

# Sustainability Audit Report

Submitted to: Justin Fleming

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Space/Date Audited: Motor Pool/August 1, 2008

## Lighting

### Observations:

- Several areas were over lit, including rooms 102A, 102B, 102C, and 103.

<b>Light Fixture Type and Energy Use</b>			
<b>Fixture Type</b>	<b>Quantity</b>	<b>Energy use per fixture</b>	<b>Watts per fixture type</b>
4 lamp T12	2	136W	272
2 lamp T12-8ft	6	219W	1746
4 lamp T8	17	128W	2176
3 lamp T8	35	96W	3360
2 lamp T8	15	64W	2240
60W incandescent or halogen	4	60W	240
150W Incandescent or halogen	3	150W	450
23W CFL	10	23W	230

### 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.
- **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 over-lit** or areas where natural or task lighting provides sufficient illumination. Please email [sustainability@oregonstate.edu](mailto:sustainability@oregonstate.edu) for more information on delamping procedures.
- **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 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](mailto: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](mailto: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 and monitors in unoccupied spaces were on

<b>Computer Equipment and Energy Use</b>				
<b>Equipment</b>	<b>Quantity</b>	<b>Energy consumption on</b>	<b>Energy consumption standby/sleep</b>	<b>Energy consumption off</b>
Computer	5	65W	2W	0W
Liquid crystal display (LCD) monitor	6	35W	2W	0W
Printers	2	13-1350W	5-48W	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.
- **Purchase liquid crystal display (LCD) monitors** when replacing CRT monitors or for new workstations. LCDs use considerably less energy and cause less eye strain, and their slimmer profile increases useable workspace. Consider **EPEAT™** or Energy Star® certified products (<http://www.epeat.net/>, <http://www.energystar.gov/>) which meet stringent energy-saving and environmental criteria.
- **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. The average standby power for the laser printer at the Motor Pool is 48W. If high volume printing is not necessary, recommend that staff use inkjet printers, which typically use considerably less energy (<5W) when in standby. Also consider turning off your Roland GX-24 vinyl cutter when not in use or at night.
- **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.

- **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.**

### Air Compressor

#### Observations:

- Audible leaks were noticed in room 101B

#### Recommendations:

- **Locate and fix air leaks.** Depending on the size, leaks may be costing you between \$30-90 per leak per year. Air compressors in general tend to be somewhat inefficient, so it is especially important to increase efficiency wherever possible.
- **Additional recommendations.** There are several other ways to increase energy efficiency of your compressor:
  - Make sure that the air filter is cleaned regularly.
  - If tool function won't be negatively affected, consider reducing the pressure in the compressor.
  - Consider replacing any old open end nozzles with the newer engineered style. These nozzles provide an equal amount of pressure, but use less air thereby reducing overall energy consumption.

For more information visit the Center for Energy Efficiency and Renewable Energy's website on air compressors. This site also offers numerous energy-saving tips as well as energy-savings calculators. <http://www.ceere.org/iac/assessment%20tool/ARC2420.html>

### Other Electrical Equipment

#### Observations:

- 1 regular size refrigerator
- 1 TV, 1 microwave, and a small coffee pot

#### 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.

### Heating & Cooling

#### Observations:

- Windows were typically single pane with wooden frames; air infiltration was significant.
- Administrative area was heated/cooled with an air-source heat pump; natural gas-fired heaters provided heating to the shop area; infrared heaters in the break room.
- Water heaters appeared to be oversized.
- A few inches of blown in fiberglass insulation were observed in the shop attic.

#### Recommendations:

- **Consider installing weather stripping around windows and doors.** Daylight was noticeable around many of the window frames in the conference room and offices as well as the exterior door in the break room. Weather stripping around all of the windows, or at least those with noticeable daylight, will help with heating and cooling efficiency by decreasing air leaks. Installing weather stripping around the break room door will further increase the efficiency of the infrared heater.
- **Consider installing storm windows.** This type of weatherization may be a good choice for the Motor Pool. Most of the windows in the shop are inoperable or don't appear to be opened. Storm windows could prove to be a very beneficial energy savings purchase.
- **Consider replacing your water heater with a smaller, higher efficiency model.** High efficiency, Energy Star® appliances have efficiency ratings of up to 90%. In the restroom off the break room, consider replacing the large water heater with a smaller and more efficient on-demand natural gas heater.
- **Consider additional insulation.** This will create a more effective barrier between the heated areas and exterior. Since the attic has some insulation already, consider blowing in additional loose fill fiberglass insulation. For more information on insulation, please email [sustainability@oregonstate.edu](mailto:sustainability@oregonstate.edu).

- **Consider installing a programmable thermostat in the break room.** The infrared heaters in the break room are fairly efficient due to the nature of how they heat a space. Instead of heating the air in the room, they instead use photoelectric energy (like sunlight) to directly heat the objects in the room. By having a thermostat programmed to have the room heated only during the lunch break, energy efficiency could be increased.

## 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](mailto: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](mailto: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 near printers small boxes 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 Savings (kWh)	Annual Savings (\$)	Implementation Cost (\$)	Return on Investment (Years)
Replace all incandescent bulbs with compact fluorescents (CFLs)	1370	\$68.50	Avg. \$6/bulb + \$10 labor/bulb; \$112 total	1.64
Reduce total lamp hours (1 lamp on for 1 hour) of overhead lights by 300 per day (ex. 30 bulbs off for 10 hours); accomplished through delamping, better task lighting etc.	2160	\$108.00	0	Immediate
Turn off all computers at night that typically run 24/7; estimated impact is 5 computers. Enable Standby modes.	3255.0	\$162.80	0	Immediate
Turn off all printers at night typically run 24/7; estimated impact is 2 printers. Enable Standby modes.	378	\$18.88	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	\$10.95	Avg. \$3/power strip; \$12 total	1.1
Repair compressor leaks, clean filters, etc.	4651	\$200.00	Estimated \$100 for materials and labor	2
Improve building envelope by installing storm windows and additional attic insulation	6110	\$305.55	Estimated \$2,500	12.5
<b>Total savings if above changes are implemented</b>	<b>18,143 kWh</b>	<b>\$874.68</b>	<b>\$2724</b>	<b>3 years</b>

By implementing the changes listed above **36,685** lbs of CO<sub>2</sub><sup>1</sup>, **236** lbs of SO<sub>2</sub><sup>2</sup> and **123** lbs of NO<sub>x</sub><sup>2</sup> 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](mailto: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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