

Get SMART! Resource Efficiency Program



OSU COLLEGE OF FORESTRY, CORVALLIS December 2005

Get SMART! Resource Efficiency Program
Corvallis Environmental Center
PO Box 2189, Corvallis OR 97339
(541) 753-9211 Fax (541) 753-4507

Location:

109 Richardson Hall
Oregon State University
Corvallis, Oregon 97331-5751
(541) 737-0872

Contact: Susan Morr , International Programs Intern

Employees: 500 students, 300 faculty and staff

Hours of operation: Main department hours: 10 hrs per day, 5 days per wk; 2500 hrs per yr
Building hours: 24 hrs per day; 8760 hrs per yr

This report is unique in that it is being used by the OSU Sustainability Group as a template to provide resource conservation assessments campus-wide. The OSU College of Forestry was used as the focus, and includes two buildings, Peavy Hall and Richardson Hall. Many of the ideas described in this report are specific to these two buildings, and we have also included ideas that are general and will apply to many other buildings. The College of Forestry has already taken many steps towards using its resources efficiently. Examples include:

- Energy efficient T-8 fluorescent lighting is used in portions of the college, conserving energy.
- Numerous locations had "turn off lights" signage, encouraging faculty, staff, and students to conserve energy.
- Office computers and monitors are turned off at night, conserving energy.
- A portion of the HVAC system has been updated, including installation of programmable thermostats for many offices, conserving energy.
- The main HVAC system is serviced annually, maximizing energy efficiency.
- At 5 pm daily, heat is turned down in all areas, conserving energy.
- Flat panel computer monitors, which use less energy than standard CRT monitors, are used in many of the computer labs.
- The restroom fixtures in Peavy Hall are low-flow, conserving water.
- Spent printer cartridges are recycled, reducing waste and conserving resources.
- Paper is reused in many areas, reducing waste and conserving resources.
- Roll-style recycled content paper towels are used in all restrooms, conserving resources and reducing waste.
- Nearly all locally recyclable items are recycled on a regular basis including office paper, glass, plastic, cardboard, magazines, metals, and pop cans, decreasing the garbage load and supporting recycling markets.

These examples demonstrate the dedication of the College of Forestry towards being resource efficient. Other establishments can benefit from these examples. This report is intended to both illustrate current successes, and to indicate opportunities for additional improvements towards becoming a more environmentally sustainable workplace. It will include recommendations, ideas and evaluation methods for energy, water, and materials use as well as opportunities to reduce hazardous waste and storm water pollution when applicable. All calculations provided are estimates based upon available data. Calculations for annual savings will be

based on a 50-week year to account for downtime observed for holidays.

I) ENERGY USE

The following section offers recommendations for conserving energy. Energy conservation calculations are based on a conservative \$0.05 per kilowatt-hour (kWh) charge; some power customers maybe paying even more per kilowatt, further increasing the estimated savings. Energy at the College of Forestry is primarily used for lighting, and general office use. The HVAC system is operated and maintained by the University maintenance crew and is only briefly analyzed for the purpose of this report.

LIGHTING

- **Turn off overhead fluorescent lighting in the lobby during daylight hours.** The lobby has large windows, hallway lighting, and 12 compact fluorescents per lobby. College of Forestry staff has expressed that this area lighting was over designed and is amply lit with daylight and hallway lighting. Turn off the lobby lights when natural lighting is sufficient. Consider adding very small signage to the appropriate light switches, such as a small arrow that says "please turn this light off during times of bright sunlight". This method is employed at the First Alternative Cooperative South store in Corvallis, which also has an abundance of bright windows. They say it serves as a friendly reminder to co-op employees to maximize efficiency whenever possible.
Estimated Savings: Turning off (24) 20W compact fluorescents located on the first and second floor lobby areas for all daylight hours would result in **savings of 960 kWh and \$80 per year**. Savings include the cost of electricity, bulb purchasing, and labor for changing the bulbs, and are calculated with the use of spreadsheets, which are available upon request.
- **Keep one-half of hallway lights turned off during day.** Many of the hallways are lit with (14), 4-foot, 2-lamp T-12 fluorescent fixtures. Most hallways have two separate lighting banks allowing either half or all lights to be turned on at one time. These lighting banks are already turned down after main building hours. Keep one-half of the lighting banks off during the day to **save 1400 kWh and \$80 per hallway per year**. Savings include the cost of electricity, bulb purchasing, and labor for changing the bulbs, and are calculated with the use of spreadsheets, which are available upon request.
- **Retrofit 4-foot T-12 fluorescent fixtures and lamps.** Currently many areas including hallways, classrooms, and faculty offices are illuminated with two-lamp 4-foot T-12 fluorescent fixtures. To increase energy efficiency, consult with lighting experts to estimate retrofit costs and savings to convert T-12 fixtures to energy efficient T-8 fixtures. The table below provides an estimate for a number of lighting options and includes energy and cost savings plus payback information in the table below.

Please note: REP staff are conservation analysts not lighting experts. Our knowledge is based on our latest lighting industry research and is by no means comprehensive. It is designed to give ideas and a starting point for energy conservation. Please compare the following information with other lighting specialists and contact us if names for lighting specialists are needed.

Retrofit existing 4-foot T-12 fluorescent light fixtures with energy-efficient 4-foot T-8 fixtures. T-8 fixtures and lamps (which use an electronic ballast) are more energy efficient while providing brighter lighting levels than T-12 fixtures and lamps (which use magnetic ballasts). Including reflectors in the retrofit of each fixture can further increase energy efficiency by increasing lighting levels and allowing for fewer lamps to be used. In many cases, installing reflectors allows for a reduction in the total number of lamps per room further increasing energy savings.

Simple Payback: An average retrofit cost per fixture (changing from T12 to T-8 fixtures and lamps) is \$100 (including ballast conversion, reflector, and installation). Incentives and tax credits provide a reduction of 35% of total cost from the Business Energy Tax Credit, plus \$15 per fixture cash back from the Energy Trust of Oregon.

Retrofit options for tube fluorescent lighting by area	Annual Energy Savings	Annual Energy Cost Savings	Simple Payback
Classroom conversions: Existing: (30) 2-lamp T-12 fixtures per classroom Replace every (2) 4-foot, two-lamp T-12 fixtures with (1) 4-foot, two-lamp T-8 fixture	3600 kWh per classroom	\$200 per classroom	3.8 year
Faculty office conversions: Existing: (4) 2-lamp T-12 fixtures per office: Replace every (2) 4-foot, two-lamp T-12 fixtures with (1) 4-foot, two-lamp T-8 fixture	480 kWh per office	\$30 per office	3.3 year

- **Move night classes and meetings into one area/classroom to minimize “open” buildings.** In large Colleges there may be numerous rooms that remain available for use with lights and equipment running for potential night schedules. Schedule evening classes and meetings to be held in only one area of the building, or as few as possible, to reduce lighting needs.
- **Install occupancy sensors (motion detectors) in restrooms, copy rooms, offices, and other appropriate areas.** Occupancy sensors will turn on lights and fans immediately when someone enters the room and turns them off when rooms are no longer occupied, conserving energy and the life of the fixtures. Sensors can be purchased for around \$40 for wall mounted units and up to \$100 for ceiling mounted units, plus cost of installation. Energy Trust of Oregon’s incentives are available for occupancy sensor installations. See below for Energy Trust of Oregon contact information.
- **Remove or replace all burned out or flickering lights.** Lighting ballasts continue to send energy to each lamp even when no light is produced, using the same energy as a fully-lit lamp. There were numerous locations where lights were burned out and still in the fixture. Remove burned out lamps completely or replace them to maximize lighting.

COMPUTERS

- **Set all monitors and CPUs to go into “sleep mode” during inactivity periods of 10 minutes or more.** Each College across the OSU campus has numerous computer rooms and computers located throughout the buildings. Please note, in the College of Forestry, there have been many updates to flat screen monitors which use only 20W of energy when on and power down to no energy usage. This recommendation only applies for CRT monitors and all CPUs. Energy costs of running computers when not in use can quickly add up. Set all computers to go into sleep mode after 10 minutes of inactivity. Screen savers are not enough, as they do not actually reduce energy use; they merely prevent screen imprint. Most monitors use 85W when active and are reduced to 25W when in "sleep mode". CPUs use 55W when active and are reduced to 25W when in “sleep mode”. Thus, for each computer there is an average 80W reduction when both CPU and monitor are in “sleep mode”.

This option is available on most computers under the display menu/screen savers/energy star settings. Make sure all staff is aware of this option if they have not already changed it, or ask computer support staff to apply this change.

- **Turn off computers at overnight and on weekends.** Currently, student computer rooms have policies to turn off computers when finished; however, many graduate student offices and employee offices do not adhere to the same policy. Educate all staff and students of the important issue of completely turning off all computer equipment after hours to conserve energy and energy costs.
Estimated Savings: Currently, approximately 500 computers are used throughout the College of Forestry. Computer and monitor energy requirements are 55W and 85W respectively, for a total energy use of 140W. When computers are in “sleep mode” they still use approximately 50W per hour. The following calculation assumes all computers are in “sleep mode” after hours but not entirely shut down. For one graduate student computer room with 15 computers, turning computers and monitors off after hours **conserves 4700 kWh and saves \$230 per year.**
Energy Conservation Calculation: $50W \text{ per computer} \times 15 \text{ computers} \times (8760 \text{ hours per year} - 2500 \text{ hours of operation}) \times 1 \text{ kWh}/1000Wh = 4700 \text{ kWh} (x\$0.05/kWh) = \$230 \text{ per year.}$

A company called Verdiem has created energy conservation software called Surveyor Energy Network Manager, which is currently being evaluated for implementation University-wide. This software can be programmed to power down computer systems automatically on a predetermined schedule and can be customized to individual users. See the latest report at <http://www.verdiem.com/>.

- **Turn off printers when not in use, especially overnight and on weekends.** Printers can easily be turned off at the end of each workday without harming the machines. There are numerous desktop printers and network printers located throughout the College of Forestry. Develop a printer turn-off policy that is easy for faculty and students to remember. An example cost and energy savings is as follows:
Estimated Savings: For example, laser printers use 80W when on and are reduced to 25W when in “sleep mode”. For every one laser printer that is turned off at the end of every workday, energy and cost savings of **160 kWh and \$10 per year per printer** would be realized. Ink Jet printers use less energy than laser printers but are still drawing up to 10W when in sleep mode adding up to 90 kWh and \$5 per year when left on all hours.
Energy Savings Calculation: $25W \text{ per laser printer} \times 1 \text{ printer} \times (8760 \text{ hours per year} - 2500 \text{ hours of operation}) \times 1 \text{ kWh}/1000Wh = 160 \text{ kWh} (x\$0.05/kWh) = \$10 \text{ per year.}$

HVAC

- **Replace filters.** Regularly replace all filters to maximize blower efficiency. During the on-site visit it was determined that the difficulty with this recommendation is the number of personnel required to replace all filters. Educate interns to accomplish these tasks, replacing all filters one to two times per year.
- **Evaluate areas where major air leaks may be occurring.** Each College and building has numerous offices, classrooms, storage areas, laboratories, and bathrooms. This provides many opportunities for accidentally left open windows, poorly-sealed windows, and vents, and other possible areas for heat losses. Take a complete inventory of each area to determine if there are any heat losses that might be easy to fix.
- **Turn off heat in unused areas and offices.** In seldom-used areas with individual thermostats, manually turn heat off and close doors. In seldom-used areas without individual thermostats, consider close heating registers and doors. Then, for maximum efficiency, turn the heat on in these areas just prior to room occupancy.
- **Keep blinds closed after-hours in all offices with windows.** Existing office windows are single pane glass with aluminum framing. This older style of window dramatically loses heat during the winter months and conducts heat in the summer months. Keeping blinds closed after-hours reduces temperature loss from the building. Also check seals on these windows and replace as needed.

GENERAL EQUIPMENT

- **Turn off cooling units on water fountains.** There are numerous refrigerated drinking fountains located throughout both Forestry buildings. Currently, when a condenser burns out, it is not fixed or replaced. Turn off condensers on all water fountains or consider the following ideas to increase refrigeration efficiency:
 - Rewire drinking fountain into light switch circuits which would be shut off at nighttime and on weekends, or
 - Use a timer to turn fountains off during unoccupied time periods (e.g., nights).
 - Provide adequate insulation around the chiller unit and any exposed pipes to maximize cooling efficiency.
 - Set the chillers' temperature controls to slightly higher temperatures. The water does not need to be ice cold to be satisfying.

Many universities and governmental agencies across the country are advocating the unplugging of refrigerated drinking fountains as a way to save energy and cut costs. Drinking fountain manufacturers have estimated energy consumption of refrigerated fountains to be approximately **600kWh and \$30 per unit per year**. This consumption can vary widely due to usage rates, ambient conditions, feed water temperatures, and rated capacity of the units.

- **Turn off copy machines when not in use, especially overnight and weekends.** Copy machines can also be turned off at the end of each workday without harming the machines. An example cost and energy savings is as follows:
 - Estimated Savings: Standard copiers use 180W when on and are reduced to 120W when in "sleep mode". For each copier that is turned off at night and over weekend, a total annual energy and cost savings of **750 kWh and \$40 per year per copy machine** can be realized.
 - Energy Savings Calculation: $120W \text{ per copier} \times 1 \text{ copier} \times (8760 \text{ hours per year} - 2500 \text{ hours of operation}) \times 1 \text{ kWh}/1000 \text{ kWh} = 750 \text{ kWh} (\times \$0.05/\text{kWh}) = \$40 \text{ per year}$.
- **Make sure all equipment is turned off during school breaks including weekends.** Each college has numerous laboratories, classrooms, and student and faculty offices, all of which may have electrical equipment. Assess all areas that are heavy in equipment, create a list of which equipment should be turned off, and have appropriate personnel turn off these items. Have one person per college, or building, inspect these areas occasionally to assure equipment is being not left on after faculty and students leave.
- **Turn-off all small appliances when not in use especially over-night, weekends, and school breaks.** There are many different types of small appliances used throughout each College including various office appliances, televisions and video equipment to name a few. It may be possible to completely remove many of these items especially when they are redundant, such as removing individual refrigerators and asking staff to share staff lounge refrigerators. In cases where appliances are not removed make sure they are turned off after hours. The table below describes a variety of common appliances and their yearly energy costs when left on all hours. Make sure all these appliances are turned off when not in use.

Appliance	Average Wattage of appliance	Kilowatt hours per year	Annual Cost per one Appliance
Clock, Coffee maker, Radio/stereo	5W - 10W	45kWh – 90kWh	\$2 - \$5
Window Fans	20W - 45W	175kWh – 400kWh	\$10 - \$20
Refrigerator (small)	45W (average with on/off cycling)	380	\$20
Refrigerator (standard size)	90W (average with on/off cycling)	800	\$40
Electric Heater (left on after hours during winter months only)	500W – 1500W	2000 kWh	\$100

To assure extra equipment is removed, or at least turned off after hours, educate all faculty and staff. Send out a message including energy costs and potential savings. Also, individually contact all faculty about the importance of keeping personal electrical appliance use to a minimum. For a thorough energy use evaluation, determine the number of each appliance and summarize their total energy use. Use these totals to further educate faculty and students why it is important to keep all appliances turned off when not in use and minimize their use in general.

- **Turn down water heaters to 110°F required for hand washing.** For office settings where hot water is used only for hand washing, 110°F is the minimum temperature required by the Benton County Health Department. For every 10°F reduction in water temperature there is a savings of 8% of the costs associated with heating that water. For example, reducing water heater temperature from 125°F to 110°F will reduce water-heating costs by 12%.
- **Encourage pedestrian travel, bicycle use, and other modes of transportation that minimize environmental impact.** Develop a campus wide campaign to remind students to use alternative transportation. Students may need to be reminded that city buses are free, or shown comparisons of the time it takes to get to campus by bike or bus compared to driving and parking. Work with other departments such as the library, commons, or bookstore to see if printed receipts could include a reminder message. Dedicate one week per year to alternative transportation and conduct contests between colleges and provide other fun incentives. This recommendation will require awareness, creativity, and dedication to change transportation habits and behaviors.

REFRIGERATION- There are many locations where refrigerators are used such as in laboratories and lunch rooms. There are numerous low-cost options for maximizing energy efficiency with this equipment.

- **Service refrigeration units regularly.** Clean refrigeration coils several times per year to maximize refrigeration efficiency. Regularly check seals on all refrigeration units and replace as needed. Keep refrigeration units relatively full to maximize cooling. When replacing refrigeration units, research and purchase high-efficiency models. High-efficiency refrigeration units can save up to *one-half* of the energy associated with refrigeration.
- **Minimize the number of refrigerators whenever possible.** Check all refrigerators to assure they are being fully utilized. If refrigerators are found with only a few items in it, turn off the units and find a way for employees and students to share another unit. For every additional, standard sized refrigerator that is not needed, savings of at least **800 kWh and \$40 per year** are realized.

- **Check the temperature settings and adjust as needed.** If settings are lower than necessary, chances are that energy and money is being wasted. Keep refrigerator settings at the highest temperature possible that will still keep food and materials adequately cold. Savings from temperature adjustments will depend upon the insulation, size, and motor of unit, the ambient air outside the unit, the number of times the door is opened, how long door is left opened, how long person is inside, if it's closed right behind each person, etc.

RETROFIT ASSISTANCE (Always contact these agencies at the beginning of any project planning process, to avoid disqualification)

Oregon Office of Energy's BETC program: 35% of a lighting retrofit project's eligible costs can be taken as a tax credit, so long as the retrofits result in a reduction in energy usage of at least a 25% and has at least a one-year payback period. Projects under \$20,000 may take this credit all in one year, and can be carried over into additional years if the entity has no tax liability. For more information on the BETC program, please contact the program manager, Evan Elias at the OR Office of Energy: 1-800-221-8035, or visit <http://www.energy.state.or.us/bus/tax/betcbrtx.htm>.

Energy Trust of Oregon: the Energy Trust of Oregon offers standard incentives for a variety of energy efficiency retrofits. Cash incentives are paid upon project completion, which reduces overall installation costs and helps the lighting fixtures pay for themselves sooner over time. As of January 1, 2006 Energy Trust new rebates are in affect. For more information contact Energy Trust of Oregon at 1-877-510-6800, or visit <http://www.energytrust.org/buildingefficiency/standard.html>

GREEN POWER FROM PACIFIC POWER (Blue Sky)

Businesses can invest in renewable energy, such as wind, solar, geothermal and biomass, which has a much lower impact on the environment than traditional methods of electricity generation. Visit Pacific Power online at <http://www.pacificpower.net/Article/Article49267.html>, or contact them directly at 1-800-769-3717.

II) WATER USE

The following summarizes methods to conserve water and save on water and sewer costs. Water use at the College of Forestry is primarily in restrooms, staff rooms, and laboratories.

- **Install low-flow toilet or “toilet tummy” (water displacement device) in restrooms.** Toilets installed prior to 1991 use more water than toilets installed there after. Older, high-flow can easily be using up to 5 gallons per flush (gpf). Replace old toilets with low-flow models (1.6 gpf) or install toilet tummies or other flow regulation devices. Toilet tummies will displace, and therefore conserve, up to one gallon of water per flush. Replacing the toilet with a low-flow model will save up to 3.4 gallons per flush. Low flow models do not only use less water; they are specially engineered to flush effectively with minimal water.
Estimated Savings: **For every 100 people** using a high-flow toilet once per day, switching to low-flow 1.6 gpf toilets would result in **water savings of up to 85,000 gallons and \$450 per year**. Simply installing toilet tummies will save up to 25,000 gallons and \$130 per year.
Water Conservation Calculation: *100 people x 1 flushes per day x 5 days per week x 50 weeks per year x 3.4 gallons per flush water savings = 85,000 gallons water savings x 1/748 ccf/gal x \$4 per ccf = \$450.*
Cost savings include both water and sewer rates. (ccf =one hundred cubic feet)
- **Install low-flow aerators in restroom sinks.** Sinks without aerators can use up to 5 gallons per minute (gpm) compared to low-flow faucets which flow at 2 gpm. Installing aerators provides a water savings of up to 3 gpm per faucet. Aerators can be purchased for around \$2 each and are easily installed by screwing into faucet tip. Regularly check public restrooms to assure any existing aerators are in working order. Note: only install aerators in sinks that are used for rinsing or hand washing, not for janitorial needs; aerators significantly slow down the amount of water making bucket filling more time consuming.

Estimated Savings: A standard hand wash is 15 seconds each. **For every 100 people** using a sink without an aerator for hand washing once per day, installing aerators would result in **water savings of 18,800 gallons and \$100 per year.**

Water Conservation Calculation: $100 \text{ people} \times 1 \text{ hand wash per day} \times 0.25 \text{ minutes per hand wash} \times 3 \text{ gallons per minute water savings} \times 5 \text{ days per week} \times 50 \text{ weeks per year} = 18,800 \text{ gallons water savings} \times 1/748 \text{ ccf/gal} \times \$4 \text{ per ccf} = \$100.$ Cost savings include both water and sewer rates. (ccf = one hundred cubic feet)

- **Fix faucet and toilet leaks immediately.** Faucet leaks can occur in any faucet including in laboratories, and can quickly add up to hundreds of wasted gallons of water plus high water costs. Faucets that drip 1 drop per second can be wasting up to 200 gallons of water per month, or **2400 gallons and \$22 per year per faucet.** Toilet leaks can also add up quickly. To determine if there are toilet leaks, place 10 drops of food color in the toilet tank. If color appears in the toilet bowl after 15 minutes, try first repairing the leak by replacing the flapper valve, before considering complete toilet replacement. Educate all staff of the importance of noticing and reporting leaking faucets and toilets, and having maintenance staff fix leaks immediately.
- **Minimize the volume of water used for irrigation.** A majority of the University irrigation system is computer controlled which turns off water during rainy periods, waters in the morning and evening hours to reduce evaporation, and controls the amount of water applied in each area. Still, there are complaints that many areas are being over-watered. Assess the current water use by placing one tuna can out during irrigation. One-inch of water per week is the recommended amount for healthy, thriving lawns. This should equate to one full can for lawns watered once per week or one-half a can for lawns watered twice per week. Also, decide if there are areas campus-wide if there are areas that are less used and can receive less watering. Consider letting these areas go brown in the deep summer months. Water pooling in grass or on sidewalks is a sign of over-watering and of wasting valuable water resources.

III) MATERIALS USE

The following section identifies recommendations for material savings and reduction in solid waste.

REDUCE

- **Reduce overall office paper consumption.** The following ideas can be integrated into printer and copier use policies and may require a concerted effort by staff to change behavior. Periodic reminders, explanations of cost and waste savings, and signage are recommended (REP staff can provide signage). It is difficult to project the savings that could be realized in any one office setting, but a conservative guideline is that if an office were to actively institute all of these measures, paper expenses could be cut by at least 25% or more! This list is comprehensive; some may be less applicable than others.
 - **Print double-sided.** Set up the computer/printer default to double-sided printing. Post signage about the need to override the default when single-sided printing is needed on a case-by-case basis. Encourage faculty to require that reports and homework be turned in double-sided.
 - **Use draft paper** more frequently. Establish clearly marked boxes to collect clean unwrinkled paper that is already printed on one side (non-confidential paper only). Where possible, dedicate one printer drawer for draft paper and encourage all students and staff to use this paper for all draft prints.
 - **Refrain from printing emails** whenever possible.
 - **Eliminate fax cover sheet.** Use fax Post-Its® rather than a full sheet cover page when faxing documents. Set the fax machine to only print out periodic transmission reports, or to print on command, rather than automatically after every transmission.
 - **Fax directly from your computer.**
 - **Use print-preview** and spell check options before printing.

- **Pay attention to margins, type font, and spacing.** One-half to one-inch margins, a maximum of 11-point fonts, and single spaced documents are recommended.
- **For documents that require comment from more than one person, print just one copy and circulate** with a document routing sheet that allows employees to signoff that they have received and read the document.

REUSE

- **Reuse office and laboratory supplies whenever possible.** Many office supplies can be reused including mechanical pencils, refillable pens, folders, and envelopes.
 - Purchase items that have long life spans and reusable potential.
 - Provide a special closet or shelf space where employees can find, return, and store reusable items.
 - Educate staff about which items are reusable and where they can easily be found when needed.
 - Donate unneeded office supplies to Surplus Property and visit the Surplus Property used office supply area.

RECYCLE- For any assistance for improving or increasing recycling efforts, contact Justin Fleming, Campus Recycling Program manager, at 541-737-7349, or Justin.fleming@oregonstate.edu.

- **Recycle used overhead transparency sheets.** Transparencies are made of Type 1 polyester. Although this material is normally easy to recycle, the inks and toner used on them complicates the recycling process. 3M, one manufacturer of transparencies provides the opportunity to recycle these items simply by sending them in, and even guarantees the confidentiality of the info contained on the sheets. Ship used transparencies, no paper, to 3M's recycling partner at the following address (be sure to clearly mark your name and your organization for record keeping purposes):
 3M Recycle Program
 c/o Gemark
 99 Stevens Lane
 Exeter, PA 18643
 The material is then recycled and remanufactured into fiber fill for chairs and carpeting, automotive products, more transparency film, insulation, and many more useful products made from polyester. Learn more by visiting http://www.3m.com/us/office/meetings/product_catalog/recycle.pdf.

PURCHASE RECYCLED MATERIALS

- **Whenever possible, purchase paper products that are made from 100% recycled materials with at least 30% post-consumer waste paper.** This recommendation includes printing paper, envelopes, files, paper towels, etc. Buying recycled products with the highest percentage of recycled content supports the recycled material market, reduces waste generation, and conserves natural resources.
- **Purchase remanufactured printer and copier cartridges whenever possible.** Currently, a majority of printer and copier cartridges throughout the College of Forestry are recycled. To increase collection, create one or more central locations where cartridges can be collected. In addition, consider purchasing remanufactured or refilled cartridges. Sometimes remanufactured cartridges can be less expensive than OEM (original equipment manufacturer) cartridges. In addition, the use of remanufactured cartridges does not void equipment warranties. Many programs are available for these services.
 - Local companies that provide **recycling and refill services** are Cartridge City on North 9th street and Rapid Refill in downtown Corvallis. Another Oregon company who accepts spent cartridges for recycling and remanufacturing and also sells remanufactured cartridges is Step Forward Activities. Contact www.stepforwardactivities.org to find out more information.

- An Oregon company selling **remanufactured laser toner cartridges** is MCPc in Portland. MCPc also recycles some brands of laser toner cartridges, and even sells some **remanufactured copier cartridges**. Contact Kasey Flicker at 800-444-0936 for more information.

CLEANING PRODUCTS

- **Purchase and use non-toxic cleaning products.** There are many natural cleaning products available for business cleaning needs. One local company, Your Green Home, carries a variety of natural cleaning products. Contact Your Green Home in Corvallis at (541) 754-7336, or info@yourgreenhome.com. Bi-O-Kleen, located in Portland, manufactures natural, non-toxic, biodegradable, cleaning products. Go to <http://www.bi-o-kleen.com/> for more information. Bi-O-Kleen products are also available at retail stores including both First Alternative Cooperative stores and Fred Meyers in the health section.

ADDITIONAL INFORMATION

- Learn more about Green Campus and associated awards. The following two web-sites provide a number of links to University campus's that are committing to sustainability projects. There are many creative ways to involve OSU in sustainability and including awards and contests that may entice additional resource conservation activity.
 - Green campus <http://www.ase.org/section/program/greencampus>
 - Step-by-step auditing approach for green campus. <http://dolphin.upenn.edu/~pennenv/audit/>

Thank you for participating in the *Get SMART!* Resource Efficiency Program. We appreciate the chance to demonstrate how this program works, and hope that you will find a few recommendations that will work for your organization. Please feel free to use these recommendations as a guideline for any changes that you would like to consider. We hope you will call on us with questions or for assistance with implementation.

Please note that any professional services or products mentioned are only examples and are in no way intended to be endorsements of a particular company. In addition, any prices used in calculations are unofficial and subject to change.

It would be beneficial to record any savings you are able to make using these recommendations. We will call you soon to discuss the recommendations you have decided to implement, and to provide you with additional resources. We look forward to continuing this work with you.

Cassandra Robertson and Jeanette Hardison, Conservation Analysts,
 Get SMART! Resource Efficiency Program
 (541) 752-1122