

Sustainability Audit Report

Audit performed by: _____ Greg Smith _____ **Date:** 3/9/07

Space Audited/Date Audited: _____ Kerr 4th Floor / _____ 2-20-07

Feedback report to: Todd Simmons 416A; Mark Peterson 416B; Carlea Freeman 422P; Cynthia Hubbard 402A;

Lighting:

Observations:

- Typical fixture is fluorescent recessed with an opaque shield-type diffuser;
- Lights were typically off in unoccupied areas;
- Lamps had been intentionally removed in some places to reduce lighting levels;

Fixture Type	Quantity	Energy use per fixture	Watts per fixture type
4 lamp T12	42	136W	5712
2 lamp T12	52	68W	3536
4 lamp T8	1	128W	128
2 lamp T8	19	64W	1216
1 lamp T8	4	32W	128
60W incandescent	2	60W	120
150W full-spectrum incandescent	1	150W	150
150W halogen	3	150W	450
50W halogen	1	50W	50
40W U-tube fluorescent	13	40W	5200
13W compact fluorescent	3	13W	39
100W incandescent	1	100W	100

Recommendations:

- **Replace all incandescent and halogen bulbs with compact fluorescent (CFL) bulbs.** 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 spectra and intensities, so a suitable CFL can be found for almost any application.
- **Remove half of the U-tube fluorescent lamps located down hallway AH400 (which runs east-west along the 416* office spaces).** Light readings indicate that this area receives sufficient light from overhead and natural lighting sources so that half of these bulbs could be removed and the area would still be adequately lit, as per Illuminating Engineer Society (IES) footcandle recommendations.

- **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.
- **Consider natural light sources when arranging furniture and work spaces.** Natural light is full-spectrum, aesthetically-pleasing and free. Even on overcast days, natural light can provide sufficient illumination for many tasks.
- **Delamp areas that are overlit** or areas where natural or task lighting provides sufficient illumination. Please email sustainability@oregonstate.edu for more information on delamping procedures.
- **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 needs to be replaced, contact a janitorial or Facilities Services electrical staff person.

Computers and peripherals:

Observations:

- Some computers and monitors observed in unoccupied spaces had monitors in stand-by and computer on;
- A variety, totaling 13 units, of printers were noted;

Equipment	Quantity	Energy consumption on	Energy consumption standby/sleep	Energy consumption off
PC computer	23	65W	2W	0W
Apple computer	13	50W	2W	0W
Liquid crystal display (LCD) monitor	38	25W	2W	0W
Cathode-ray tube (CRT) monitor	4	65W	up to 45W	0W
Misc. LaserJet Printers	13	330-690W	>5-165W	0W

Recommendations:

- **Institute a power saving mode 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 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.

• **Replace older model cathode-ray tube (CRT) displays with liquid crystal displays (LCDs).** LCDs are more efficient and cause less eye strain. Older (pre-1995) CRTs consume considerable energy even while in standby or sleep modes. In one case, we measured a 17" CRT using 58W while on and 45W in standby. 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 run all day long. Printers consume considerable amounts of energy even while in standby mode; according to manufacturer's specifications, several laser printers inventoried during the audit consume 150W while in standby. Personal laser printers also draw a large phantom load; several models inventoried draw 20W or more. If high volume printing is not necessary, recommend that staff use inkjet printers, which typically use considerably less energy (<5W) when in standby.

• **Use a surge protector for computer peripherals and other accessories.** While many computer peripherals like speakers do not use very much energy (<5W), the accumulated energy consumption is significant. By having them all plugged in to a surge protector, not only are they protected from fluctuations in current, they also 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 at work or at home while allowing the full portability required of a laptop.

• **Decrease time at which copiers and printer enters power-save mode to 15 minutes.**

Other Electrical Equipment:

Observations:

- 3 small refrigerators were observed;
- TVs, microwaves, coffeepots, space heaters and fans were also noted;

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 refrigerators into a larger, shared refrigerator.** Small ‘mini’ refrigerators use between 200 to 300 kWh annually. A new, full-sized refrigerator uses only 600 kWh to cool a volume many times greater.

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.**

Paper Use:

Observations:

- Approx. 1 box per month is used by News and Communication; approx. 1 ream per day is used by EESC; approx. 1 box per 2 months is used by Research;

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 near printers small boxes containing this draft paper or leave a stack of this paper in printer bypass feeders.

Recommended and Potential Energy Conservation Measures		
Conservation Measure	Annual Savings (kWh)	Annual Savings (\$)
Replace all incandescent and halogen bulbs with compact fluorescents (CFLs)	1,548 kWh	\$66.56
Delamp (remove) half of the U-tube lamps in hallway 400	630 kWh	\$27.09
Reduce total lamp hours (1 lamp on for 1 hour) of overhead lights by 100 per day (ex. 10 bulbs off for 10 hours); accomplished through delamping, occupancy sensors, better task lighting etc.	1,460 kWh	\$62.78
Turn off all computers at night that typically run 24/7; estimated impact is 10 computers	4,231 kWh	\$181.96
Replace 4 cathode ray tube (CRT) monitors with LCD	440 kWh (110 kWh per monitor)	\$18.92 (\$4.73 per monitor)
Turn off all printers (especially laser printers) at night that typically run 24/7; estimated impact is all laser printers	4,114 kWh	\$176.90

Unplug (or use surge protector switch-off) all small office equipment (cell phone chargers, coffeepots, TVs etc.) at night that are typically plugged in 24/7/365; estimated 200W total	1,302 kWh	\$55.99
Consolidate 3 small refrigerators into 1 full-size unit	300 kWh	\$12.90
Total savings if above changes are implemented	14,025 kWh	\$603.10

By implementing the changes listed above 28,359 lbs of CO₂¹, 182 lbs of SO₂² and 9,537 lbs of NO_x² 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. I 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.

Greg Smith
Sustainability Office