Sustainability Audit Report

Submitted: September 24, 2008
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Space/Date Audited: Student Sustainability Center/July 30, 2008

Lighting

Observations:

- The vast majority of lighting was fluorescent, either compact or linear.
- Lights were usually off in unoccupied areas.

Fixture Type	Quantity	Energy use per fixture	Watts per fixture type
2 lamp T8	2	64W	128
2 lamp T8-2'	1	34W	34
60W incandescent or halogen	1	60W	60
13W compact fluorescent (CFL)	8	13W	104
23W CFL	14	23W	332

Recommendations:

- **Consider replacing the incandescent bulb with a compact fluorescent (CFL) bulb.** 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.
- **For the bathroom, consider a regular light switch or adjust the occupancy sensor.** A standard light switch may be a better alternative than the occupancy sensor currently in place. If occupants remember to turn off the light when leaving, the amount of time the light and fan are on could be considerably decreased. The sensor currently in place could also be adjusted to turn off sooner.
- **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.
- **Replace fluorescent bulbs immediately when they burn out**. 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.

Computers and peripherals

Observations:

- Some computers and monitors observed in unoccupied spaces were on.
- Computers used a screen saver, but were not set up to enter standby mode.
- Most computer peripherals (speakers, external hard drives etc) were on in unoccupied areas.

Equipment	Quantity	Energy consumption on	Energy consumption standby/sleep	Energy consumption off
Computer	3	65W	2W	0W
Liquid crystal display (LCD) monitor	3	35W	2W	0W
Printer	1	320W	7W	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 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.
- **Turn off printers at night** that typically are on all day. Laser printers consume considerable amounts of energy even while in standby mode.
- **Use a surge protector for computer peripherals and other accessories**. While many computer peripherals like speakers, scanners and external hard drives 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.
- **Decrease time at which printer enters power-save mode to 15 minutes.**

Other Electrical Equipment

Observations:

- 1 standard size refrigerator; 1 TV + DVD and VCR; microwave

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.

- **Increase refrigerator efficiency** by practicing the following measures:
    - Keep fridge at least one and a half inches away from the wall. The coils on the back of the fridge need space to dissipate heat pulled from inside the refrigerator.
    - Clean coils at least once a year. Dirty coils dissipate heat less efficiency, adding unnecessary burden to the fridge motor.
    - Place jugs of water in the fridge and blocks of ice in the 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:

- Various types of recycling bins were present: paper, electronics, cans and bottles. It appeared that your recycling was adequate for the occupancy level.

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

Heating & Cooling

Observations:

- The only observed insulation at the SSC was four inches of fiberglass batting in the attic with the vapor barrier facing up.

- Windows were single pane, wooden framed with significant air infiltration.

- The furnace was rated at 80 Annual Fuel Utilization Efficiency (AFUE).

- Ducts in basement were insulated.

- Open holes were noticed in exterior walls for wiring.

Recommendations:

- **Consider installing insulation in walls, attic and basement**. This will create a more effective barrier between the heated areas of the house and the unheated basement or outdoors and will decrease heating costs. Pre-cut fiberglass batts may be a good solution for insulating between joists in the basement. Blown-in cellulose or icynene, a spray in foam insulation, may be a better solution for the exterior walls. Also ensure that what insulation you have is installed properly. Fiberglass batts should have the vapor barrier towards the heated area of the house. For more information on insulation, please email sustainability@oregonstate.edu.

- **Consider insulation for the hot water pipes in the basement.** This conservation measure has numerous benefits: since the water sitting in the pipes will lose less heat, the water heater will function more efficiently. Also, warm water will reach the faucet more quickly, equating to increased water efficiency as less water is wasted while waiting for the water to become hot.

- **Consider installing weather stripping around windows.** Daylight was noticeable around many of the window frames. Weather stripping around all of the windows, or at least those with noticeable air infiltration, will help with heating and cooling efficiency by decreasing air leaks.

- **Consider installing storm windows** or installing plastic film over inoperable windows**.** Due to the historic nature of the building, it is desirable and cost effective to keep the original windows. Storm windows can greatly improve the heat retention of the Center, thereby reducing heating costs. Plastic film works similarly and is more cost-effective, but durability and aesthetics are potential issues.

- **Seal leaks to exterior**. Numerous gaps exist, mainly due to the installation of conduits and wires. Most occur in the basement, though the front room has a sizable hole. By sealing these areas where air infiltrates, heating efficiency can be increased and the likelihood of pests entering the building is diminished.

- **On future heating, cooling and ventilation equipment, consider lifetime costs.** While it does not make economical sense to replace the furnace, a higher efficiency model would be saving at least $50 annually in natural gas bills. Higher upfront costs can be daunting, but over the lifetime of the equipment, overall costs will be lower.

Water Conservation

Observations:

- Leaking faucets on north and west sides of the house.

- Water from greenhouse sprinkler was falling on ground instead of garden beds.

Recommendations:

- **Install new washers in all hose connections** or if this does not improve the situation, purchase new hoses. Just one leaky hose can be wasting more than 10 gallons of water each day. This could be costing up to $40 per summer.

- **Consider installing a drip irrigation system** in the greenhouse and garden areas. This type of irrigation system conserves water by reducing evaporation and only delivering water to the desired plants, not the surrounding areas. Once installed, drip irrigation is easy to use and can even be set up on an automated system.

Recommendation Summary

Recommended and Potential Energy Conservation Measures				
Conservation Measure	**Annual Savings (kWh)**	**Annual Savings**	**Implementation Cost ($)**	**Return on Investment (Years)**
Replace all incandescent bulbs with compact fluorescents (CFLs)	117.8	$5.90	$4	.7
Turn off all computers at night that typically run 24/7; estimated impact is 3 computers. Enable Standby modes.	1878.0	$93.90	0	Immediate
Turn off all printers at night typically run 24/7; estimated impact is 1 printers. Enable Standby modes.	43.8	$2.20	0	Immediate
Unplug (or use surge protector switch-off) all small office equipment (cell phone chargers, coffeepots, TVs etc.) at night; estimated 25W total	219.0	$10.95	Avg. $3/power strip; $6 total	.5
Improve building envelope by installing storm windows and additional insulation	2457.7	$122.88	Estimated $1500	12.5
Repair leaking faucets.	N/A	$40	Estimated $20 for hose	.5
Total savings if above changes are implemented	**4716 kWh**	**$275.83**	**$1530.00**	**5.5 years**

By implementing the changes listed above 9,535.8 lbs of CO_2[1], 61.3 lbs of SO_2[2] and 32.9 lbs of NOx[2] will not be emitted into the environment each year.

1- PacifiCorp; 2 - 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.

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