated with the IT system). IT would then reallocate those costs to the appropriate end-user departments. It would be problematic for most campuses to isolate all of the energy costs of the IT system although the server room itself could be metered separately. Although the approach described in the BusinessGreen article may not be workable, the concept of making end-user groups responsible for their energy costs would make it much easier to get plug-load efficiency measures implemented. In addition, the savings should be estimated with special recognition to the groups who facilitate the savings.

[2] See http://www.businessgreen.com/articles/print/2203621

Lack of Program Models to Educate and Motivate Students to Take Efficiency Actions

The NYSERDA Energy $mart Offices program addresses plug-load energy use in residence halls and the PA project team recommends that campuses develop a program that educates and motivates the students to take plug-load efficiency measures. Although many colleges process student computers for antivirus before they are allowed on campus networks, they are reluctant to make changes on student computers or require students to enable the power management settings on their computers. In addition, some campuses are aware of others that have run dorm competitions with prizes to the students in a residence hall that were able to save the most energy over a period of time. Facilities managers, who are usually leading the energy-efficiency effort on campus, lack the time, the skills and the experience to develop student programs that include outreach and education. ENERGY STAR does offer many resources on its web-site that are targeted to higher education including case studies and examples of programs to promote the use of ENERGY STAR products. Unfortunately, the facilities managers are often not aware of those resources or, if aware, they still feel they do not have the time or marketing skills to run these programs.

Possible Solutions. Some facilities managers may need a packaged set of off-the-shelf toolkits that would allow them to easily implement a comprehensive plug-load efficiency program that has been tested and worked well at similar campuses in the same region. The NYSERDA Energy $mart Offices project team worked with the University of Buffalo Green Office and they developed a student plug-load efficiency program, which the students named "Do It In the Dark." The program included a component to encourage students to implement appropriate power management settings on their own computers. SUNY Fredonia used the University of Buffalo program as a starting point for their own "It's Only Sleeping" Campaign to promote power management on student computers. Other colleges intended to use these two programs as models instead of inventing their own program. In the absence of model programs, universities will also benefit from information sharing via electronic newsletters on what programs and policies have been implemented for similar campuses in New York State. It is also clear that these campuses need some continued assistance and follow-up to ensure the plug-load efficiency measures are implemented. Other colleges have been able to take a creative and holistic approach to plug-load efficiency on campus once the savings opportunities have been identified..

SUNY Fredonia Plug-Load Efficiency Case Study

State University of New York (SUNY) Fredonia is an example of one campus that has been very effective in implementing plug-load efficiency projects by collaborating very effectively with other campus groups to take a comprehensive approach to efficiency. SUNY Fredonia is located in upstate New York with a current enrollment of 5,400 students. The plug-load equipment survey was completed in 2005 and the project team identified a total annual savings of $75,000 could be achieved by implementing specific plug-load efficiency measures. Although their computers met the ENERGY STAR specifications at that time, the PA project team estimated that over $68,000 in electric costs could be saved annually by ensuring that the power saver features were enabled for computer and monitors as shown in Table 3. These included computers for administrative staff, faculty, computer labs, and for half of the students living in residence halls. At that time, 40 percent of the monitors and 90 percent of the staff computers were not enabled to go into low power (system standby or hibernate) mode when inactive for a period of time. Only about half of the computers were turned off after hours in the computer labs. The estimated savings for students in residence halls was conservative in that the project team assumed that half of the computers were turned off

already and therefore only half of the students would participate in a program to implement power management settings on their computers.

Table 3. Annual kWh Savings Opportunities for Computers at SUNY Fredonia

Group	kWh Savings from Power Management of Monitors Plus Powering Off Computers	kWh Savings after Adding in Power Management of Computers
Staff (700 Computers)	135,809	159,270
Faculty (400 Computers)	110,934	124,340
Computer Labs (300 Computers)	48,814	98,082
Residence Halls (600 (25%) /1,200 (50%))	201,530	403,061
TOTAL	497,087	784,753
Annual Dollar Savings Estimates	**Annual Cost Savings from Power Management of Monitors Plus Powering Off Computers**	**Annual Cost Savings after Adding in Power Management of Computers**
Staff (700 Computers)	$11,815	$13,856
Faculty (400 Computers)	$9,651	$10,817
Computer Labs (300 Computers)	$4,247	$8,611
Residence Halls (600 (25%) /1,200 (50%))*	$17,533	$35,066
TOTAL	$43,246	$68,350

Another $7,000 in annual savings was identified for copiers, printers, and vending machines with the majority of savings ($6,000) estimated for replacing 54 vending machines with ENERGY STAR models. The following Table 4 shows the findings for observed equipment. Most of the copiers and printers were ENERGY STAR but optimal savings were not being realized because the timers were set for too long of a period before going into low power modes. In addition, the equipment was not turned off after hours.

Table 4. Observations for Other Plug-Loads at SUNY Fredonia

Equipment/Quantity Observed		Observations During Equipment Survey
Copiers/Large MFDs	11	About half (5) of the 11 copiers used by Admin. Staff were left on after hours. The setting were checked on 3 of them and 2 were set for 4 hours of "auto off" and 1 for 6 hours.
Printers—Med./Large (Admin.)	60	About 25% were OFF after hours; about half were set to go into "power save" after 30 min. or more; the analysis did not include small inkjets
Printers—Computer Labs	17	Only 1 was turned OFF after hours; most were set to go into "power save" after 30 minutes.
Cold Beverage Vending Machines	54	A spot check of model numbers did not indicate any that met ENERGY STAR Tier I or Tier II specifications

The total annual plug-load savings estimate of $75,000 was very conservative for the 2005 project in that the savings did not include individual printers, task lights, or refrigerators. These plug-load equipment savings estimates are now included as standard procedure for NYSERDA's Energy $mart Offices projects.

The results were presented first to the technical team, and then to the key decision-makers from the various functions. Despite the very positive response to the findings, not all of the recommended strategies that required actions by other departments were implemented immediately. At the same time, the facilities manager was able to use the information from the NYSERDA Energy $mart Offices project to achieve more than the identified potential energy savings of $75,000 a year.

Monitor and Computer Power Management

The majority of savings identified for the NYSERDA Energy $mart Offices project was for monitor and computer power management. PA's project team collected data on most of the administrative computers (over 100 PCs) and observed more than 240 PCs in computer labs. The total estimated electric load for the computers was close to 14 percent of the total campus electric bill for the year. For various reasons, the IT group would not use network tools to implement the recommended power management of staff, faculty, and lab computers. One reason was that there were still some DOS programs being used by accounting staff that could interfere with computer power management. The IT group is currently implementing power management for computer monitors, and the facilities manager was able to take other approaches to reduce computer electric costs on campus. In particular, the facilities manager used every opportunity to educate and promote the efficient use of plug-load equipment.

Staff Computers. The IT group did not initially use network tools to implement power management of computers and monitors as recommended, but they encouraged campus staff to implement plug-load efficiency recommendations made by the PA project team. For example, SUNY Fredonia's Associate Vice President of Information Technology Services sent out a campus email to "Celebrate Our Earth on Earth Day April 22nd by Implementing Computer Power Savings Tips" that included recommendations to:

- Implement monitor power management on PCs and Macs with instructions on how to enable that function
- Use a black screen saver since studies indicate white and bright colors can use up to 20% more power than black or dark colors
- Discontinue use of 3-dimentional screen savers since they double the power output of some computers
- Turn off printers after hours or when not in use

The IT staff are now enabling power management setting on all new monitors.

Residence Halls Computers. The PA project team estimated savings if 50 percent of the students in residence halls participated in a voluntary program to enable power management settings on their computers. As a result, the facilities management, in collaboration with ResNet and Residence Life, developed a web-based program to promote monitor power management on student computers in residence halls. The initial introduction of the program was the 2005-2006 school year with an estimated 83 percent participation by students in residence halls, which was significantly higher than the projected 50 percent participation. The following school year saw an increase to 89 percent in the estimated number of residential hall computers with monitor power management. Figure 1 uses the web-site instructions to describe the SUNY Fredonia program.

Figure 1. Web-site Instructions for SUNY Fredonia Residence Halls Program

> **Qualify to win an iPod Nano!**
> Just participate in the ***"I'm Only Sleeping"*** program. It is easy. If you agree to use the Monitor power management settings available in Windows or run the "EZ Wizard" tool, which will take you through a step by step process to put your monitor to sleep when your computer is on but not in use.
> To qualify: Complete and print the certificate (pdf format) with your name, residence hall name, room number and Fredonia I.D. number. Take the completed certificate to your RD to be entered in the drawing. Entries must be received by February 14, 2006.
> Drawing will be held on March 1, 2006
> This offer is for current SUNY Fredonia residents only.

Computer Labs. After the project team identified the significant energy savings opportunities in computer labs, the computers in the labs were programmed to power off when the lab closes at the end of the day. In addition, IT has set the monitors in the computer labs to go into "sleep" after 5 minutes if no one is logged in to use the computer. The facilities staff also made sure that the separate CRT monitors in one graphic lab were manually powered off when not in use.

Plug-Load Efficiency in Residence Halls

In addition to encouraging students to implement monitor power management, SUNY Fredonia's facilities management staff took other actions to reduce electric use in residence halls. The PA project team estimated that about 1,300 kWh per student was used for individual plug-load equipment in the dorm rooms with half of that coming from computers. PA's project team conducted group sessions attended by SUNY Fredonia staff that described a wide range of plug-load savings opportunities. As mentioned earlier, these additional plug-load savings were not estimated and presented in the total electric savings opportunities at SUNY Fredonia. The focus at that time was on computers and other office equipment, while today's program takes a more comprehensive approach to identifying plug-load savings opportunities. Based on estimates of typical per-unit electric savings provided by the plug-load project team, SUNY Fredonia's facilities manager took the initiative to implement these more comprehensive measures. They also conducted surveys of computers and plug-load equipment in residence halls to provide good baseline information and trends on student plug-loads, before implementing the following:

- Installed compact fluorescent lightbulbs (CFLs) in overhead lights in dorm rooms
- Hands out CFLs to students for desk lamps
- Installed ENERGY STAR washing machines in residence halls laundry rooms
- Installed ENERGY STAR microfridges in one residence hall building and recommends ENERGY STAR refrigerators to students coming to live on campus in other buildings
- Encouraged the use of power strips with surge protectors for student in residential halls
- Promoted other plug-load efficiency measures during residence halls orientation

Finally, the facilities staff have managed to get everyone involved in the process of saving energy—even the custodian and residence hall staff are playing important roles. Residence hall staff monitor refrigerators to be sure they are shut off when school is on break. The custodians check and shut off exhaust fans in bathrooms when not in use. All staff who contribute to energy-efficiency are recognized by name for their efforts in staff meetings.

Other Energy Efficiency Actions on Campus

The facilities management staff participate in a sustainability committee that will help ensure that energy-efficiency is a campus-wide initiative. In addition, SUNY Fredonia's facilities manager provided content for a "GoGreen" section on their web-site with "Conservation 101" tips that include plug-load efficiency ideas for students, staff and faculty, residence halls, and other entities on campus. The facilities management team also took the lead to use the information from the campus events management system to reduce energy use on campus. The facilities management staff update the activities schedule on a regular basis and, in conjunction with their energy management system, they use these systems to reduce energy use. They are able to change the HVAC settings for those rooms with individual mechanical controls when the activities schedule shows the rooms are not being used for an appropriate length of time. The system also controls the outside lights in the main entrance according to the events schedule.

SUNY Fredonia's facilities management group continues to look for every opportunity to implement the no-cost/low-cost plug-load efficiency measures recommended by the project team. When the PA team suggested simple timers, the facilities management group went to the next level by tying their 5-burner coffee maker into the campus energy management system (EMS) to schedule the coffee maker so it does not continue to heat water after hours. Based on the savings estimated by the PA team, the payback for the measure is 1.5 years.

Summary

The ENERGY STAR program provides a wealth of information, tools, and other resources to guide facilities managers, IT, and procurement staff in acquiring the most efficient plug-load equipment. There is still a need for programs such as NYSERDA's Energy $mart Offices to ensure the maximum savings are achieved from ENERGY STAR plug-load equipment by reducing many of the barriers that exist in a campus environment. SUNY Fredonia's staff have indicated that they would not have taken actions to achieve more than $75,000 annually without having participated in the NYSERDA Energy $mart Offices program.

Using the average number of computers on campus of 5,000, the PA team found that an average campus can save an additional $150,000 annually from a comprehensive plug-load project. Based on NYSERDA's Energy $mart Offices project, if only 50 percent of these identified savings are implemented, the cost of the program is less than one cent per kWh saved, using a measure life of 3 years.

With office equipment electric consumption expected to increase at 3 to 4 times the increase in HVAC energy consumption in the commercial sector, this is an important end-use for energy-efficiency actions. As another example, the 2005 "Assessment of Energy Efficiency Potential in Georgia"[3] estimated that, next to commercial interior lighting (with 15 percent of the total savings), office equipment has the second highest achievable potential savings opportunity in that state, with 12 percent of the total achievable electric savings by 2010. More is being done by ENERGY STAR to place more stringent requirement to qualify for their label, but there are still opportunities to take immediate low-cost/no-cost measures to achieve significant savings opportunities on campuses.

[3] The Assessment of Energy Efficiency Potential in Georgia, Final Report, May 5, 2005, ICF Consulting, is a comprehensive analysis of the technical, economic, and achievable energy efficiency potential in the residential, commercial and industrial sectors of Georgia.