

Sustainability Audit Report

Submitted: March 6, 2009

Audit performed by: Kelsey Hanrahan

Space Audited: Plageman Student Health Center

Date Audited: January 15, 2009

Building contact: George Voss

Lighting

Lighting Energy Usage			
Fixture Type	Quantity	Energy use per fixture	Watts per fixture type
4 lamp T12	84	164W	13776W
3 lamp T12	1	123W	123W
2 lamp T12	27	82W	2214W
1 lamp T12	21	41W	861W
4 lamp T8	21	96W	2016W
3 lamp T8	11	72W	792W
2 lamp T8	28	48W	1344W
1 lamp T8	43	24W	1032W
100 watt incandescent	95	100W	9500W
27W CFL	12	27W	324W
Circular	4	22W	88W

Observations:

- Typical fixtures are 4 lamp T12 fluorescent recessed fixtures and 100W incandescent surface mount fixtures.
- Lights were mostly off in unoccupied areas.

Recommendations:

- **Replace incandescent and halogen bulbs with compact fluorescent (CFL) bulbs wherever possible.** CFLs produce light much more efficiently than incandescent and halogen bulbs. CFLs also produce less heat, an important factor to consider during the summer months. CFLs come in a wide-range of color temperatures and wattages, so a suitable CFL can be found for almost any application.
- **Replace all T-12 fixtures with T-8 fixtures equipped with lighting controls.** T-8 lamps have a higher efficacy (light output per energy unit) than T-12s so the same level of light can be maintained while using fewer fixtures and bulbs. Integrating lighting controls can reduce energy consumption by an additional 25%.
- **Install motion-activated occupancy sensors in common areas such as restrooms, kitchen spaces and copy rooms.** These types of sensors are efficient and easy to install. They automatically turn off the lights if no motion is detected within a specified period of time. Detailed recommendations for specific spaces can be provided upon request.

- **Replace or remove burnt-out fluorescent lamps.** Unlike incandescent bulbs, burnt-out fluorescents still consume energy. If the light level in the area is adequate without the lamp lit, please email sustainability@oregonstate.edu for more information on delamping procedures. If the lamp has been out for more than two weeks and needs to be replaced, contact Facilities Services by email at FacilitiesCustomerServ@oregonstate.edu or by phone at 7-2969. Notes on specific areas with burnt-out bulbs are available upon request.

Computers and peripherals

Observations:

- Some computers, monitors, and printers were on in unoccupied spaces using standby mode.
- Most computer peripherals (speakers, external hard drives etc) were on in unoccupied areas.

Office Equipment Energy Usage				
Equipment	Quantity	Energy consumption on	Energy consumption standby/sleep	Energy consumption off
Computer	72	65W	2W	0W
Liquid crystal display (LCD) monitor	66	35W	2W	0W
Cathode ray tube (CRT) monitor	6	65W	Up to 45W	0W
Misc. printers/copiers/faxes	2	27-1350W	5-95W	0W

Recommendations:

- **Institute power management settings on all monitors** that have been inactive for 10 minutes.
 - On most computers, power management options can be found under the Control Panel (from Start → Settings → Control Panel). Click ‘Power Options’. Here you can designate when your monitor or computer should enter standby.
- **Turn off or standby computers at night** and have them enter standby when not in use for extended periods of time (one hour or longer).
 - Turning a computer on and off does not damage its hardware like it once did. Most hard disks are rated at 20,000 on/off cycles. If turned on/off once a day, it would take 55 years to reach this rating number.
- **Manually turn off cathode-ray tube (CRT) monitors at night** or during prolonged downtime (20 minutes or longer). Older (pre-1995) CRTs consume considerable energy even while in standby or sleep modes. In one case, a 17” CRT was measured using 58W while on and 45W in standby. Turning them off (using the hard switch) guarantees that these monitors are not drawing a large phantom load.

- **Replace older model cathode-ray tube (CRT) displays with liquid crystal displays (LCDs) either actively or upon failure.** LCDs use half the energy of CRTs and lessen eye strain. If replacing the monitor is cost-prohibitive, make sure the monitor is manually turned off at night or when it will not be used for more than 20 minutes.
- **Turn off printers at night (especially laser printers)** that typically are on all day. Laser printers consume considerable amounts of energy even while in standby mode; according to manufacturer's specifications, several laser printers inventoried during the audit consume over 80W while in standby. The average standby power draw is 28W. If high-volume printing is not necessary, recommend that staff use inkjet printers, which typically use considerably less energy (<5W).
- **Use a surge protector for computer peripherals and other accessories.** While many computer peripherals like speakers, scanners and external hard drives individually use small amounts of energy (<5W), the accumulated energy consumption can be significant. By plugging them in to a surge protector, not only are they protected from fluctuations in current, they can be easily shut off at night or during extended periods of downtime.
- **Use laptops in place of desktops when appropriate.** Laptops use considerably less energy than a desktop (20-30 W vs. 100-150 W) and do not require an uninterruptible power supply. A laptop docking station allows for desktop-like function while permitting the portability desired of a laptop.
- **Decrease time at which copiers and printer enters power-save mode to 15 minutes.**

Other Electrical Equipment

Observations:

- 2 mini- and 2 regular- sized refrigerators were observed.
- 3 microwaves, 3 coffee pots and an ice machine were also noted.
- Miscellaneous fans and radios were noted in many offices.

Recommendations:

- **Plug accessories into a surge protector** so they can be easily shut off at night and on weekends. Many of the accessories listed above require a constant power supply to power displays and maintain system functions. While this phantom load is usually small for an individual piece of equipment, the aggregate power consumption can be surprising. A surge protector is a safe and convenient way to protect these devices while allowing the user a fast and simple way to shut them off when they are not in use.
- **Consolidate contents of small refrigerator into a regular-sized refrigerator.** Small, 'mini' refrigerators use between 200 to 300 kWh annually, whereas a new, full-sized refrigerator uses only 600 kWh to cool a volume many times greater. If there are times when more space is necessary, the small fridge could always be plugged in only when needed. This could save up to \$45 annually.

- To maintain refrigerators at optimal efficiency:
 - **Keep fridge at least one and a half inch away from the wall** (if possible) to allow for more efficient cooling. Placing a wood block on the floor behind the fridge will help maintain this position.
 - **Clean the coils regularly every six months.**
 - **Place jugs of water in fridge and blocks of ice in freezer** if units are consistently empty. Filling empty air space lessens the amount of warm air that needs to be cooled each time the fridge or freezer door opens.

Recycling

Observations:

- Paper and commingled recycling bins were present in various locations around the area;

Recommendations:

- **Ensure enough recycling bins are located to be convenient for all office occupants.** Ideally, a commingled recycle bin would be adjacent to every trashcan in a common area. For more information on recycling, please contact sustainability@oregonstate.edu.

Other Notes:

- If your office space generates electronic waste, **consider participating in a new electronic media recycling program offered by Campus Recycling.** Items such as CDs, CD cases, 3.5" floppy discs, and audio/visual tapes are accepted. For more information, please contact sustainability@oregonstate.edu.

Purchasing

Recommendations:

- **Consider [Energy Star](#)® products when replacing appliances and office equipment.** These products are typically 10-30% more efficient than non-rated models and the purchase price difference is oftentimes negligible.
- **Consider [EPEAT](#)™ -certified computers and accessories** when purchasing new equipment. EPEAT™ evaluates products on a wide-range of environmental criteria, ranging from energy consumption and materials to toxic content and end-of-life management.

Paper Use

Recommendations:

- **On all computers, set double-sided printing as the default setting for printers with this capability.**
- **Encourage printing on clean side of single-sided paper.** Add small boxes near printers containing this draft paper or leave a stack of this paper in printer bypass feeders.

Recommendation Summary

Recommended and Potential Energy Conservation Measures				
Conservation Measure	Annual Energy Savings	Annual Savings	Implementation Cost	Return on Investment
Replace all incandescent lights with CFLs. Estimated impact is 95 bulbs.	4,380 kWh	\$208.50	Estimated \$479.95	2.3 years
Replace T12 linear fluorescent fixtures with newer T8 fixtures. Estimated impact is 135 fixtures.	47,168 kWh	\$2,245.70	Estimated \$24,300. after incentives	10.8 years
Enable standby modes on computers that typically run all day and turn computers off at night; estimated impact is 72 computers.	3,554 kWh	\$169.23	0	Immediate
Turn off all printers at night that typically run 24/7; estimated impact is 45 printers.	4,591 kWh	\$218.57	0	Immediate
Unplug (or use surge protector switch-off) all small office equipment (cell phone chargers, computer accessories, etc.) at night; estimated 300 W total	900 kWh	\$42.85	Avg. \$3/power strip; \$45 total	1.1 years
Total savings if above changes are implemented	60,594 kWh	\$2,885	\$24,825	8.6 years

By implementing the changes listed above 121,187 lbs of CO₂¹, 154 lbs of SO₂² and 198 lbs of NOx² will not be emitted into the environment each year.

1- PacifiCorp; 2 - Phil Carver, Oregon Department of Energy

If you have any questions or comments regarding the format, observations or recommendations of this energy audit, do not hesitate to write or call. We can be reached at sustainability@oregonstate.edu or 7-3307. Other staff or departments interested in receiving a Sustainability Audit are also welcome to contact me at the email and phone number listed above. Thank you for your time and participation.

Kelsey Hanrahan
Sustainability Office