

**Appendix D - UNIVERSITY HONORS PROGRAM
SENIOR PROJECT - APPROVAL**

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PROJECT TITLE: Environmental Blueprint for the
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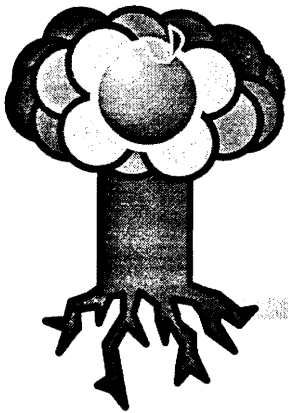
I have reviewed this completed senior honors thesis with this student and certify that it is a project commensurate with honors level undergraduate research in this field.

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Date: 5/14/97

Comments (Optional):

This was an extraordinary project, not only because of the depth of the research, but also because it was motivated by the highest ideals. Few students have done so much to benefit the University



Blueprint for the 21st Century
the Greening of Big Orange

Environmental Blueprint for the Twenty-First Century: The Greening of Big Orange

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&
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Spring 1997

A Senior Thesis completed for the
University of Tennessee, Knoxville
College Scholars Program
and the
University Honors Program

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Abstract

As the birthplace of innovation and education, the university has the potential to serve as a model of environmental sustainability. An environmental blueprint was developed for the University of Tennessee-Knoxville by us in order to facilitate the progression towards this goal. University operations were divided into eight categories: a university environmental policy, solid waste, radioactive and hazardous waste, energy, purchasing, landscaping, grounds maintenance, and campus design, transportation, and education. Research in each of these areas focused on interviews with faculty and staff at UT and other universities, EPA officials, and non-profit environmental groups; published books on campus ecology; and internet sources which included environmental audits completed by other universities.

Results were presented as follows:

1. A general description of the issue.
2. Relating the problem to universities and UT.
3. Specific objectives within each policy.
 - A. An in-depth look at key suggested policy changes.
 - B. Case studies from other universities that have implemented similar policies.
 - C. Resources, including contacts at UT and other campuses.
4. End notes

Through research, several environmentally sound, cost saving initiatives were compiled from universities across the nation. These policies were then customized in order to make them more applicable to UT. Policy suggestions and resources were described in a manner that will allow future faculty, staff, and students to pursue their implementation. The results will be included in a comprehensive campus environmental audit that will be released by other students in the Fall of 1997. It will be presented to the Board of Trustees, campus administration, student government, professors in relevant departments, and Students Promoting Environmental Action in Knoxville.

Summary of Key Policy Recommendations

The following key recommendations have been taken from each of the eight chapters of the blueprint:

A University Environmental Policy

- Develop a university environmental policy by gathering input from all campus levels (students, faculty, and staff), then further define these commitments at the department level.
- Sponsor an annual university environmental award

Solid Waste and Recycling

- Hire a recycling and materials reduction coordinator for the university, reducing waste disposal costs for the university and increasing campus recycling. This position could be combined with the energy manager (see Energy).
- Place more bins on campus to make campus-wide recycling more accessible.
- Adopt waste reduction and recycling policies at the department level, such as double sided printing, electronic mail, and a campus waste exchange program.
- Implement a double sided printing policy in campus computer labs.
- Reduce waste in dining services by giving incoming freshmen a reusable mug and implementing the Eastman cup recycling program in campus cafeterias.
- Reduce paper waste on bulletin boards by using electronic systems and banning commercial advertisements in academic buildings.
- In residence halls, begin using floor by floor mini-recycling centers, donate used furniture and clothes to service organizations, and hold recycling competitions.

Radioactive and Hazardous Waste

- Reduce the use of hazardous chemicals by switching to microscale experiments, which achieve the same results with a fraction of the chemicals and waste.
- Use non-toxic substitutes for experiments.
- Establish a departmental “tax on chemicals” to create incentives for hazardous waste reduction at the department level.
- Educate the campus community on reducing drain disposal of chemicals.

Energy

- Hire an energy manager to coordinate campus energy efficiency. This position could be combined with the recycling and materials reduction coordinator (see Solid Waste and Recycling).
- Implement energy efficient lighting projects by retrofitting current lighting systems and signing on to the Environmental Protection Agency’s Green Lights Program.
- Improve efficiency in heating and cooling by establishing better temperature guidelines for campus buildings.
- In computer labs, purchase energy star computers and screen savers.

Purchasing Policy

- Develop an environmentally sound purchasing policy, or Green Procurement Policy, that includes a mission statement and basic standards for environmentally preferable products.
- Develop a strategy for the purchasing department in dealing with vendors to improve environmental product standards and options.
- Adopt the Green Procurement Policy at the department level.
- Track the policy by keeping records of products purchased with recycled content.
- Improve environmental purchasing and marketing at the bookstore.

Landscaping, Grounds Maintenance, and Campus Design

- Hire a landscape architect to oversee a coordinated campus landscaping strategy and teach student interns. This position could be combined with the traffic engineer/transportation supervisor (see Transportation).
- Utilize native plants in landscape design.
- Implement Integrated Pest Management as a strategy for pest control.
- Utilize students in the Ornamental Horticulture and Landscape Design (OHLN) program as landscaping interns.
- Involve the campus community through Adopt-A-Spot and tree plantings.
- Consider the impacts of construction and renovation by reviewing the impacts of proposed projects and utilizing environmentally sound construction materials.

Transportation

- Hire a traffic engineer/transportation supervisor to reduce automobile use and congestion on campus. This position could be combined with the landscape architect (see Landscaping).
- Support carpooling by setting up a ride share program for off campus students and give parking privileges to those who carpool. Encourage the use of mass transit.
- Ban cars on campus for freshmen.
- Push parking to the campus periphery by phasing out core parking lots.
- Increase bicycle use by increasing the number of bike lanes and bike racks.
- Build a Green Fleet of campus vehicles by purchasing fuel efficient vehicles, monitoring emissions, and handling oil and chemical wastes responsibly.

Education

- Create an environmental literacy requirement that students must fill in order to graduate, and monitor its effectiveness through an assessment.
- Establish continuity among undergraduate environmental majors through the creation of an environmental department or the publication of a guidebook.
- Improve existing environmental course offerings.
- Provide and support environmental internship opportunities, on and off campus.
- Support extra-curricular educational opportunities, such as Earth Week events.
- Conduct and follow-up a campus environmental audit.
- Improve environmental career opportunities within career services and career fairs, and by hosting a "Careers in the Environmental Field" panel.
- Establish a student environmental center.

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*This Blueprint is dedicated to the memory of
Drew Wilson.*

*May your dedication, energy, and activism
live on in the work of
generations of young activists*

- Mary Anne Peine & Jamie Pizzirusso
Spring, 1997

Introduction

The University of Tennessee-Knoxville is very much like a small city. It has governing bodies, workers, a newspaper, housing, infrastructure, roads, parks, and arenas. Along with these things come many of the same problems of a small city: budget cuts, traffic, lack of parking, inadequate planning, waste disposal, and maintenance difficulties. Many city planners are also beginning to address issues surrounding the natural environment. Sustainability has become a buzzword in planning circles as professionals strive to minimize the impact of cities on the environment. This blueprint proposes a strategy for UT to minimize its impact as well. We are not planning professionals, nor are we policy gurus, but we have relied on case studies and information from other universities that have implemented many of these recommendations in order to learn from their mistakes and benefit from their successful initiatives. We tried, whenever possible, to include peer institutions or state universities of a similar size to UT in our case studies. Many of the policy initiatives in the following case studies and examples are, therefore, extremely applicable to the University of Tennessee.

This Blueprint is designed to be a guide for decision makers throughout the campus and at the state level. It is presented in the following, easy to follow format: a basic discussion and explanation of the issue, the issue as it relates to UT, policy recommendations, case studies of success, and local contacts and networking opportunities. It is our hope that these resources will be approached so that they can give first hand knowledge and expertise in the implementation of these suggestions.

We decided to write this Blueprint for our Senior project because we wanted to leave something to this university that could be used to improve the campus environment and would survive changes in campus leadership. This practical guide will, hopefully, facilitate the implementation of our recommendations by decision makers. In times of fiscal crisis at the University, it is very easy for "environmental" issues to be put on the back burner and they are often the first to be cut when money is tight. However, we have focused much attention on ideas that are not only good for the environment, but are also good for the pocketbook.

We know our goals are lofty and much red tape will have to be cut in order to put some of our ideas in place. As such, we recognize the difficult task ahead for those who happen to pick up a copy of this guide. But remember:

*"No one made a greater mistake than he who did nothing
because he could only do a little."*

-Edmund Burke

A University Environmental Policy

Dr. David W. Orr, author and chair of the Environmental Studies Program at Oberlin College, describes our current environmental crisis as a "failure of education. The loss of species, topsoil, rainforests, and impending climate change are not primarily technological problems or even economic ones. They are first and foremost problems rooted in how we think about the world we inhabit."¹ However, universities are also places of incredible promise and potential. As a training ground for future leaders and the birthplace of research and innovation, our universities have the potential to lead the nation toward a cleaner, healthier, more responsible future. Universities have a vested interest in incorporating environmental policies into their day-to-day management, thus improving the quality of campus life, teaching students how to become environmentally responsible citizens, improving efficiency, and reducing costs.

A written university environmental policy is essential to any and all future environmental initiatives at a university. "When it is supported by senior administrators, written environmental policy can help ensure that commitment to ecology survives among competing priorities, limited funds, and perpetual turnover in campus leadership".²

The University of Tennessee

The University currently does not have a policy that outlines the University position on environmental issues. A university environmental policy would provide an institutional framework for motivated students and faculty members who have innovative ideas for creating a healthier campus environment. A written environmental policy would also ensure that the environmental commitment of the university will survive changes in faculty and student leadership.

¹ Smith 1993, p. ix.

² Keniry 1995, p. 190.

Policy Recommendations

A policy that articulates the environmental goals of the university will be a valuable tool for creating a more efficient, environmentally friendly university. Emphasis should be placed on incorporating as many stakeholders as possible in the development of the policy. The final policy will be most effective if it is representative of the entire university community and is supported by the administration.

I. Gather Broad-Based Input From Different Levels in Developing the Policy

Faculty, staff, administrators, and students should work together through a series of meetings to develop a university environmental policy. Much like the Commission for Blacks or Women, there should be a Commission for the Environment. The focus of these meetings should be coming to some sort of agreement on the specific components of the policy.

Participants should be asked to review drafts of the policy before presenting it to the President for approval. The policy should be approved by the President of the university, the Chancellor, Department Heads, the Faculty Senate, the Student Government Association, and the President of the Graduate Student Association.

II. Select Specific Principles to be Included in the Policy (see Appendices A-1, A-2, and A-3)

The policy itself should be general enough to allow for interpretation and application by individual staff and departments, yet specific enough to clearly articulate the environmental goals of the university. The policy should cover each of the following seven subject areas outlined in this blueprint. Establishing these administrative goals will provide faculty, staff, and students with a starting point for the pursuit of environmental initiatives on campus. The three examples that follow are environmental policies from the State University of New York at Buffalo (25,000 students), Tufts University, and Brevard Community College. The principles outlined in these policies suggest specific goals that can be articulated within the university policy. Development of the policy should start with the obvious strengths of the University of Tennessee and expand from there.

III. Further Define Environmental Commitments at the Departmental Level

Once a general environmental policy is established, its application and effectiveness will be left to the initiative of individual departments. The working group that created the policy should push to have policies adopted at departmental and division levels. Department heads should be presented with the option of signing onto the policy, expressing the commitment of their department to the provisions expressed therein. Departments should be encouraged to incorporate a statement of environmental commitment into their mission statements.

At Rutgers University, a provision in the university environmental mandate provided the institutional foundation for purchasing staff member Kevin Lyons to make the university purchasing policy more environmentally sound and cost-effective. The administration provided the framework and the individual department developed the details of the application, putting rhetoric into practice.

IV. Sponsor An Annual University Environmental Award

A University Environmental Award should be established to honor excellence in environmental teaching, research, activism, and commitment. These awards would be presented at the Chancellor's Honors Banquet in the spring to recognize one undergraduate or graduate student and one faculty, staff, or administrator who have made significant contributions to the university community through their commitment to the environment.

The recipient of the award would be selected by a panel that should include, but is not limited to: a member of the Student Government Association, a member of the Graduate Student Association, the Director of the Campus Beautification and Environment Committee (if the position is currently filled), a member of Students Promoting Environmental Action in Knoxville, a faculty senate member, and a faculty member from the Energy, Environment, and Resources Center.

Nominees would be judged based on environmental contributions made to the campus community, environmentally significant research projects, and/or involvement in regional environmental work. Special value would be placed on efforts that had led to environmental improvements at the University of Tennessee, Knoxville campus. The award would compliment the recent establishment of the Chair of Environmental Excellence, confirming the commitment of the university to working toward environmental solutions.

Case Study: Tufts University

Tufts University has made a strong environmental commitment campus-wide. One of the most successful results of the Tufts University environmental initiatives was the university's adoption of an environmental policy (see Appendix A-2 for the full policy). Members of the Tufts Cooperation, Learning, and Environmental Awareness Now! (CLEAN!) program brought together faculty, staff and administrators for several meetings. According to Sarah Creighton, coordinator of CLEAN!, the group made people feel invested in the program "by interviewing them - not just the people in power, but the people who clean floors and make sandwiches...We got managers' permission first. People were usually willing to talk with us if we said 'I talked with your boss and you were suggested.'" Participants drafted and reviewed components of the policy before finally presenting it to the president for approval. Although the CLEAN! program ended after five extremely successful years, the policy ensures that the university's commitment to environmental goals will provide an institutional framework and guidance for future student, faculty, and staff environmental leaders.³

Tufts University, Office of Environmental Programs
Curtis Hall
474 Boston Avenue
Medford, MA 02155
(617) 381-3486

Networking:

SUNY Buffalo
Office of the Senior Vice President for University Services
520 Capen Hall
Buffalo, NY 14260
(716) 645-2922 • Fax: (716) 645-2933
usvrjw@ubvms.cc.buffalo.edu
Ask for a copy of their environmentally related policies.

Brevard Community College
Attn: Public Relations
1519 Clear Lake Road
Cocoa, FL 32922
(407) 632-1111
General environmental policy, as well as award-winning energy conservation and efficiency programs.

³ Keniry 1995, pp. 190-2.

Solid Waste and Recycling

In 1989, the University of Colorado at Boulder cut its waste stream by recycling 625 tons of newspaper, glass, aluminum, office paper, cardboard, phone books, batteries, plastics, and yard waste; collecting 300 gallons of used motor oil; gathering 40 cubic yards of used clothing books and appliances; and donating 25 boxes of used text books to developing nations⁴

The United States has often been called a throw-away society for the amount of waste it produces and the way in which decision-makers and consumers deal with the problem. On a per capita basis, the U.S. generates more than twice as much solid waste as most of the other developed nations in the world.⁵ This comes out to about 50,000 pounds per person per year, or enough to fill every average size family's backyard with a pile of waste 28 feet high.⁶ While the vast majority of the solid waste produced in the United States is from mining and agriculture, municipal waste, the by-product of consumer consumption, "presents greater political and managerial problems and often has serious environmental impacts on land and water resources."⁷

In the U.S. approximately 73% of all municipal waste is landfilled, 14% incinerated, and 13% recycled.⁸ Incineration is the combustion of waste at high temperatures in order to reduce the volume of it. A by-product of this procedure is toxic fly ash which is usually baked into bricks and landfilled. While some incinerators produce energy from the waste heat, the environmental problems associated with them are numerous. The United States is quickly running out of accessible landfill space as well. In addition to the fact that siting landfills and incinerators is politically controversial, the price to ensure their environmental safety is often very high.

The vast majority of landfilled waste can be recycled. The approximate composition of landfills by weight is as follows: glass-7%, metals-8%, plastics-8%, yard and food waste-25%, and paper-38%.⁹

Universities and colleges have taken the lead in the last couple of years in promoting recycling. In 1994, it was determined that roughly 2700 two and four-year institutions (about 75%) had recycling programs. This is compared with only 50 schools in 1980.¹⁰ Cash-strapped colleges have looked to recycling and composting (biodegrading food scraps for fertilizer) as ways to reduce their tipping fees for waste hauling. At the University of Vermont, a cost/benefit study showed that a

⁴Blueprint 1995, p. 26.

⁵Council on Environmental Quality 1987, p. 421.

⁶Conservation Foundation 1985, p. 467.

⁷Smith 1992, p. 166.

⁸McKinney 1996, p. 540.

⁹McKinney 1996, pp. 540-545.

¹⁰Debell 1994, pp. 44-47.

composting program could save the university more than \$45,000 in just two years.¹¹

The University of Tennessee

The State of Tennessee has asked all state, county, and local government institutions, including the University of Tennessee-Knoxville, to reduce the waste they send to landfills by 25%. This is one goal that UT has already taken positive steps towards achieving. In 1992, the first on-campus recycling center was sited next to the Presidential Courtyard area because of concerns expressed by the Student Government Association. The center has bins for glass, newspaper, tin cans, and plastics. In the spring of 1996, a similar center was added next to Massey and Greve Halls to service the East side of Campus. In the spring of 1997, a third center was established in Fraternity Park which has the same bins as the others and a bin for aluminum cans.

In addition to the centers, cardboard boxes for collecting aluminum cans are supposed to be in every residence hall on every floor. Some residence halls have tried to implement floor-wide recycling by adding boxes for plastic, paper, and glass but these efforts have been met with minimal success. There are bins for white paper pick up in most of the computer centers as well as near library printers and scattered throughout campus buildings. Next to most *Daily Beacons* (campus newspaper) stands are small bins for recycling newsprint.

In Thompson Boling Arena (TBA) and Neyland Stadium, plastic cups are recycled. This program is handled by Eastman Chemical, which contracts with a local hauler to pick up the plastic for handling by Eastman. After sporting events, the cups are collected and placed in large bins. Eastman uses the plastic to produce things such as backpacks and park benches. While this helps the university reduce waste, it is also great public relations effort for Eastman.

UT has recently entered into an agreement with Waste Conversion Systems (WCS) to handle all of the recycling on campus. They will service the student centers and other bins on a no-fee basis and make their money off of selling the recovered materials. According to Gordon Brooks, recycling coordinator at the physical plant, between March 20th and mid-May, 1997, mixed paper pick up will begin to be implemented in the office buildings, with residence halls to follow sometime later. White paper will be picked up by itself. The newspaper bins will be converted to larger bins by April 15th with additional bins being placed around campus that are better looking than the older ones. By July, the WCS hopes to increase the cardboard recycling with several eight-yard dumpsters strategically located throughout campus. The Physical Plant will also be working with WCS and campus organizations to promote recycling and education for the students. Since WCS is doing all of the recycling on a no-fee contract, custodial services, which is

¹¹SEAC 1991, p. 12.

outsourced, has been gathering the recyclable materials for WCS even though this is not a part of their contract. The new contract, which will be awarded August 1st, will place a heavy emphasis on custodial services' involvement in the recycling effort. In addition, the Chancellor has convened a new recycling task force made up of students, faculty, and staff to suggest changes and evaluate the current recycling program.¹²

¹²Brooks, 1997.

Policy Recommendations

While there seems to be a genuine desire and commitment from University administrators to increase campus recycling, their talk needs to be turned into action. Recycling throughout the university needs to be more comprehensive and centralized in order to ensure the most efficient and effective program possible.

I. Develop an Overall Commitment to Waste Reduction and Recycling

A. Create a position that would be a recycling and waste-reduction coordinator for the university. The money for this position could come either from the activities fee or from savings realized by increased campus recycling. Some duties of this position are currently handled by Gordon Brooks at the physical plant and Roosevelt Allen at WCS, but these duties are in addition to their other ones. This should be a campus position in and of itself with funding by the university because neither Allen nor Brooks can handle all of the duties that this job might entail. Student volunteers working for academic credit could also help to identify and implement some of the ideas for this office. This office would work closely with Waste Conversions Systems to promote waste reduction and recycling throughout the campus and would most likely pay for itself many times over.

B. Adopt waste reduction as a goal in *Hilltopics*. A sample statement might be: "This university affirms that waste reduction and recycling are important not only to control costs but for the environment as well. As such, we will make every effort to reduce the campus waste stream and recycle what is left over."

C. Develop a comprehensive education program for students and staff about the recycling center locations as well as what can and can not be recycled. This program could be developed by WCS, SGA, and SPEAK. They should create flyers that could be placed in orientation packets as well as around campus. Presentations to faculty organizations and student groups such as SGA, residence halls, and Greek organizations should be offered as well.

II. Make Campus-Wide Recycling More Accessible

A. Place more boxes around campus for aluminum cans in locations that are easily accessible by students. These need to be within site of all vending units.

B. Place more bins throughout campus that can handle paper. Cut slits in the top of these bins in order to reduce the amount of trash that is thrown in them. Encourage mixed paper and white paper recycling at the end of each semester by adding more bins at this time in order to handle the influx of paper after exams.

III. Reduce Paper Waste on Bulletin Boards

- A. Encourage student groups and others to post only one flyer per bulletin board. Take down multiple copies and recycle them. This policy should be posted on all bulletin boards.
- B. Ban commercial advertisements in academic and department buildings (unless posted by departments) and residence halls. Restrict them to outdoor bulletin boards only. This would include ads for such items as credit cards, concerts, spring break vacations, and t-shirt companies. In-door bulletin boards would be limited to flyers from student organizations, departments, and campus events.
- C. Develop a Web site that can be used for posting messages by student groups. Encourage student groups to utilize the campus television network to post messages and to use the newly implemented monitor system in the University Center.

IV. Reduce Waste and Increase Recycling at the Departmental Level

- A. Encourage double sided printing for all departments and staff. All copying and printing requirements should be double-sided by default. Single-sided copying should be specifically requested.
- B. Reduce the number of telephone directories printed by sharing in departmental offices, allowing only one per person distribution for personal use, and reducing the number of pages through typographic means (see Appendix A-4).
- C. Encourage the use of electronic mail for internal communications whenever practical and possible (see Appendix A-5).
- D. Address lists for campus and outreach mailings should be carefully screened to reduce redundancies and should be updated periodically.
- E. Limit printing needs to the actual requirements for distribution in order to eliminate overruns.
- F. Place bulletins and brochures in a prominent location rather than distributing them to individuals.
- G. Encourage the use of reusable campus envelopes whenever it is necessary to communicate by hard copy (see Appendix A-5).
- H. Operate an on campus waste exchange program. This would be a program open to all faculty, staff, administrators, and student groups where they would bring reusable things that they no longer need (e.g. paper, pens, calculators, staples, and manila folders) and take things they do need for free. This would save money and time on ordering supplies and help reduce waste. This could be handled through a number of existing offices or through the office of Recycling and Waste-Reduction if it is created.

I. Encourage faculty to give and accept assignments on e-mail, disk form, or on re-used paper.

J. Reuse/remanufacture toner cartridges for copiers, fax machines, and laser printers.

K. Organize a network of local contacts in each building (or department) who will work to instill a sense of environmental responsibility through face-to-face contact modeled after the Building Conservation Contact Network at the University of Buffalo (Appendix A-7 - also see case study - SUNY Buffalo in the energy section).

L. Encourage the posting of many printed materials such as course catalogs on the internet to eliminate the need for extra copies.

M. Have janitorial services replace trash bag liners only when necessary. Otherwise, they should just remove the trash and leave the liner.

V. Reduce Waste and Increase Recycling in Computer Centers:

A. Encourage students to print on paper that has already been used on one side and placed in the recycling bins for non-important or first draft printing needs.

B. Post signs near all computer lab printers that encourage double sided printing and explain how to do it.

VI. Increase Recycling of the Daily Beacon

A. Assess the amount of Beacons that go unread by monitoring the paper at all sites and use the data gathered to minimize the number of excess copies printed. This could be implemented along with a push to encourage the sharing of papers which could be relayed to advertisers to avoid concerns about fewer papers being printed (see Appendix A-6).

VII. Reduce Waste and Increase Recycling in Dining Services

A. Give all in-coming Freshmen a mug that can be used in dining services facilities for a discount on drinks. This would reduce the number of cups that are used.

B. Compost food waste and/or give left over food to local shelters, missions, etc.

C. Incorporate the cup recycling at Neyland Stadium and TBA into the dining facilities. The infrastructure is there to implement this and a large part of the paper waste in dining services is from cups.

D. Only give disposable food ware to those that ask for it and offer reusables at all locations.

VIII. Reduce Waste at the Bookstore

A. Encourage the use of reusable cloth/net bags by selling them at the counter. Train cashiers to ask shoppers whether they need a bag if they do not have a reusable one. Establish a plastic bag return program at the University Bookstore in which there is a small deposit (such as \$.10) paid on plastic bags which students get back when they return them in good condition.

B. Reserve a space in the UC to place reusable packaging boxes for student use. This would be especially helpful at the end of the semester when students will be packing up their belongings to go home.

IX. Reduce Waste and Increase Recycling in the Residence Halls

A. Encourage the use of floor by floor mini-recycling centers in residence halls that can be emptied into larger bins by residence assistants or custodial services. These centers should have facilities for aluminum, glass, plastic, and mixed paper.

B. Encourage students leaving residence halls to donate furniture and clothes to local non-profit agencies by inviting them to the campus at the end of each semester and reserving space for their trucks or drop-off bins.

C. Have competitions between the residence halls to see who can recycle the most per capita (see Education section).

Case Study: University of Georgia-Athens

At UGA, students are not only active recycling participants, but they gather and sort the materials as well. In high rise residence halls, students drop their recyclables down a shoot where they are collected by students at the end of the day. These students are paid out of the activities fee to gather the recyclables and take them to the drop-off recycling centers around campus. In low-rise buildings where students have to take their own trash out, recycling bins are placed on the routes to the dumpsters so students can easily place recyclables in them along the way. Not only has this lowered costs, but it has also encouraged students to be more active recycling participants.¹³

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Case Study: University of Colorado-Boulder

After his graduation in 1984, Jack DeBell found funding for his own position as a recycling coordinator at the University of Colorado-Boulder and has since established what is arguably one of the most comprehensive recycling programs on any campus in the United States. The office, which is staffed by students and community service volunteers, collects recyclables from every campus building. The recycling program is so successful that DeBell estimates that over 60% of students and staff regularly participate in the effort.¹⁴

DeBell is a strong proponent of using students to aid in the recycling effort. In addition to the low-cost labor they provide (all student recycling employees are paid through the work study program), a prime reason for using students is public relations. DeBell feels that publicity for the program works best from within peer groups. Additionally, "The bottom-line reason for keeping students involved," says DeBell, "is that they are future leaders. . . It enhances their undergraduate academic experience. We call it service learning, task-based learning, applied research. Call it what you will. Students can learn the operations, management, and the education or promotion of recycling. . . and prepare themselves to be future leaders of this booming field."¹⁵

Students give presentations to staff, faculty, and other students about the recycling program at CU, as well. These student trainers are required to take a one-semester independent study course which, in addition to having many of the

¹³Ayoob, 1997.

¹⁴Smith et al. 1993, p. 5.

¹⁵Keniry 1995, p. 138.

requirements of a regular course, also requires that students volunteer four hours per week in the recycling office where they respond to inquiries from the public. Response was so strong to this program that DeBell had to institute a competitive selection process.

To facilitate easier collection of materials, CU put together a task force which decided to integrate its recycling program into its regular solid waste collection. Custodians worked with the task force to redesign the collection process. To save on labor costs, CU chose to collect recyclables one day a week and reduce waste collection from five days a week to four. They estimate that about 60% of their waste is diverted to recycling in comparison to the national average of 13%.¹⁶

Since the entire CU recycling program is run "in-house," CU students also pick-up the materials on one of three trucks and bring them to a warehouse for sorting. Here, students remove contaminants and DeBell oversees the marketing of the recovered materials instead of going through another company. DeBell is surprised by the number of universities that don't have direct contracts with buyers. Even in bad market situations, he says, "schools, colleges, and universities will still probably be the best source of recyclables for the buyer. If that buyer is buying any recyclables at all, they should be buying from colleges and universities. . . I am shocked at just how many schools don't realize they are sitting on a gold mine of high grade recyclables - not only a lot of aluminum cans, but tons of high grade white paper that makes it a really lucrative account for area buyers."¹⁷

Funds for the recycling program at CU come from four different sources: the students, the administration, avoided costs, and revenues from the sale of the materials. The student activities fee contributes \$50,000 to the program, but the bulk of the money comes from a half-million dollar loan that CU-Recycling lobbied the administration for and received. It is repaying this loan not from revenues (about \$35,000 per year) but from avoided costs (about \$60,000) for year that come from not having to pay to landfill the materials. "By repaying its loan through avoided costs, CU Recycling sets a precedent that can be applied not just to recycling, but to myriad other environmental initiatives, from energy efficiency to transportation management."¹⁸

Most recently DeBell has worked to incorporate recycling into the master plan by requiring provisions for recycling facilities in all new floor plans. He hopes to include more provisions for the purchase of recycled rubber and plastics in the master plan as well. In addition, future goals call for incorporating a household-hazardous-waste-reduction program, alternative chemical waste disposal, and increased recycled product procurement.¹⁹

¹⁶Keniry 1995, p. 141.

¹⁷Keniry 1995, p. 142.

¹⁸Keniry 1995, p. 144.

¹⁹Smith et al. 1993, p. 5.

University of Colorado, Boulder
Attn: Jack DeBell
Recycling Office
Campus Box 207
Boulder, CO 80309
(303) 492-8307

Local Contacts:

Gordon Brooks, UT-Physical Plant 974-5107
Roosevelt T. Allen, Waste Conversion Systems-Director of Recycling Services
470-2536
Athena Lee Bradley, Knox County Recycling Coordinator 215-2300

Networking:²⁰

Brown University
Attn: Kurt Teichert
Box 1941
Providence, RI 02912
(401) 863-7837

e-mail kurt_teichert@brown.edu

Teichert administers "Recyc-l," a discussion group on the internet meant especially for campus recycling coordinators. To subscribe to the "listserv" (an electronic correspondence group over e-mail) send the following message to:

LISTSERV@BROWNVN.BROWN.EDU

"subscribe RECYC-L 'your name'."

Vanderbilt University
Attn: Brenda Gilmore
Resource Conservation Advisory Committee
Nashville, TN 37235
(615) 343-6923

Coordinates office paper recycling and waste reduction in mail services.

²⁰Keniry 1995, pp. 153-157.

Radioactive and Hazardous Waste

Hazardous waste is defined as "wastes that are particularly dangerous or destructive; specifically characterized by one or more of the following: ignitable, corrosive, reactive, toxic."²¹ Congress has passed a number of laws to reduce the use of toxic materials and to regulate their disposal. These include: "the Toxic Substances Control Act (TOSCA), passed in 1976 to establish new requirements for identifying and monitoring toxic chemical hazards; the Comprehensive Environmental Response, Compensation, and Liabilities Act (or "Superfund"), first authorized in 1980, which increases corporate liability for environmental damage and for cleanup; the 1984 Hazardous and Solid Wastes Amendments to the Resource Conservation and Recovery Act (RCRA), which dramatically increase disposal and incineration costs; the Emergency Planning and Community -Right-to-Know Act of 1986, which for the first time gives citizens access to information on the hazardous chemicals stored, used, and released in their communities; and the Pollution Prevention Act of 1990, which encourages prevention of pollution at the source over recycling and disposal of hazardous waste."²²

Despite the vast number of complex laws regulating hazardous waste, it is estimated that 80-90% of hazardous waste is disposed of illegally or improperly. Roughly 60% of hazardous waste is injected into deep wells while 35% is held in surface ponds and 5% is landfilled.²³

Hazardous waste likely to be found on a college campus includes substances such as pesticides, paint, turpentine, and chemicals used in biology, zoology, chemistry, photography, and architecture. Radioactive waste is produced in biomedical classrooms, medical therapies, and energy and scientific research. Typically, lab wastes are packed in lab packs, large drums containing several small containers of wastes in an absorbent packing material, then landfilled or incinerated. Some wastes such as organic solvents and waste oil can be collected in bulk and either recycled or burned as supplemental fuel. Technology is also available for recovering silver salts from photochemicals.

Colleges have come to realize that hazardous waste disposal can no longer be ignored. Instead of dumping wastes down sinks or in 55 gallon drums in the ocean, Universities have been paying a hefty price for waste disposal in special landfills. As a result of this, efforts to minimize waste are not only good for the environment but can help cut costs.

²¹McKinney 1996, p. G-7.

²²Keniry 1995, p. 159.

²³Aeppel 1987, p. 20.

The University of Tennessee

As of now, a company called ENSCO has the contract to handle the hazardous waste at the University of Tennessee. The contract is bid every 4 years as a 1 year contract with optional 1 year extensions for 3 years before it has to be rebid. Last year, the University paid \$145,000 to dispose of its hazardous waste. The vast majority of this waste came from departments involved in research and from lab experiments. However, hazardous waste also comes from the Art department (painting, print making, and photography) and *The Daily Beacon* (the campus newspaper).

During the past few years the amount of hazardous waste produced at the University has stayed fairly steady. With budget cuts at the state level and at the Federal level in terms of research grants, it is projected that the amount of waste produced by departments will probably decrease because less research will be done. Costs are also projected to go down in the next bid because of competition.

Right now, there are few monetary incentives for departments to voluntarily reduce the amount of waste they create. The money to dispose of hazardous waste comes from a central account; the departments don't pay for their own disposal costs. While some conscientious professors have taken it upon themselves to do things such as eliminate solvent based scintillation processes, others don't seem to care. Billing each department for their waste has been discussed, but administrators are worried that if departments had to handle the costs of the waste they produce, they might find "creative" ways of dealing with it.

The Office of Environmental Health and Safety has put together a manual on hazardous waste and has encouraged waste minimization. However, there is only one employee, Chuck Payne, who in addition to his other duties, coordinates hazardous waste disposal. John Shanks, administrator of the office, feels that this one, part-time position is not enough to handle the needs of this office. For example, there is no way that this person could meet with every professor involved in research in order to encourage waste reduction. He also agrees that if a full time position were funded by the university, the savings from reduced disposal costs would probably cover the salary for an employee.²⁴

²⁴Schanks 1997.

Policy Recommendations

Specific steps need to be taken to ensure that hazardous wastes are reduced as much as possible and that those dealing with the wastes, from students to researchers, are aware of the laws governing their disposal and the implications they have on the environment. Too often, students are given a cursory "Don't wash the chemicals down the drain" speech that doesn't stress the importance of proper handling and disposal of these chemicals.

I. Reduce the Use of Hazardous Chemicals

A. Redesign the lab section of chemistry courses to reduce the amount of chemicals needed. Whenever possible, switch to microscale experiments (see case study: Bowdoin College). While glassware would need to be replaced making the initial cost expensive, the savings in the long run are well worth it.

B. Use non-toxic substitutes for experiments, such as biodegradable scintillation fluids instead of hazardous solvents such as toluene and benzene, whenever available.

Safer Substitution for Common Laboratory Chemicals

adapted by the University of Wisconsin-Madison²⁵

Hazardous Chemical	Safer Substitute	Used For
Acetamide	Stearic Acid	Freezing point depression
Benzene	Xylene or hexane	Many solvent uses
Benzoyl Peroxide	Lauryl Peroxide	Some polymer catalysts
Carbon Tetrachloride	Cyclohexane	Qualitative tests for halides
Formaldehyde	Ethanol	Specimen storage
Halogenated solvents	Non-halogenated solvents	Some extractions and other solvent uses
Sodium Dichromate	Sodium Hypochloride	Some oxidation reactions
Toluene-based Scintillation Cocktail	Non-ignitable Scintillation Cock.	Studies using radioactive materials

C. Establish a surplus chemical exchange program to collect hazardous materials from researchers that no longer need them and make them available to other users before they are discarded. This could be modeled after the successful program initiated at The University of Washington (see Campus Networking) and placed on the internet so various members of the University community could exchange chemicals across departmental lines.

²⁵Keniry 1995, p. 168.

D. Implement a program that educates students and staff working with hazardous materials about waste reduction, proper handling, and proper waste disposal procedures. This program should be given to every class that deals with chemicals that can't be placed in the regular campus waste stream.

E. As opposed to billing each department for the disposal of their waste, a "tax on chemicals" should be established that each department would have to pay each time they ordered a particular chemical. This would encourage them to reduce the amount of chemicals they buy and provide funds to dispose of them after they were used. It also gets around the problem of cash-strapped departments dumping hazardous waste down the drain so they wouldn't have to pay for disposal costs.

II Minimize Drain Disposal of Chemicals

A. Educate the campus community to minimize the drain disposal of chemicals and the use of toxic substances in automotive shops, research labs, the classroom, and janitorial services. Since janitorial services are outsourced at the University of Tennessee, the contract should include environmental specifications for cleaning agents (see Purchasing section).

B. Fleet vehicles should be regularly maintained in order to reduce the amounts of lost fluids and oil leaks. Used batteries, oil, and solvents should be recycled as well.

Case Study: Bowdoin College

In the late 1970's, several Chemistry professors and students began to be concerned about the antiquated ventilation systems at Bowdoin. The high cost of replacing these systems lead Professor Dana Mayo to examine the way in which they do experiments and how that impacts environmental quality in the labs. While examining experimental protocol, he discovered that standard chemistry books called for using roughly the same amounts of chemicals in experiments that were used during the turn of the century. Thus, he, with help from other professors and students, began to develop ways to significantly reduce the amount of chemicals necessary for experiments. These new methods used 100-1000 times less material than their counterparts.

They collaborated with Ace Glass Company in Vineland , New Jersey to develop new glassware for the experiments. "They had a local representative in our area," recalls Mayo, "and when he walked in, his eyes lit up...this guy was right on to it; he saw the potential.²⁶" Mayo began sending him designs which Ace would design and Fed Ex to him which helped Mayo and his students tremendously.

In the spring of 1981, an organic chemistry class started using these miniaturized replacements of standard chemistry experiments. This highly successful prototype proved that not only could these experiments improve air quality, but they could also improve lab safety, allow students to experience better results, and allow them to finish more quickly giving them time to repeat an experiment if necessary. "Instead of sitting around chewing the fat while something comes to boil," Mayo noticed, "they were working. Consequently, they learned the techniques much more quickly... they really learned the right way to handle stuff, and they were much more concentrated on what they were doing."²⁷

The use of hazardous substances dropped dramatically from 300-400 milliliters of solvents per student to 100 milliliters now being used for the entire class. Annual costs to run organic labs at Bowdoin fell from \$8,000 per year to \$1,000 mostly due to reduced disposal fees. The program, developed from a \$20,000 loan from the school, also saved \$280,000 which would have been necessary to replace the ventilation system in the labs.²⁸

The program has since been duplicated at University of Nebraska, Rice University, University of Washington, University of Michigan, UCLA, NYU, UNC, Duke, Arizona State and many others. Introductory organic labs at the University of Wisconsin at Madison generated 110 liters of waste in 1987, but only 14 liters in 1988, after only partial conversion to micro-procedures. The University of Minnesota converted only two freshman chemistry courses and saved \$35,000.²⁹

²⁶Keniry 1995, p. 162.

²⁷Keniry 1995, p. 162.

²⁸Keniry 1995, p. 163.

²⁹Keniry 1995, p. 164.

Bowdoin College
Department of Chemistry
Brunswick, ME 04011
(203) 725-3000

Case Study: University of Wisconsin, Madison

UW-Madison is the second largest nonmilitary licensee of radioactive materials in the country and they have developed a model radioactive waste management program. They instituted an Office of Radiation Safety which focuses on reducing the amount of hazardous substances used in research and encourages rigorous training, monitoring, and safety in the disposal of these materials.

In 1987, UW became the first radioactive research licensee to convert to biodegradable scintillation fluids instead of hazardous solvents, such as toluene and benzene. They also purchased a vial crusher which separates liquid from glass and plastic vials. These alternative liquids can be sewerer by law, thereby eliminating a hazardous waste stream and associated disposal costs. Switching to these safer fluids and processes has saved the university \$45,000 a year in disposal costs. Researchers were heavily involved in identifying these less toxic substances and have incentives to use them. If substances such as toluene are used when alternatives are available, then the department's research grant is required to cover disposal costs.

Careful separation of radioactive and solid waste has also resulted in significant volume reduction. For example, they have replaced disposable paper-work-area covers with washable stainless steel trays. While the university once generated 20,000 cubic feet of radioactive solid waste each year, they now ship only about 70 cubic feet, although the number of radioactive material orders has remained constant.³⁰

University of Wisconsin, Madison
Safety Department
317 N. Randall Ave.
Madison, WI 53715
(608) 262-8769

Local Contacts:

Professor Leland, painting-974-3215
Professor Lyons, print making-974-3202
Professor Lee, photography-974-9388
David Pratt, Biology Service Facility-974-4219
John Shanks, Administrator, Office of Environmental Health and Safety-974-

³⁰Smith et al. 1993, pp. 18-19.

Networking:³¹

University of Washington

Attn: Erin McKeown

Environmental Health and Safety

Hall Health Center, GS-05

Seattle, WA 98195

(206) 543-3351

e-mail: mstoxic@u.washington.edu

Coordinates a comprehensive computerized system of waste management at the university along with a fully integrated chemical inventory and Material Safety Data Sheets database. Also implemented a comprehensive surplus chemical exchange program.

National Pollution Prevention Center for Higher Education

University of Michigan, Dana Building

430 E. University

Ann Arbor, MI 48109

(313) 936-2195

Established by the EPA in October, 1991, to develop and disseminate pollution prevention curriculum modules to colleges and universities in a variety of disciplines.

³¹Keniry 1995, pp. 184-185.

Energy

*Since 1979, this country has gotten about four and a half times as much new energy from savings as from all net increases in energy supply put together. . . . You can now save twice as much electricity as you could five years ago at only a third the cost.*³²

- Amory Lovins, Rocky Mountain Institute

Energy makes life possible on this planet. All energy, except nuclear and geothermal, is derived from the sun either indirectly or directly.³³ "By using oil and coal to meet more than 80% of our energy needs, we have unnecessarily pitted energy against our environment."³⁴ The reliance on fossil fuels in this country has led to many serious environmental problems: acid rain, oil spills, global climate change, air pollution, and strip mining. This has also put us in a precarious position. Eventually, these fuels will run out and some form of transition will have to take place. However, we are doing very little to prepare for this transition. Renewable alternatives to fossil fuels such as solar, wind and biomass, however, have recently become cost-competitive and reached the efficiency levels of many of their carbon based counter parts.³⁵ It also is estimated that every dollar invested in efficiency and renewables produces about twice as many jobs as a dollar invested in fossil fuels or nuclear power.³⁶

Cleaner fuels, such as natural gas, have also been discovered that can be used for things such as transportation. In addition, many utilities generally recognize that it is cheaper to encourage demand-side management than build new power plants. Demand-side management includes the promotion of energy efficiency and conservation by giving consumers rebates and incentives to switch to things like energy efficient lighting.

Energy efficiency and conservation aren't just good for the environment, though. At Connecticut College, reducing room temperature by one degree Fahrenheit saved 20,000 gallons of fuel and \$8,000 annually.³⁷ At SUNY-Buffalo, a university in similar size to UT, an energy manager has instituted hundreds of energy efficiency projects which have resulted in savings of \$3 million a year.³⁸

³²Blueprint 1995, p. 29.

³³Smith 1992, p. 126.

³⁴Keniry 1995, p. 59.

³⁵McKinney 1996, p. 227.

³⁶Lent 1992, p. 1.

³⁷Blueprint 1995, p. 29.

³⁸Smith et al. 1993, p. 51.

The University of Tennessee

Electricity comes from the Tennessee Valley Authority to a substation on campus to provide UT with its energy needs. The energy is metered there and distributed to most of the other buildings on campus. There are very few individual meters on campus buildings. Those buildings that do have their own meters are residence halls, dining services buildings, and some of the newer buildings on campus. These circumstances make it difficult to determine which university buildings are the most inefficient.

The university produces energy from four boilers on the main campus: three burn coal only and the fourth can burn coal or natural gas. The coal boilers are each approximately thirty years old and the fourth has been in operation for less than a year. The boiler system produces steam which is used in various ways throughout campus.³⁹

While several of the newly built and renovated buildings at UT have added energy efficient devices such as lighting and reflectors, the vast majority of the campus is highly inefficient when it comes to energy use. The classrooms are often kept at temperature extremes causing professors to open the windows in the dead of winter and summer; lights are left on in empty campus buildings over the weekends; and computers are left running without energy saving devices that put the computers in "sleep mode."

The current budget crisis that UT is facing is aggravated by increased energy costs from new facilities and increased computer use. While some buildings have experimented with energy efficient technologies and saved a little money, these spot-job projects at UT are few and far between and lack measures to determine how successful they have been. Unfortunately, if UT did invest a large capital expenditure into energy efficiency measures to save money in the long run, the state would just give the University less money in the future. Therefore, any substantial policies for energy efficiency are going to have to be worked out with the state government. However, State Senator Bud Gilbert and other members of the legislature have been approached about this subject and seem very willing to work out a deal that would be beneficial to both the state and UT. Alternatives might include the state footing the bill for energy efficiency projects or, if UT pays for them, to allow UT to keep a large percentage of the savings to pay off their investment and encourage future savings.

³⁹Baucom 1997.

Policy Recommendations

Energy efficiency is one of the most effective ways that UT can make a difference in terms of overall environmental impact and its also one of the easiest ways to save money. As utility costs sky rocket, this is truly a textbook example of a win-win situation for the university and the environment.

I. Develop an Overall Commitment to Energy Efficiency

A. Create a position for an energy manager who initiates and coordinates efforts throughout the university to promote energy efficiency. This position could be in the physical plant or it could even be a graduate student with a background in environmental studies or engineering. This person would work with departments and the administration to identify and quantify potential savings from energy efficiency and conservation. The energy manager would then develop plans for their implementation. The money for this position could come from general revenues, as the position would more than pay for itself - or the money could come from the student activities fee.

B. Encourage students to perform solutions-oriented research on campus energy use for academic credit (this could be in conjunction with the energy manager position).

C. Adopt energy efficiency as a goal in *Hilltopics*. A sample statement might be: "This university affirms that energy efficiency and conservation are important not only to control costs but to the environment, as well. As such, we will make every effort to save energy throughout the campus."

II. Encourage Energy Efficiency in Lighting

A. Retrofit lights with more efficient compact flourescents, reflectors, and ballasts. Use motion or heat sensors in areas that aren't always occupied such as bathrooms and offices. Put LED lights in exit signs.

B. Sign on to the EPA's voluntary private/public partnership: Green Lights. EPA provides help and support with implementing energy efficiency on campuses. Over 1500 colleges and universities have already signed on to this program.

C. Place "please turn off the lights" stickers by switches.

III. Encourage Energy Efficiency in Heating/Cooling

A. Establish better guidelines, which are based on comfort and energy costs, for the temperature of classroom and office buildings (see Appendix A-8).

- B.** Develop a computerized energy management system to regulate heating and cooling and maintain constant temperature.
- C.** Examine windows and other places of air escape for proper insulation and thermal leaks. Encourage the use of weather-stripping and efficient window panes.
- D.** Plant trees strategically to improve the natural cooling of buildings in summer and provide wind breaks in winter.
- E.** Upgrade the boilers to use the most energy efficient technology. Discontinue the burning of coal and focus on renewable energy sources.

IV. Encourage Energy Efficiency in Computers

- A.** Encourage the use and purchase of "energy star" computers (as designated by the EPA), which are the most efficient.
- B.** Turn off computers when they will be idle for long periods of time and purchase screen savers, which reduce the energy use when they are used intermittently.

SUNY Buffalo (UB) is the largest of the four SUNY university centers. There is an enrollment of 25,000 students with 8,532 at the graduate and post baccalaureate professional level.⁴⁰ In the early 1980's, energy office Walter Simpson and biophysics professor Fred Snell determined that the university produced 313,900 tons of CO₂ emissions each year and that electricity accounted for 71% of the school's annual carbon emissions. They then made a detailed report that involved suggestions to reduce the campus' energy use. These recommendations included such things as an "accelerated campus-wide energy efficiency program, with particular emphasis on new building design and construction; conversion to natural gas wherever possible; increased faculty research in the areas of energy efficiency and renewable energy sources; cutting less grass on campus lawns and planting more trees; and increasing awareness about global warming both on campus and in the surrounding communities."⁴¹

In 1982, the university launched a comprehensive energy efficiency program that has saved the university \$3 million a year. In the past decade, more than 100 lighting, heating, and cooling projects have been implemented. UB also posts information about the annual energy cost of each building in the entry vestibule. With the help of UB's recycling coordinator and student assistants, Simpson uses a team of volunteer "building conservation contacts." They do things like "disseminate information about university environmental policies, monitor participation levels, and act as liaisons to UB's conservation programs and its environmental task force."⁴² The departments they contact are given an environmental check list that, in addition to providing information about energy, covers solid waste, hazardous waste, water, purchasing, and transportation. It includes recommendations like turning off lights and office equipment, including computers; maintaining certain heating and cooling temperatures; and reporting rooms and buildings that are overheated and undercooled. Contacts are also asked to point out other areas in need of conservation programs.⁴³

In the future, UB plans on doing more projects, such as renovating the fume-hood exhaust systems, to dramatically increase savings and reduce even more CO₂ emissions.⁴⁴

Conserve UB
SUNY Buffalo, Physical Facilities
120 John Beane Center
Amherst, NY 14260
(716) 636-3636

⁴⁰Barrett et al. 1995, p.4.

⁴¹Smith et al. 1993, p. 51.

⁴²Keniry 1995, p. 71.

⁴³Keniry 1995, p. 71.

⁴⁴Smith et al. 1993, p. 31.

Local Contacts:

Eli Fly, Physical Plant-974-5107

Networking:⁴⁵

Sonoma State University

Attn: Rocky Rohwedder

Energy Center

1801 East Cotati Avenue

Rohnert Park, CA 94928

(707) 664-2577

e-mail: energy.center@sonoma.edu

Energy management and renewable energy education, professional training, consulting and information referral, demonstration projects and research.

Green Lights

U.S. Environmental Protection Agency

401 M Street, S.W.

Washington, D.C. 20460

(202) 775-6650

Energy Efficiency and Renewable Energy Clearinghouse (EREC)

P.O. Box 3048

Merrifield, VA 22116

1-800-363-3732

e-mail: energyinfo@delphi.com

[Http://www.eren.doe.gov](http://www.eren.doe.gov)

Central source of free information and technical assistance on energy efficiency for renewable energy.

⁴⁵Keniry 1995, p. 82-83.

Purchasing Policy

A campus that purchases 75 tons (or about 6,000 cases) of 100% post-consumer toilet tissue uses 525,000 fewer gallons of water; 225 fewer cubic yards of landfill space;; 307,500 fewer kilowatts of energy, 1,275 fewer trees; and is responsible for the release of 4,500 fewer pounds of air pollutants than a campus that purchases the same quantity of virgin toilet paper.

Students Working for a Sustainable Future, Cool It!, 1992-93

Recycling is often described as a loop. In the long term, recycling cannot be successful unless there is a strong demand for recycled products. Known as *closing the loop*, the importance of purchasing recycled materials has become increasingly obvious. Universities have enormous economic power as consumers of goods and services. In 1992-93, colleges and universities spent \$186 billion for goods and services. College bookstore sales reached \$6.5 billion in the same year.⁴⁶ This volume of economic activity gives universities a tremendous amount of leverage over campus suppliers and vendors. Because most goods and services enter the campus system through purchasing, "this gateway is also one of the best sites for environmental innovation".⁴⁷

Environmentally sound purchasing policies can often save universities money. The University of Illinois found that some recycled paper products (including paper towels, toilet and facial tissue, kitchen wipes, table covers, and computer paper) were 10% cheaper than non-recycled products.⁴⁸ Rutgers saved \$18,000 a year by switching from virgin petroleum-based garbage bags to recycled bags.⁴⁹ At the University of Arizona, converting a single introductory chemistry course to microscale (see Radioactive and Hazardous Waste chapter) has helped the university eliminate 3,600 gallons of hazardous waste and save over \$12,000 in disposal costs.⁵⁰

The potential for an environmentally sound purchasing policy extends far beyond simply buying recycled paper products and garbage bags. Recycled construction materials are available, including ceiling tiles, wall boards, insulation, plastic lumber, roofing products, decks, and parking bumpers. Campus labs are an important target for improved purchasing policies, with significant potential for reducing environmental and economic costs by switching to microscale experiments. University bookstores provide an excellent opportunity to educate students about becoming responsible consumers through environmentally sound purchasing and merchandising. University newspapers can be printed on recycled newsprint with soy-based inks. Environmentally sound janitorial supplies are

⁴⁶ Keniry 1995, p. 5.

⁴⁷ Keniry 1995, p. 3.

⁴⁸ Smith et al. 1993, pp. 60-61.

⁴⁹ Keniry 1995, p. 10.

⁵⁰ Blueprint 1995, p. 6.

available. Universities have only scratched the surface of developing environmentally responsible purchasing policies that save money and conserve natural resources. The benefits of an environmentally sound procurement policy are far reaching and significant, as indicated by the following example.

The University of Tennessee

The University of Tennessee Purchasing office is responsible for all purchasing on the University of Tennessee, Knoxville campus except for major construction. Purchasing responsibilities include campus purchases, hospital purchases for the University of Tennessee Medical complex, state-wide agricultural extension offices, ten agricultural experimental stations, and state 4-H camps.

These policy recommendations will focus on the Knoxville campus. Within the campus, individual departments evaluate their own purchasing needs. Purchases of up to \$1000 are left to the discretion of individual departments, unless the University is already under contract with a specific supplier. Purchases over \$1000 must be submitted by individual departments for approval by the purchasing department. The formal bid limit is \$5000. Purchases above that amount must be handled directly through the Purchasing department. Janitorial services have been outsourced to Southeast Services, so the University no longer handles the purchase of janitorial supplies.⁵¹

The current purchasing policy at the University of Tennessee contains no specific environmental provisions or recommendations.⁵² However, some individual departments, such as Graphic Arts, which produces University literature, letterheads, and other materials, voluntarily purchase recycled materials if they are available and cost-effective.⁵³

⁵¹ Wade 1997.

⁵² Wade 1997.

⁵³ Williford 1997.

Policy Recommendations

Assuming that individual departments will "do the right thing" and buy environmentally sound products is not enough. The University of Tennessee should make a serious commitment to the specific goals and strategies of an environmentally sound procurement policy. The development and implementation of this policy involve several steps.

I. Adopt an environmental procurement mission statement

A. The **strategic objectives** of an environmentally sound procurement policy must first be established. The following statement is an example:

As a part of our commitment to participating in the long-term shift toward the more sustainable management of this university, the University of Tennessee commits to purchasing and operating procedures that favor products, services, and methods that:

- use fewer natural resources, including energy;
- generate less waste that requires disposal, or special precautions to prevent environmental harm; and
- use fewer toxic materials, thus reducing damage to the environment.⁵⁴

B. A **mission statement** that defines the basic guiding principles of the policy must then be drafted. The development of a practical, effective, environmentally sound procurement policy is a complex process. The more specific means of carrying out these goals will follow (see Appendix A-9).

C. Specific and measurable goals, called **green performance procurement yardsticks**, should be set. These goals should be communicated to vendors and the campus community. They should be formulated based on the current purchasing policy, the feasibility of adopting new policies, and environmental goals. This will provide a concrete means of measuring progress made, to avoid the pitfall of merely paying lip service to environmental goals. These goals will be more effective if stated as percentages, rather than numerical targets. For example: "Ninety percent of all paper purchased (by value or weight) after December 2000 will contain at least 50% recovered paper, including 10% post-consumer waste, or be totally chlorine-free."⁵⁵

II. Establish basic standards for environmentally preferable products

A. Given the overwhelming number of confusing terms related to recycled products, such as "post-consumer," "recyclable," "organic," "biodegradable," "chlorine-free," and "soy-based", it is difficult for purchasers to keep up with new

⁵⁴ Green Seal 1994, p. 6.

⁵⁵ Green Seal 1994, p. 6.

technologies and determine which products are truly environmentally friendly. Green Seal is a nonprofit organization dedicated to helping people and institutions buy products and services that are less damaging to the environment. They have developed the following minimum standards for several products.⁵⁶

- **Printing and writing paper** - minimum 50% recovered material and 10% post-consumer waste, or 25% post-consumer material in the absence of other recovered material
- **Newsprint/Daily Beacon** - minimum 40% recovered material with a minimum of 25% recycled newspapers
- **Tissue products** - minimum 100% recovered material including at least 20% post-consumer waste since tissue products cannot be recycled after use
- **Paper towels and napkins** - minimum 100% recovered material, including 40% post-consumer content
- **Toner cartridges** - purchase toner cartridges for copy machines and computer printers that have been remanufactured from used toner cartridges

Other products for which environmental standards should be established include:

- **Garbage bags** - purchase garbage bags made of recycled plastic
- **Food** - two characteristics are important in the purchase of food: where it is grown and whether or not it is organic. Locally grown food is more environmentally sound because less fuel and energy are required to preserve and transport the food, and it supports the regional economy. Organic food is free of pesticides and other chemicals that are potentially harmful to human health and the environment.
- **Copiers** - in Hodges Library, phase in environmentally friendly copiers that are compatible with recycled paper. As old copiers need to be retired, replace them with environmentally improved copiers that are stocked with recycled paper and will make double-sided copies .

B. When establishing basic standards for products, it is important to consider the true cost of the product. Most UT purchasing policies focus only on the initial cost of a product. However, the real price of an item is not just the initial cost but also the cost of installing, maintaining, operating, replacing, and disposing of the product and its by-products, which include packaging and chemical wastes. This is known as the life cycle cost of the product.

III. Specify strategies for the purchasing department in dealing with vendors

A commitment to environmental goals and specific standards should be discussed with all vendors. The following steps, suggested by Green Seal, are effective in working with vendors toward these goals.⁵⁷

⁵⁶ Green Seal 1994, pp. 21-25.

⁵⁷ Green Seal 1994, p. 11.

A. Publicize the new standards to vendors and discuss environmental products with them.

- Give a copy of the Green Procurement Policy to all vendors, and discuss specific goals and targets of the policy with them.
- Broadcast the requirement for "green" products as widely as possible to get the best possible vendor list. Make sure that vendors of green products are on purchasing department lists. Work with purchasing departments in other colleges and universities to foster cooperation on "green" procurement.
- Discuss with vendors the issue of life cycle costs and ask them to provide more detailed estimates of the true cost of their products.

B. Construct decision frameworks within the purchasing department that make environmentally sensitive decision-making easier for the purchasing staff.

- Construct product decision frameworks to favor products that use minimal packaging and maximize use of recycled materials in packaging. Specify that vendors take back excess packaging, which they will then either dispose of or recycle. This lowers waste and disposal costs for UT and encourages vendors to reduce and recycle packaging. Excessive packaging represents significant waste disposal costs which UT is responsible for but which are never factored into the price of the product.
- Consider constructing decision frameworks to favor companies that will take back goods that have reached the end of their useful lives. This helps vendors understand the seriousness of the waste issue at UT.
- When applicable, specify products that can be easily and efficiently repaired.

IV. Communicate the environmental commitment to individual departments

Since individual departments make their own purchasing decisions for purchases under \$5000 (although purchases between \$1000 and \$5000 must be approved by the purchasing department), a commitment to environmentally sound procurement must become a part of departmental purchasing decisions as well. Every university department should be required to meet university-wide purchasing standards. Departments can be brought into the loop through the following steps:

A. Write a letter to all staff involved with purchasing in each department, outlining the importance of environmental considerations when making purchasing decisions and offering the further assistance of the purchasing department in selecting environmentally friendly vendors and products.

B. Provide each department with the information necessary to make environmentally sound purchasing decisions. Each department should receive a copy of the Green Procurement Policy and a copy of the minimum standards for environmentally sound products.

V. Track the progress of the Green Procurement Policy (see Appendix A-10)

By compiling data on the purchase of environmentally sound products, the progress and success of the policy can be assessed and reviewed each year. Appendix A-5 includes Recycling Report from the University of Illinois at Urbana-Champaign, which provides an excellent framework for tracking this information. For each item, the data base should specify:

- Total purchases: cost
- Portion of total purchase having recycled content: cost and percentage
- Price differential of recycled compared to non-recycled product: percent change
- Comments

Regular reports on the progress of purchasing efforts should be made each semester. The reports should be distributed to state purchasing departments and national organizations who compile purchasing information. This type of report can be implemented even before the adoption of a Green Procurement Policy, in order to track the University's environmental purchasing record.

VI. Integrate environmental priorities into bookstore purchasing and marketing

Many students learn to be consumers on their own for the first time at their university. The University should use purchasing department guidelines in stocking the shelves with environmentally friendly versions of as many products as possible. The bookstore should obtain environmental information and displays from environmental companies such as Earthbound/Top Flight, Inc. and non-profit organizations like Green Seal. This information should be displayed and provided to students in order to educate them about the environmental impacts of their decisions as consumers.

Case Study: University of Illinois at Urbana-Champaign

The University of Illinois at Urbana-Champaign, a school of 50,000 students, purchases approximately \$2 million worth of goods with recycled content per year.⁵⁸ In 1996, 43% of paper and paper products purchased by the university had recycled content. For computer paper alone, 72% had recycled content. The policy mainly addresses paper purchases. However, it is expanding to include such materials as microfiche, floor pads, plastic containers, tires, washroom partitions, plastic lockers, and mattresses. Purchases of recycled products other than paper were at 46% in 1996 (see Appendices A-9 and A-10).

Costs are considered on a product-by-product basis. While some recycled products cost up to 20% more than the virgin equivalent, many recycled products actually save the university a significant amount of money. Computer paper, toilet tissue, paper towels, wipes, napkins, and facial tissue with recycled content cost up to 24% less than their non-recycled counterparts. See Appendix A-5 for a further breakdown of university purchasing, including the differences in cost for various products.⁵⁹

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Case Study: Rutgers University

The purchasing policy at Rutgers University has saved money while reducing the university's environmental impact. Kevin Lyons, a buyer in the Rutgers Purchasing Department, has been largely responsible for what has become one of the most aggressive, effective environmental purchasing initiatives in the nation. Lyons began developing the purchasing initiative in 1988, partly due to a New Jersey mandate to divert 60 percent of the waste stream by 1995. The overall university environmental mandate also specified a commitment to environmentally sound purchasing, providing the necessary institutional backing that was the impetus for the entire process.

When Lyons began the initiative, he was breaking new ground. Hours of staff and student volunteer time were dedicated to researching suppliers, surveying department needs, and testing and evaluating various products before developing university purchasing standards - and this was just for paper. Lyons then visited

⁵⁸ Hoss 1997.

⁵⁹ Skinner 1996.

with individual vendors to discuss this environmental commitment. Lyons sends extensive mailings to contractors, encouraging them to promote "environmentally sensitive packaging, return packaging, and recycled content parts or products." Lyons researches the entire life-cycle cost of products, including disposal costs and replacement costs, providing a true picture of costs to the university.

The program has been extremely successful in several specific areas, including packaging. Rutgers returns packaging materials to suppliers that make frequent, large deliveries, reducing university waste disposal costs and encouraging vendors to reduce and reuse packaging. Vendors are required to submit a "packaging and shipping materials reuse and reduction plan" and outline any costs to the university.⁶⁰ The policy has resulted in suppliers recycling approximately 25 products. Rutgers has incorporated significant amounts of recycled materials into construction projects, especially road and parking lot repaving contracts.

Lyons emphasizes that purchasing policies and contracts with vendors must be specific. While all policies are suggestions, nothing will be done if environmental goals are only "encouraged". He uses policy evaluation criteria sheets to determine whether policies have been effective and how to improve them.⁶¹

Kevin Lyons, Rutgers University Purchasing
(609) 225-6140

Local Contacts:

Jerry Wade, UT Purchasing Department - 974 -

Networking:⁶²

University of Michigan
Attn: Purchasing Department
Ann Arbor, MI 48104
(313) 763-9897

<http://www.umich.edu/~purch>

Supported students in development and circulation of a memorandum encouraging purchase of non-chlorine bleached, post-consumer paper products.

⁶⁰ Keniry 1995, p. 6-10.

⁶¹ Lyons 1997.

⁶² Keniry 1995, pp. 21-23.

Vanderbilt University
Attn: Brenda Gilmore
General Services
Nashville, TN 37235
(615)343-6923

*Requires that suppliers identify environmentally sound products in catalogs.
Purchasing has put together a sublist of environmental items to assist purchasing decisions.*

University of Oregon Bookstore
Attn: Jim Williams
PO Box 3176
895 East 13th Avenue
Eugene, OR 97403
(503) 346-4331

The bookstore pursues source reduction of waste and environmental merchandising; also contact the print shop for information on tree-free papers and vegetable based inks.

Green Seal
1730 Rhode Island Ave, N.W.
Suite 1050
Washington, D.C. 20036-3101
(202) 331-7337

Offers an extremely helpful Campus Green Buying Guide, as well as information packets on environmental standards developed for over 22 product categories that can be used in purchasing decisions.

Landscaping, Grounds Maintenance, and Campus Design

Although they are often neglected by administrators, campus landscaping, grounds maintenance, and campus design are some of the most highly visible characteristics of a university. Carefully developed, comprehensive landscaping strategies create the beauty and 'collegiate' feel that draw students to a university. Conversely, universities with a half-hearted, piece-meal approach to campus landscaping are often described as 'ugly' by their own students, faculty, and administrators. In addition to their importance as a recruitment tool and their significance to the campus community, landscaping and design also have significant environmental impacts.

University landscaping and grounds maintenance typically require large amounts of fertilizers, pesticides, and water. While aesthetic standards are met by this 'golf course' management strategy, water and soil quality are negatively affected and the environment created is often inhospitable to birds and other wildlife⁶³. University landscaping also often utilizes plants that are not native to the area and, therefore, often require a high level of maintenance, pesticides, fertilizers, and water. These landscapes do little to reflect the natural history and character that define the area and make it unique.⁶⁴

Pesticides pose several risks to human and non-human health. Research during the second half of the 20th century has documented that many pesticides remain in the environment for years and even decades. These chemicals enter the food chain and build up in the tissues of larger animals, a process known as bioaccumulation. "Among humans, cancer is one of the best known and most feared effects from pesticides, but damage to the other major organ systems - heart, lungs kidney, liver, and central nervous system - is also common. Children are thought to be especially at risk." Some pesticides are less dangerous than others. Biodegradable pesticides, which break down after a few days, are used during a specific time during the life cycle of the pest.⁶⁵

Pesticides have also intensified some of the problems that they were originally intended to solve. Less than 1% of the sprayed pesticide actually reaches pests. The rest is dissipated into the environment, polluting soil, surface water, and groundwater.⁶⁶ Some insects and other pests have become resistant to over-used pesticides, developing tougher, more resistant strains of pests. Some plants have lost their natural resistance to pests due to the use of pesticides. Pesticides often kill beneficial insects as well as harmful pests, throwing the ecosystem out of balance

⁶³ Keniry 1995, p. 25.

⁶⁴ Keniry, 1995, p. 25

⁶⁵ Franck and Brownstone 1992, pp. 239-240.

⁶⁶ McKinney and Scoch 1996, p. 424.

and creating an opportunity for even more pests to attack. All of these factors lead to "the use of ever more pesticides to achieve the same effect".⁶⁷

The large scale, cumulative environmental impacts of poorly planned campus design include traffic problems, air pollution, noise pollution, soil erosion, habitat destruction, and climate change. Designing with the environment in mind is one of the best ways to mitigate the environmental impact of new construction.

Universities have much to gain by implementing more sustainable landscaping and campus design practices. Reducing the use of pesticides and utilizing native plants ultimately benefits the campus environment and public health, and requires less intensive maintenance by groundskeepers. The careful development of a healthy, natural, native ecosystem on campus grounds provides the campus community with a stronger sense of place. It also creates meaningful learning and research opportunities for students and faculty involved in ornamental horticulture and landscape design (OHL), environmental science, botany, and other natural science and agriculture programs.

Environmentally sound campus design strategies create a healthier, more beautiful campus community. A well designed campus serves as a powerful recruitment tool, leaving a memorable impression prospective students. The development, implementation, and maintenance of a thoughtful, innovative campus design strategy provides learning and research opportunities for students and faculty involved in planning and OHL.

As a center of research and innovation, the University is an excellent place to explore the benefits of more sustainable landscaping techniques. These techniques can be demonstrated on campus, providing an opportunity for students to put theory into practice in creating a healthier campus environment.

The University of Tennessee

Landscaping at the University of Tennessee falls under the domain of the Physical Plant. The grounds maintenance division does not have any professionally trained landscape architects or horticulturists on staff. The division is headed by a general superintendent. Two supervisors report to the superintendent, and they are responsible for several foremen. In total, there are 30-35 Physical Plant employees in the grounds maintenance division.

A master plan for campus design has been developed by the university, to increase "green space" and create a pedestrian campus. The creation of a "greenway" on Andy Holt Avenue, between Hodges Library and the Humanities building, is one of the first steps of the implementation of this plan. However, the administration has not moved to fund the plan, so further implementation is questionable. Some

⁶⁷ Franck and Brownstone 1992, pp. 239-240.

areas of campus, such as the Humanities/Clarence Brown Theater area, have individual landscaping plans. When new buildings are built, they are sometimes accompanied by landscape design plans. However, if the contractor runs out of money and cannot develop and/or implement a landscape design strategy, the responsibility falls to the physical plant.

In the selection of plants for campus landscaping, the Physical Plant incorporates input from a number of sources, including the botany department and OHLD. There is no specific priority to utilize native plants. Plant selection considerations include the resistance of the plant to disease. Pest control is supervised by employees with technical training who have been licensed by the state. Except in the case of termites, chemicals are not used preventatively, but are used to eliminate a pest after the problem has occurred.⁶⁸

⁶⁸ Sharell 1997.

Policy Recommendations

Several environmentally sound landscaping strategies in use at other universities are applicable to grounds maintenance at the University of Tennessee. The implementation of these cutting-edge practices could become a learning experience and a research opportunity for students.

I. Implement a Comprehensive Plan for University Landscape Design

The most significant obstacle to creating a more environmentally sound landscaping strategy at the University is the lack of continuity within the grounds management strategy. This is largely due to the fact that there is not a landscape architect, or even a horticulturist, on staff to supervise maintenance of university grounds.

A masters student in OHLD completed a comprehensive study of UT landscaping and grounds maintenance for an unpublished masters thesis. Based on his extensive research into the effectiveness of university landscape management, he made several well-founded recommendations to improve the current infrastructure:

A. There should be a **landscape division** that has the power to implement policies. The grounds maintenance staff should be dedicated only to grounds development and management and should receive periodic training and reeducation courses.

B. The University grounds should be considered an **arboretum and plant repository** so that an active program of increasing diversity can begin. University greenhouses should work with grounds maintenance in providing plants, especially natives, for university landscaping.

C. The division should be headed by a **trained landscape architect**. This professional would oversee landscape planning and work to develop a more comprehensive landscape design strategy. This division should actively work with interns as well as seeing to the teaching and research needs of all relevant departments.⁶⁹

None of the following suggestions will be possible without infrastructure changes at the university. It will be very difficult to facilitate implementation of environmentally sound landscaping practices or utilize the expertise of student interns and professors in the OHLD department unless these efforts are coordinated by a trained landscape architect which could easily be someone from OHLD.

II. Utilize Native Plants in Landscape Design

⁶⁹Russell 1992, p. 122.

Utilizing native plants in landscape design is critical to improving the campus landscape and provides several benefits to the campus community. Native plants often require much less care and maintenance than exotics because they are adapted to the regional climate and are often less susceptible to disease.

In addition to these practical benefits, native plants create a campus environment that provides students and faculty with a sense of the natural history of the area. Landscaped with native plants, the campus becomes an outdoor classroom, reflecting the character and beauty of the region. A more regionally appropriate landscape could be used as a teaching tool by professors of botany, biology, and OHLD in exploring the regional dynamics of native biodiversity.

Dr. Sam Rogers, a professor in OHLD, emphasizes the importance of the use of native plants:

"Utilization of native plant communities could add to the connectivity of the region. This would create a sense of place. This is not the only valid ecological approach, but it should be a large component. Education and teaching are also factors, as are environmental concerns such as slope stabilization. Tree cover should be primarily looked at as native. Sassafras should be used because of its orange fall color... perhaps the athletic department could sponsor such plantings. Natives are tough and useful. If we can have use of native plants as a goal, and an educational tool for demonstrating ecological design, it can set a precedent for UT and other campuses and public schools in the region. The landscape can be used to interpret ecological principles."⁷⁰

III. Implement Integrated Pest Management as a Strategy for Pest Control

A. Ground maintenance superintendents and supervisors should receive Integrated Pest Management (IPM) training. IPM is an approach to pest control that "involves analyzing the ecosystem as a whole and deciding which of all the methods available, in what proportions and combinations, are the best to deal with unwanted insects, weeds, and other pests." Methods employed may include:

- **biological** - Biological controls include natural enemies of pests, such as ladybugs which prey upon aphids. This also includes the introduction of more biological diversity into the area, which deters pests. For example, some plants produce natural toxins that will inhibit the growth of weeds nearby.
- **chemical** - This is the last resort, "to be used only in limited, tightly controlled times and places and to precise ends, not wholesale".
- **cultural** - involving changes in planting patterns or the addition of barriers. Transitional zones, such as hedges or shrubby borders, provide habitat for natural enemies of pests, including birds, and beneficial insects, such as bees.
- **mechanical** - physically removing weeds or pests from the site.

⁷⁰ Russell 1992, p. 82.

- **physical** - quarantining products to prevent entry of new pests.⁷¹

B. Once this training has been completed, the grounds maintenance division should work with faculty and student research projects in implementing IPM techniques on campus. The application of IPM does not necessarily have to be expensive, and can be cheaper than pesticide-dependent management. The main cost of IPM is research about target pests, their natural enemies, and how they interact in the environment, a cost typically borne by the government. "Even if minor additional short-term costs are involved with IPM, however, they are far less than the long-term costs (both economic and environmental) of damage to health and to the environment and of cleaning up the chemical residue of pesticide use."⁷²

IV. Involve the Larger Campus Community Through Community Landscaping

A. Perhaps the most important aspect of this policy suggestion is the **utilization of students in the OHLD program as landscaping interns** at the University. Again, this will be impossible unless it is coordinated by a trained landscape architect. According to Dr. Sam Rodgers, internship experience is essential training for an OHLD student. However, these students must leave the university to complete their internships, taking their energy and expertise with them.⁷³ A university landscape architect could facilitate an internship program with the university Physical Plant, allowing these students to put their training into practice and, at the same time, improve the university landscape through some of the aforementioned techniques.

B. Involve the campus community in the university landscape through the continuation of the **Adopt-A-Spot program** and **campus tree plantings**. A landscape architect could keep the work of Adopt-A-Spot participants to a manageable level by guiding them toward native and other well adapted plants, rather than short-lived, blooming annuals. Participants can then watch the seasonal changes taking place as their plot matures.⁷⁴

Campus-wide tree planting is another means of involving the campus community in campus beautification. Trees and green spaces not only provide aesthetic qualities to the campus, but they also act as buffers against noise and pollution, protect against erosion, provide habitat for wildlife, and mitigate climate change. Tree planting reduces costs as well, creating natural windbreaks and shade that reduce the energy needed for heating and cooling. Research from the Lawrence Berkeley Building Laboratory in Berkeley, California shows that properly placed vegetation can reduce energy costs by as much as 50%. The global benefits of

⁷¹ Franck and Brownstone 1992, pp. 35, 99, 167-168.

⁷² Franck and Brownstone 1992, pp. 167-168.

⁷³ Rogers 1997.

⁷⁴ Keniry 1995, pp. 34-35.

planting trees, from filtering air to reducing the potential impacts of global warming, are well documented.⁷⁵

C. Insure that campus trees are planted correctly. Tree planting should be supervised by a professional landscape architect. According to Russell, trees planted on campus often die due to poor site quality; planting methods that are entirely incorrect; poor species selection (i.e. planting water loving species in areas that are too dry); placement that causes trees to suffer from poor pruning practices (i.e. trees placed under power lines); mechanical damage (i.e. trunk damage from lawnmowers or weedeaters); competition from turfgrass planted under the trees; soil compaction; and disease. At a cost of approximately \$50.00 for every tree planted, the university has a financial as well as an environmental interest in assuring that campus trees are planted properly.⁷⁶

V. Consider the Environmental and Public Health Impacts of Construction and Renovation.

A. Numerous health hazards may be posed by carpets, paints, compressed wood products, and other building materials. A university policy to review the environmental and health impacts of proposed construction projects before construction could lead to the discovery and utilization of less harmful alternatives.

B. Whenever possible, renewable, recycled, and environmentally sound materials should be used in building construction. Examples include recycled carpet padding, "good wood" (wood not harvested from rainforests or old growth), recycled steel, "glassphalt" (asphalt made with recycled glass), and insulation made with recycled paper. These items should be specified in bidding contracts when they are not cost prohibitive (see Purchasing section).

⁷⁵ Russell 1992, p. 63.

⁷⁶ Russell 1992, pp. 63-80.

Case Study: Georgetown University, Washington, D.C.

The grounds maintenance division at Georgetown University is working to reduce the amount of harmful chemicals in the campus environment. The superintendent applies information he learned through an Integrated Pest Management course at the University of Maryland to pest control on the Georgetown campus. When a pest problem is discovered, the staff does not immediately turn to pesticide manuals to deal with the problem. Instead, they look at the life cycle of the pest to determine where its weak points lie. They disrupt its life cycle, for example, by reducing mating, through the use of nontoxic soaps and oils. They work to preserve populations of beneficial insects which are natural enemies of the pests. They eliminate much of the wasp and insect problem simply by dumping out, removing, or recycling cans that attract these insects. For weed control they are trying to implement procedures that treat pest problems individually rather than blanket spraying, and to use products that are more rapidly biodegradable.⁷⁷

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Washington, D.C. 20057
(202) 687-2033

Case Study: Nebraska Wesleyan University

Twyla Hansen, grounds manager at Nebraska Wesleyan University, has experimented extensively with the use of native grasses and perennials in campus landscaping. The 50-acre campus in Lincoln, Nebraska, is located on a grasslands that once covered most of the region from Canada to Texas and from the Rocky Mountains to Illinois. The vast majority of these native prairies, home to dozens of such grasses as big and little bluestem, Indian grass, and buffalo grass, have been displaced by agriculture. Hansen has worked to introduce these natives into campus landscaping because they are much less costly to maintain and provide the campus community with a sense of the unique natural history of the region.

Hansen and her staff have been collecting seeds from viable prairie patches and grow many of the grasses themselves. They have converted flower beds from annuals to perennials. Much less labor is required to water and maintain the perennials, not to mention the fact that they don't have to be replanted every year. They are also gradually reducing turf grasses, especially along edges where labor-intensive trim mowing was previously required. Displaced turf is composted and clippings are left in place after mowing, reducing fertilizer needs by about a quarter.

The campus population of native species has become self supporting, and the university looks forward to sharing its native plants with the community. Bird populations have increased. Increased bird populations often, in turn, help keep insect populations down. Hansen's research has significant applications for water

⁷⁷ Smith et al. 1993, p. 29.

conservation in dry areas that are now soaking their Kentucky bluegrass lawns with precious drinking water. The use of native plants fosters a sense of connection with the landscape and is an important step toward stewardship and environmental responsibility.⁷⁸

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Local Contacts:

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Networking:⁷⁹

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IPM; coordinates national IPM mailing list on the internet for those others concerned about the application of pesticides and herbicides. To subscribe, send the following message to LISTSERV@UIOWA.EDU: subscribe PESTCON "your e-mail address" QUIT.

Texas Southern University
Attn: Ron Jerido, Horticulturist
Houston, TX 77004

Urban forestry, Adopt-A-Plot, mulching, and paper-waste composting

U.S. Environmental Protection Agency (EPA), Office of Pesticide Programs
Crystal Mall Building 2, Room 1115
1921 Jefferson Davis Highway
Arlington, VA 20460
(202) 557-5725

⁷⁸ Keniry 1995, pp. 26-9.

⁷⁹ Keniry 1995, pp. 39-41.

Transportation

"What is a university?"

"A group of administrators, faculty, and students held together with a common grievance over parking."⁸⁰

While walking, mass transit, and bicycling are clean and energy efficient ways of traveling, Americans are addicted to the automobile. This addiction has made transportation one of the largest fossil fuel dependent sectors in the economy burning more oil each year than residential, commercial, industrial, and electric utility uses combined.⁸¹ In fact, Transportation accounts for approximately 25% of our total energy use.⁸² Our reliance on gasoline powered vehicles is the main reason why the U.S. is one of the worst countries in terms of per capita contributors of carbon dioxide to the atmosphere.⁸³ Carbon dioxide is responsible for over half of the global warming problem.⁸⁴ An environmental audit of the University of California - Los Angeles, revealed that the campus is the tenth largest emitter of carbon dioxide in the Los Angeles basin - mostly because of pollutants from cars.⁸⁵

Some campuses have taken the initiative to turn their problems over parking into an opportunity for environmental leadership. Outside factors such as the exorbitant cost of building new parking structures, resources for the research and development of new transportation sources, and student and staff concerns over for safety and environmental quality have led transportation professionals on campus to promote alternative ways of doing things.

The University of Tennessee

At the University of Tennessee, the addiction to the automobile is very apparent. The building of new parking garages just encourages more people to bring their cars to campus. There are very few incentives to ride one's bike or even carpool. There is only one narrow strip of bike lane on the entire campus which runs next to Hodges Library. In order to maneuver around campus on a bike, one must go down stairs, encourage erosion by wearing bike trails on the inadequately planned (and relatively few) green spaces, and risk their life by riding in streets designed for automobile traffic only.

UT should be a model of sustainable transportation use. Many students and faculty have bikes or live close to someone that they can carpool with. In addition,

⁸⁰Keniry 1995, p. 43.

⁸¹Keniry 1995, p. 43.

⁸²Nolt et al. 1997, p. 179.

⁸³Keniry 1995, p. 43.

⁸⁴Mckinney 1996, p. 478.

⁸⁵SEAC 1991, p. 18.

student engineers have built award winning designs for natural gas and electric vehicles.

Policy Recommendations

Adequate transportation planning could alleviate many of the headaches faced by administrators, faculty, and students. Getting to and from an institution of higher learning should not cause more stress than a final exam.

I. Reduce Automobile Use

A. Hire a traffic engineer/transportation supervisor through the Transportation Center to coordinate efforts to reduce the needs for parking, coordinate car pooling, and encourage bicycling.

B. Set up a ride-share program at local apartment complexes and through staff offices. Have a special bulletin board in the UC that is designated for rides only so that people looking for rides can network with others.

C. Impose surcharges on those driving alone and designate the prime parking spaces for those that carpool as indicated by a special tag (or a set of two tags). For example, the staff lot next to Clarence Brown Theater is most central and heavily desired by students. There could be a pilot program tested here where students would be able to purchase a carpool pass that costs less than two regular passes (with the hope that the costs would be split between more than one person and savings would result). Then, those with this special pass could have better parking privileges (such as being able to park in that central lot or in staff lots earlier). Compliance could be monitored by student volunteers to make sure people aren't buying the special passes and then not carpooling.

D. In the long term, encourage parking at the periphery of campus by eliminating parking lots in the center of campus. Experiment with banning cars (except for UT, delivery, and emergency vehicles) from campus for a day.

E. Ban campus cars for Freshmen (except for those with special needs).

F. Encourage UTPD to increase bicycle patrols as opposed to car patrols.

G. Augment land-use planning for the university with transportation planning in order to increase walking and bicycling.

II. Encourage Bicycle Use

A. Have designated bike lanes throughout campus to encourage bike riding in a safe manner.

B. Make sure there are enough bike racks to accommodate bicycle use.

II. Green Fleet Vehicles

- A.** Designate fuel efficiency standards for all university-owned vehicles and factor the costs of fuel into the cost of the vehicle when it is purchased.
- B.** Encourage the recycling of used motor oil and the use of environmentally safe chemicals in fleet maintenance.
- C.** Inspect emissions in fleet vehicles.
- D.** Purchase a freon capturing machine to facilitate the drawing out of CFC-12 on site from University vehicles. This would allow the freon to be filtered, pressurized and reused as needed. Since vehicles invariably leak freon, new bottles will have to be purchased. However, enough would be reused that the resulting savings should pay for the machine in a few years.

IV. Encourage the Use of Mass Transit

- A.** Appoint a task force to determine student usage of mass transportation and to make suggestions and act as a liaison to the city government. This task force could suggest ways to improve the use of mass transit by students, which could benefit the city as well as the University.
- B.** Use the activities fee to subsidize mass transit that is consistent with class schedules from the Papermill area and College Park area and encourage its use by students living in those areas.

Case Study: The University of Illinois Urbana-Champaign

Jim Trail has been a traffic engineer at UIUC for 33 years and has encouraged transportation demand management: creative efforts to eliminate the demand for parking and promote alternatives to cars. The administration at UIUC has been steadfast in their implementation of his proposals. They now have 8 miles of class I (set off from the street) bike lanes throughout campus, custom bike racks, and bicycle facilities in most parking structures. The university master plan has included transportation alternatives for decades and according to Trail, UIUC has a policy "that goes back over 20 years in major street plan studies, that we would like to favor the pedestrian/bicyclist over the motorized vehicle operator...We do whatever [is] necessary to accommodate bicycles in a cost-effective manner-even passing some of the costs on to the car operator when necessary."⁸⁶

Trail also does annual surveys of cyclists to get their insight and see how things are working. From these surveys the university gathered information and built custom bike racks to facilitate the most convenient methods of locking up bikes.

Student fees also finance an extremely successful mass transit program on the campus and within the urban area. Students voted to increase their transportation fee by \$13 per semester, which entitled them to ride for free on all city-owned buses just by showing their ID. The bus route was modified to accommodate students and their class schedules and students now take 11,000 rides daily on the metropolitan system, compared to less than 300 before this policy was implemented. The campus also instituted a remote parking lot shuttle service that runs every five minutes between the lot and campus.⁸⁷

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Urbana, IL 61801
(217) 333-4122
jimt@msmail.o&m.uiuc.edu

Networking:⁸⁸

University of Kansas at Lawrence
Environmental Ombudsman Program
Lawrence, KS 66045
(913) 864-4665

Recycling and pollution prevention in fleet maintenance. including the purchase and use of a freon capturing machine.

⁸⁶Keniry 1995, p. 47.

⁸⁷Smith et al. 1993, p. 65.

⁸⁸Keniry 1995, pp. 56-57.

University of Wisconsin at Madison
Rm. 120 WARF Bldg.
610 Walnut St.
Madison, WI 53705
(608) 265-3417

Will provide copies of 1993 comprehensive transportation demand management survey and related reports.

Education

*In the end, we will conserve only what we love;
We will love only what we understand;
We will understand only what we are taught.*
-Sengal Proverb

Economic activity in the environmental field amounts to \$150 billion, about two percent of the gross national product. Students who have a background in environmental issues often find that they have a significant edge in the job market.⁸⁹ However, the purpose of the university extends far beyond simply training students to prepare for careers. Through classroom and extra-curricular experiences, students shape their own values for the first time and develop a personal understanding of their role as citizens.

Exposing students to the far-reaching implications of current environmental problems must be a part of this educational experience. Many large scale environmental problems, including species extinction and biodiversity loss, world water supply contamination, depletion of the world's fishing stocks, rapidly increasing population growth, rapidly increasing levels of consumption, soil loss and desertification, and global climate change, may very well reach critical thresholds within the lifetimes of the current generation of university students. In order to tackle the reality of these problems as a national and global community, students must first be prepared to understand and address environmental issues.

Courses within environmental studies and environmental science programs provide a foundation for most of the environmental education that takes place on college campuses. It is estimated that a total of approximately 400 environmental studies and environmental science programs exist in the 3700 institutions of higher education in the U.S.⁹⁰ Many of these programs boast some of the fastest-growing enrollments on their campuses. As of 1994, over 30% of existing programs had been established in the 1990s. Most environmental science and environmental studies degrees are administered through *programs* rather than departments. As a result, the programs often suffer from poor advising, lack significant power in the tenuring process, and are severely under-funded, considering their popularity.⁹¹ Over 64% of environmental studies graduates go on to environmental careers. A study by the Nathan Cummings Foundation describes a trend toward an increasing focus on the sciences within these programs, often allowing for only a moderate amount of economics, policy, or humanities courses.⁹²

⁸⁹ Blueprint 1995, p. 37.

⁹⁰ Strauss 1996, p. 10.

⁹¹ Strauss 1995, p. 1346.

⁹² Strauss 1996, pp. 10-13.

Environmental education must extend beyond environmental studies and environmental science courses, however. The university community as a whole should expose all students to the complex environmental issues that confront their generation. While skilled environmental professionals will be essential to understanding the causes of environmental problems and developing solutions, "it is even more critical for the development of a sustainable future that people whose job titles do not include the word 'environmental' come to exercise a strong environmental awareness and competence in their lives and work. Environmental concerns cannot be compartmentalized."⁹³

As a training ground for future leaders across all disciplines, from engineers to economists and politicians to philosophers, the university provides the ideal opportunity to integrate a basic understanding of environmental problems into society as a whole. By creating new generations of leaders who understand environmental responsibility, the university provides them with the opportunity to build a better world for the generations that follow.

University of Tennessee

The University of Tennessee has made a considerable environmental commitment in several educational areas. In 1993, Vice President Al Gore established the Nancy Gore-Hunger Chair of Environmental Excellence, which was recently filled by Dr. Dan Simberloff, an expert in the field of ecology and evolutionary biology. Several university departments participate in joint environmental research with the Oak Ridge National Laboratory and the Tennessee Valley Authority. The Energy, Environment, and Resources Center (EERC) makes significant regional, national, and international research contributions in a variety of environmental fields. The Tennessee Institute for Management and the Environment is dedicated to developing an environmental approach to the field of marketing.⁹⁴

The University curriculum offers environmental education opportunities for undergraduate students with environmental interests. Two undergraduate degrees are offered. An environmental science B.S. is offered through the Plant and Soil Sciences department under Dr. Gary Lessman and Dr. Mike Mullen. An environmental studies degree is offered through the geology department, with Dr. Don Byerly as the head advisor. Both majors depend on a wide variety of departments to offer the classes needed to fulfill the degree. Other undergraduate degrees with a significant environmental focus include environmental engineering and environmental sociology. Some natural science majors, including biology, botany, ecology, forestry, wildlife, and fisheries, geography, geology, and plant and soil science, offer an environmental component. As of March, 1993, a total of 211 undergraduate and graduate courses with an environmental component were

⁹³ Strauss 1996, p. 3.

⁹⁴ Clellan 1997.

offered in 32 different departments. For a complete listing of these courses and departments, see Appendix A-11.⁹⁵

Since these degrees are all offered in different departments, there is a lack of continuity and community among students with environmental majors. There is no professional society, department head, department office, or other central source of information, guidance, and advising for students in these majors. There was a multi-disciplinary Environmental Resources and Education Committee which put together the list of courses with an environmental component. However, it is now inactive. Locating information about environmental courses, majors, internships, careers, and study abroad opportunities proves frustrating to students because the information is scattered throughout numerous university departments.

Outside of these environmental programs and courses, environmental education opportunities for students are quite limited. The campus student environmental group, Students Promoting Environmental Action in Knoxville (SPEAK), provides students with opportunities to create a healthier campus environment and work with regional environmental groups. Due mainly to the work of SPEAK, UT was recognized by *Mother Jones* magazine in October, 1996, as one of the top 20 activist universities in the nation. Despite this high level of interest, there is no campus environmental office or center to handle student questions about environmental issues, courses, careers, or other opportunities.

⁹⁵ EERC 1993.

Policy Recommendations

The following policy changes are based upon the underlying goals of providing all students with an understanding of environmental problems, creating a campus community that teaches students how to reduce their environmental impact on a personal and a community level (learning by doing), encouraging debate on how to best solve environmental problems in all fields of study, and fostering a sense of environmental responsibility through course work and experience.

I. Integrate Environmental Knowledge into All Relevant Disciplines

All students should acquire a basic level of environmental literacy as a part of their education at the university. The combination of several policy initiatives would be essential to a meaningful commitment to environmental literacy.

A. Include an *environmental literacy* section in the university academic mission statement, such as "this university expects its students, upon graduation, will have received the knowledge, skills and values to work toward an environmentally sustainable future". The official adoption of such a statement provides an institutional framework for faculty, staff, and students who are motivated to pursue innovative environmental initiatives within classrooms and academic departments.⁹⁶

B. Develop an *environmental literacy* requirement that students must fulfill in order to graduate. All students would be required to take a course with a strong environmental emphasis from an approved list of courses. This would not be an inconvenience for most students, as it is likely that the course could also fulfill one of the requirements for their major. While this is much more limited than a commitment to integration of environmental issues across the curriculum, it is a valuable, proactive step.⁹⁷

C. Monitor campus-wide environmental literacy and the strengths and weaknesses of the program through an *environmental literacy* assessment. Dr. Rosalyn McKeown-Ice of the University of Tennessee Center for Geography and Environmental Education is developing an instrument to measure environmental literacy in four areas: natural science, social science, understanding of environmental issues, and a self-reporting survey of behavior. Students would be surveyed when they entered as seniors and again prior to graduation. By including behavior, this instrument assesses not only what students have learned about environmental issues, but also whether or not they have taken the necessary next step of applying environmental principles to their own lifestyles.⁹⁸

⁹⁶ Blueprint 1995, p. 10-11.

⁹⁷ Strauss 1995, pp. 1346-1347.

⁹⁸ McKeown-Ice 1997.

D. A multi-dimensional approach to **faculty involvement** is essential to campus-wide environmental literacy. Training sessions for faculty in disciplines as broad as literature, history, economics, and biology are necessary to integrate the complexities of the human relationship with the natural environment into various subject areas. Organizations exist, such as *Second Nature*, that specialize in these trainings (see Appendix A-12).

Faculty members should discuss, within their field, the environmental aspects of their area of study. A core group of faculty members representing various disciplines can design and implement a faculty development program that includes panels, discussions, lunch groups, and other opportunities for faculty interaction focused on environmental issues.⁹⁹

II. Improve Existing Undergraduate Environmental Programs

Improving the current environmental curriculum for undergraduate students in environmental majors is a two-fold task. Both the environmental program as a whole and the course offerings within these majors need improvement.

A. The lack of connectivity among students with environmental majors is a significant weakness within the current environmental curriculum. **Creating continuity among undergraduate environmental majors** should be a top priority. The creation of an environmental department would be ideal means of addressing these shortcomings. However, other options exist for improving the current system.

The publication of an environmental guidebook for students would provide a means of consolidating information that is currently scattered throughout 32 departments. The guidebook would describe environmental majors, list related courses, include a directory of professors and advisors, and provide information resources for environmental career services, internship opportunities, study abroad programs, and other campus and local contacts.

The creation of a campus environmental center (see Policy VII) would address these shortcomings superbly by providing students with a central location for guidance and information. The creation of an environmental professional organization would provide students with an opportunity to come together and share information about their majors, career options, and other problems and opportunities. Guest speakers from the university and professional communities could provide additional guidance to the group.

Finally, a task force made up of administration, faculty, and students should assess the effectiveness of the current system and make specific recommendations for improved consolidation among certain departments.

⁹⁹ Blueprint 1995, pp. 10-11.

B. The improvement of current environmental course offerings must be a priority. Environmental courses should be available, either as separate classes or integrated into existing courses, that focus on topics including "population, biodiversity, environmental justice, sustainable development, climate change, energy, waste management, public health, natural resource economics, environmental engineering, sustainable design architecture, pollution prevention, land-use, ecosystem analysis, environmental law, urban planning, water resources management, ecology, oceanography, environmental policy formulation, literature of the environment, toxicology, environmental ethics, forestry and national parks management, environmental geology, agriculture, fish and wildlife, technology, and soil resources."¹⁰⁰

Students need to acquire specific skills and experience as a part of these courses. Environmental problem solving techniques should be developed through analytical approaches such as least cost, life-cycle analysis, cost-benefit analysis, full-cost accounting, and policy design.

Hands on research experiences should then provide students with opportunities to apply these tools and make policy recommendations for solving problems. Within environmental courses, students should have the opportunity to study local and campus issues, applying their skills to real world situations.¹⁰¹

III. Provide Environmental Internship Opportunities

Environmental internships can take place both within and outside of the university. Internships not only educate students, they also provide students with valuable career experience that makes them much more successful on the job market. Internships provide students with the opportunity to apply what they have learned through course work and, as they see the relevance of what they are learning, become more motivated to produce quality academic work. Finally, the campus community can benefit greatly from student research and recommendations, as students identify ways in which the university can be more efficient and save money.

A. The university should provide opportunities for on-campus environmental internships. Students interested in environmental careers should be provided with opportunities to apply what they have learned in improving the campus community. Students and faculty would work with the physical plant and university staff to identify research needs and opportunities. This information could then be compiled and coordinated by career services. Students in such fields as environmental science, environmental studies, ornamental horticulture and landscape design, planning, environmental engineering, and environmental

¹⁰⁰ Blueprint 1995, p. 10.

¹⁰¹ Blueprint 1995, p. 14.

management would then be able to gain internship experience and offer their skills to the campus community, rather than taking their expertise elsewhere.

B. The university should **support off-campus environmental internships**. Each environmental major should set aside one semester for either an off-campus internship or study abroad. Obtaining credit for an internship should not be an obstacle for students. Information on off-campus environmental internships should be compiled by career services and made readily available to students. Outreach to environmental majors and advisors should then publicize these opportunities. Again, the problem of a lack of coordination among students with environmental majors becomes a significant obstacle.

IV. Support Extra-Curricular Opportunities for Campus Environmental Involvement

Student efforts to create greater environmental awareness on campus should be supported by faculty and administration. Extra-curricular events are an extremely effective means of expressing the campus wide environmental commitment.

A. The annual **Earth Week Events**, sponsored by SPEAK, must continue to receive administrative support. Each year, Earth Day and Earth Week events have gained increasing campus recognition and support. In 1997, the partnership between SPEAK and Hess Hall to create a campus-wide celebration brought the event to a new level. With continued support, the celebration of Earth Week will become a strong campus tradition and an annual occasion to refocus attention on environmental issues.

B. Other campus events that would promote environmental awareness include "**Ecogames**" or a "**Green Cup**", co-sponsored by SPEAK and the United Residence Halls Council (URHC). Dorms would compete to see which can conserve the most energy, collect the most recyclables, make the largest reduction in dorm waste, and win environmental trivia contests - competitions designed to protect the environment and save university funds.

V. Conduct a Campus Environmental Audit

This blueprint is part of a larger campus environmental audit that is currently underway at the university. The results of the audit and the blueprint will be presented to the administration in the fall of 1997. Once the audit is completed, the administration should set up a task force to address the audit and the implementation of the recommendations outlined in the blueprint.

An annual campus wide "Earth Summit" is an excellent means of examining and improving the progress of campus operations. Students can present research to administrators about such issues as campus energy use and waste generation, and

then work with the administration in developing and implementing more efficient, cost effective, environmentally sound alternatives.¹⁰²

VI. Support Students Who Seek Environmentally Responsible Careers

Because environmental degrees are applicable to such a wide variety of fields, overwhelmed students in environmental majors often find they are on their own in searching for jobs. The university can improve career services for students in environmental fields in several ways.

A. Environmental advising within career services should be improved. At least one staff member should track the rapidly changing career opportunities in the environmental field and be able to advise students going into environmental fields. Environmental information should be consolidated in the career services center, in order to provide an accessible resource for students.

B. The number of environmental employers invited to **career days and career fairs** should be increased. Invited organizations should include not only technical firms, environmental engineering companies, and state environmental agencies, but also non-profit organizations, such as the Sierra Club, and government agencies, such as the Environmental Protection Agency, which are not usually represented at UT career fairs.

C. Students and faculty should organize an annual "**Careers in the Environmental Field**" panel that is made up of various environmental professionals, including people in such fields as government, non-profit environmental groups, academia, business, consulting firms, think tanks, and the media. These professionals can speak to students about the necessary training for, as well as the pros and cons of, their respective fields.¹⁰³

VII. Establish a Student Environmental Center

The establishment of a student environmental center is one of the most significant environmental commitments that could be made by the university. By providing space and administrative support for a student environmental center, a durable institution is created that will remain constant as student environmental leaders come and go. It will provide a central location, information, meeting space, networking opportunities, and other resources for students and student organizations working on environmental issues. This would be especially beneficial at UT, where environmental information is scattered throughout 32 departments. The proposal for such a center could easily be another entire blueprint

¹⁰² Strauss 1995, pp. 1347-1348.

¹⁰³ Blueprint 1995, p. 37.

in and of itself. Therefore, the following guidelines should serve only as a basic framework for the process of establishing the center.

A. Develop a student coordinating committee or board of directors, beginning with members of SPEAK, to perform the following functions:

- Elect a volunteer or raise funds to hire a center director.
- Begin negotiating with administration to secure a space on campus for the center; this may be the most challenging aspect of the process.
- Draft budgets for start-up, operations, and future project needs.
- Work with a lawyer to establish the center as a 501c(3) non-profit corporation.
- Set up a center advisory board, made up of faculty, administrators, alumni, and community leaders. This board can assist in advising center projects, assessing the needs of the center, and fund-raising.

B. Work with the advisory board to proceed with the following steps:

- Draft a statement of purpose, such as this example adapted from the mission statement of the Yale University environmental center: "To increase student environmental awareness and leadership, educate and involve the Knoxville community, and strengthen the network of University of Tennessee environmentalists - students, faculty, administrators, alumni."
- Develop an operations manual or constitution for the center, specifying how the center will be run and operated, and the role of student and faculty leadership.
- Begin fundraising from various sources, including university funds, student fees, university parents, alumni, faculty, foundation grants, non-profit organizations, corporations, and local businesses.
- Develop programs to involve students and high level campus officials and alumni in the work of the center, such as Earth Week events and the "Green Cup" competition.
- Develop a working list of center projects and elect student project coordinators.

C. Develop the infrastructure of the center so that it will benefit the entire campus community, including the following steps:

Physical and administration:

- Collect donated office equipment from the university, corporations, parents, alumni, churches, or other offices.
- Create work-study positions for students to run the center and organize center-sponsored projects.

Information:

- Develop a library of information about campus environmental projects, environmental groups at the local, national, and international levels, and environmental issues.

- Establish a resource area with environmentally related academic information, including environmental courses and majors, advisors, study abroad programs, internships, and career resources.

Membership and involvement:

- Establish a coalition of groups addressing environmental issues that could use the center for meetings, office space, and other functions.
- Publicize the center through a press release, grand opening ceremonies, and presentations to campus groups, dorms, and local organizations. Regularly publish a calendar of events, both on paper and electronically.
- Pursue joint projects with other campus organizations, including the Central Program Council, the International House, Career Services, Team Vols, and student organizations such as Amnesty International and Habitat for Humanity.
- Hold an open house each fall and spring semester and invite interested trustees, administrators, faculty, students, and community leaders.¹⁰⁴

Research:

- Work with campus and local experts to make the center a living laboratory that demonstrates cutting-edge, environmentally sound building and management techniques. Students in architecture, planning, ornamental horticulture and landscape design, environmental engineering, and environmental management could use the center as a showcase for design projects and other research. Outside agencies, including the Tennessee Valley Authority and the Oak Ridge National Lab, could use the center as a testing ground for the development of progressive environmental technologies.

¹⁰⁴ Blueprint 1995, pp. 34-35.

Case Study: University of Georgia

The University of Georgia has made a dramatic, meaningful steps toward becoming one of the top environmental universities in the nation. Of the 22,000 undergraduates at UGA, *all* students must fulfill an environmental literacy requirement in order to graduate. Several years of planning and discussion, along with the active support of President Charles B. Knapp, resulted in the initiation of the policy in 1994. Students must pass one course from a specified list that includes courses from multiple schools and departments. Most of the courses were newly designed to fulfill this requirement.¹⁰⁵

University of Georgia
Athens, GA

Case Study: Tufts University

Tufts University is one of the best examples of a campus-wide commitment to environmental education. The Tufts Environmental Literacy Institute was founded by Anthony Cortese in 1990. It offers one and two week faculty training sessions each year to instruct faculty across all disciplines on how to integrate environmental issues into their courses. Faculty from over 40 national and international universities have participated in these trainings.¹⁰⁶ The program also works to educate by improving the state of the environment within the campus community. This grant-funded program, Cooperation, Learning, and Environmental Awareness Now! (CLEAN!), analyzes the flow of energy and materials through the university in order to develop policies that save money and make the university more environmentally sound.¹⁰⁷

Tufts University
Attn: Tom Kelly, Director
Secretariat of University Presidents for a Sustainable Future
Center for Environmental Management
474 Boston Ave. Medford, MA 02155
(617) 627-3486

¹⁰⁵ Strauss 1996, p. 17.

¹⁰⁶ Strauss 1996, p. 16-7.

¹⁰⁷ Smith et al. 1993, p. 93.

Local Contacts:

Rosalyn McKeown-Ice, Ph.D. - The UT Center for Geography and Environmental Education/Energy, Environment, & Resources Center - 974-4251

Ian Clelland, Ph.D. - UT, Tennessee Institute for Management and the Environment - 974-5001

Don Byerly, Ph.D. - UT Environmental Studies - 974-6007

Gary Lessman, Ph.D. - UT Environmental Science - 974-8802

Networking:¹⁰⁸

University of Wisconsin-Madison

Attn: Daniel Einstein

Environmental Management

Room 120 WARF Building

610 Walnut Street

Madison, WI 53705

(608) 265-3417

Information on university environmental management initiatives, i.e. solid waste, transportation, other research

or, Attn: David Eagan

Institute for Environmental Studies

70 Science Hall

(608) 263-3985

djegan@students.wisc.edu

Information on IES seminars and student research projects, curricular initiatives, and ecological restoration projects on campus

Yale University

New Haven, CT

Second Nature

17 Msgr. O'Brien Highway

East Cambridge, MA 02141

(617) 227-8888 • Fax: (617) 227-0104

Provides information and trainings on environmental education at the university level

¹⁰⁸Keniry 1995, pp. 205-210.

Conclusion

In researching the policies for this blueprint, it became apparent that the potential for creating a sustainable university is unlimited. From \$3 million in annual energy savings at SUNY Buffalo to reducing campus waste by 60% at the University of Colorado in Boulder, the accomplishments of committed universities were remarkable. Universities across the country are reducing their environmental impact and saving money through such innovative policies as microscale experiments, Integrated Pest Management, energy efficient lighting, environmentally sound purchasing, environmental audits, and comprehensive student-staffed recycling programs. These universities continue to expand society's understanding of 'growth' and 'development' by putting the concept of sustainability into practice.

The University of Tennessee stands to benefit significantly from the experiences of these universities. As a link in the Oak Ridge National Laboratory - University of Tennessee - Tennessee Valley Authority research corridor, the University is in an ideal position to become a model of efficient, cost-effective, environmentally sound management. Policy recommendations in each of the eight subject areas have been tailored to UT as much as possible. Contacts have been included to facilitate communication with other universities that have successfully implemented environmentally sound policies. Working with several of these individuals in developing the Blueprint, we found their wealth of knowledge and level of commitment to be invaluable resources.

The next step of this process is implementation. Students and professors should use this Blueprint as a source of ideas for group projects and research opportunities. As an institution of higher learning there are many resources in place that, with only minor modifications, could easily facilitate the implementation of many of our recommendations. Paid professionals need to be hired to coordinate efforts for waste reduction and recycling, energy efficiency, transportation and land planning, and landscaping and campus design. The University can not depend solely on student volunteers to do this work. If the University feels that it cannot afford hiring for newly created positions, then the possibility of using activities fee money as a source of funds for environmental initiatives should be explored. In addition, as these policies begin to save money for the University, deals need to be brokered with the state that allow the University to keep these savings in order to provide further incentives for future projects.

Students, faculty, staff, and the administration must work together to implement these policies at various levels. Each section of the Blueprint is structured so that environmentally motivated individuals can focus on certain areas with specific goals in mind. As a whole, these policies amount to the development of a safe, healthy, responsible campus community that can serve as a

model for all those who wonder "Why not?" and an inspiration for those who ask "What more?".

Mary Anne Peine & Jamie Pizzirusso
Spring 1997

Bibliography

- Aepfel, Timothy. "Halting Hazardous Waste at the Source." *Christian Science Monitor* April 1987: 20.
- Ayoob, John-UGA Facilities Manager. Personal interview. 10 Feb. 1997.
- Barrett, Julie and Matt Macander, eds. *University Environmental Audit State University of New York at Buffalo* 1995. 1995.
- Baucom, Gina, et al. *Environmental Audit of the University of Tennessee-Knoxville*. Unpublished.
- Blueprint For A Green Campus The Campus Earth Summit Initiatives for Higher Education*. January, 1995.
- Brooks, Gordon-UT Physical Plant. Personal interview. 10 Feb. 1997.
- Campus Green Buying Guide*. Booklet. Green Seal, Inc., 1994.
- Clellan, Ian-UT Tennessee Institute for Management and the Environment. Personal interview. 29 Apr. 1997.
- Debell, Jack. "Coming of Age: Recycling on Campus." *Resource Recycling* 13 (9) 1994: 44-47.
- Franck, Irene and David Brownstone. *The Green Encyclopedia*. New York: Prentice Hall, 1992.
- Hoss, Tim-University of Illinois at Urbana-Champaign Recycling and Materials Reduction Coordinator. Personal interview. 20 Feb. 1997.
- Keniry, Julia. *Ecodemia - Campus Environmental Stewardship at the Turn of the 21st Century*. Washington, D.C.: National Wildlife Foundation, 1995.
- Lent, Tom. *Energy for Employment: How to Heat up the Economy, Not the Planet* Greenpeace Atmosphere and Energy Campaign, July, 1992.
- Lyons, Kevin-Rutgers University Purchasing Department. Personal interview. 6 Mar. 1997.
- McKeown-Ice, Rosalyn-UT Energy, Environment, and Resources Center. Personal interview. 24 Apr. 1997.
- McKinney, Michael L. and Robert M. Scoch. *Environmental Science: Systems and Solutions*. New York: West Publishing Co., 1996.

- Nolt, John, et al. *What Have We Done?*. Washburn, TN: Earth Knows Publications, 1997.
- Rogers, Sam-UT Ornamental Horticulture and Landscape Design. Personal interview. 8 Apr. 1997.
- Russell, John Maury. *The University of Tennessee Campus Landscape: A Critique of its Effectiveness and a Guide to its Management From an Ecological Perspective*. Unpublished Masters Thesis, January, 1992.
- Schanks, John-UT Office of Environmental Health and Safety. Personal interview. 28 Apr. 1997.
- Sharrell, Mike-UT Physical Plant Grounds Maintenance Division. Personal interview. 23 Apr. 1997.
- Smith, April A., et al. *Campus Ecology - A Guide to Assessing Environmental Quality and Creating Strategies for Change*. Los Angeles: Living Planet Press, 1993.
- Smith, Zachary A. *The Environmental Policy Paradox*. New Jersey: Prentice Hall, 1992.
- Strauss, Ben. "Conservation Education: Education in the Real World." *Conservation Biology* Dec. 1995: 1346-1348.
- Strauss, Benjamin H. *The Class of 2000 Report: Environmental Education, Practices and Activism on Campus*. Nathan Cummings Foundation, 1996.
- Wade, Jerry-UT Purchasing Department. Personal interview. 20 Feb. 1997.
- Williford, Garry-UT Graphic Arts. Personal interview. 20 Feb. 1997.

Appendix

<u>Page</u>	<u>Item</u>
A-1	Environmental Policy (Senior Officers Conservation Policies and Procedures) - State University of New York, University at Buffalo
A-2	Environmental Policy - Tufts University
A-3	Environmental Policy - Brevard Community College
A-4	Campus and Regional Telephone Directory Policies - SUNY Buffalo
A-5	Campus Mail Policy - SUNY Buffalo
A-6	Campus Newspaper Policy - SUNY Buffalo
A-7	Building Conservation Contact Network - SUNY Buffalo
A-8	Summer 1994 Air Conditioning Policy and 1995/96 Campus Heating Policy - SUNY Buffalo
A-9	Recycling, Recycled Products Procurement, and Waste Reduction Policies - University of Illinois at Urbana-Champaign
A-10	Summary of Recycled Purchases for FY96 - University of Illinois at Urbana-Champaign
A-11	Courses with an Environmental Component offered at the University of Tennessee, Knoxville
A-12	<i>Second Nature</i> brochure

SENIOR OFFICERS CONSERVATION POLICIES AND PROCEDURES

Background

In 1993, the *Campus Work/Production Processes Policy* was approved and distributed to all offices on campus. This policy stated that "the University at Buffalo, through its strong commitment to environmental protection, will constantly strive to promote and publicize the implementation of work/production processes which maximize the use of recycled products, minimize or eliminate waste, seek economies and efficiencies, and reduce the consumption of energy." In compliance with this policy, and the recommendations of the campus Environmental Task Force, the offices of the President, Provost, Senior Vice President, and Vice Presidents have agreed to implement a set of policies and procedures regarding conservation measures.

Policies and Procedures

- **Unity paper:** Unity recycled paper (available from Central Stores) should be used for all draft documents, and for all copies of documents made for distribution on campus.
- **Paper recycling:** All paper that can be recycled (including shredded paper) should be recycled.
- **Building Conservation Contact (BCC) program:** A BCC contact should be identified for each office (if one has not already been appointed). The BCC should be empowered to perform his/her function, perhaps through office/departmental meetings regarding environmentally responsible office practices.
- **Green computing habits:** Departmental Building Conservation Contacts (BCCs) should be empowered to enforce the recommendations outlined in the "Green Computing" booklet. All computer equipment should be turned off when not in use for extended periods. Departments should purchase "energy star" computers whenever possible.
- **Temperature policy:** Use of individual heaters should be curtailed. If the heating temperature in the office falls below 68 degrees, Extension 71 in University Facilities should be notified so an immediate adjustment can be made to using the central heating system.

- **Recycled paper for publications:** Departments should explore the option of using recycled paper when designing and printing publications. It is the policy of University Print and Mail Services, and Publications to provide recycled papers as a part of the initial design and printing discussions.
- **Reusable campus mailing envelopes:** A more conscious effort should be made to use interdepartmental envelopes whenever appropriate.
- **Double-sided copying:** Departments should use double-sided copying whenever appropriate.
- **Phone book minimization:** Employees should be encouraged to share phone books (other than the campus directory).
- **Toner cartridge recycling:** For some copiers and laser printers, recyclable cartridges are part of the maintenance agreement/process. In all instances, departments should recycle toner cartridges whether through direct suppliers or separate contract with a vendor who recycles cartridges.
- **Newspaper Sharing:** Employees should be encouraged to pass copies along after reading, rather than each person receiving an individual copy.
- **Electronic Mail:** Whenever practical and possible, internal communications should be accomplished via electronic mail.
- **Environmental Friendly Products:** To the fullest extent possible, "environmentally friendly" products (e.g. made of recycled materials, highly energy efficient, may be recycled or safely disposed of after use, etc.) will be used.
- **Turning Off Lights:** Whenever possible, lights will be turned off in areas that will not be used for extended periods of time.

Policy was approved by the Administrative Group on November 28, 1995
nmk/November 28, 1995



UNIVERSITY AT BUFFALO
STATE UNIVERSITY OF NEW YORK

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State University of New York at Buffalo
CAMPUS TELEPHONE DIRECTORY POLICY

BACKGROUND

The University at Buffalo seeks to create sound management policies which are also protective and supportive of the natural environment

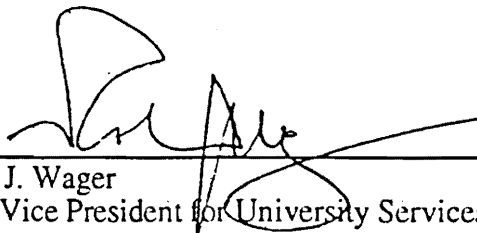
UB telephone directories are produced in large numbers and widely distributed across campus. The production of this publication (as well as others), involves the consumption of natural resources as well as the generation of pollution and solid waste.

Presently directories are distributed to faculty and staff in quantities exceeding requirements. In addition, many personnel request additional copies for convenience, home use, etc. While the directory has been reduced in size by thirty percent over the past two years, it is still a major consumer of paper and is a major waste producer.

POLICY

In order to reduce the environmental impact of producing and disposing of the UB directory, the following steps are encouraged:

- Distribution will be limited to no more than one for each full and part-time faculty and staff member. Wherever possible, directories should be shared.
- Additional copies for home use will not be available. The previous year's directory will serve this purpose.
- The Office of Publications will continue to reduce overall page numbers in the directory through typographic means (use of upper and lower case type, more columns per page, etc.) and by minimizing advertising.
- Recycled newsprint and water-based soy inks will be used when availability permits.
- Efforts will be made to recycle used directories.
- Discourage the use of any non-recyclable covers.
- As complete telephone listings become more widely available via computer networks, members of the UB family will be encouraged to use the electronic telephone listings in lieu of paper directories. The long range goal is to reduce the number of, or if possible eliminate the paper directories produced.


Robert J. Wager
Senior Vice President for University Services

1/12/93
Date



UNIVERSITY AT BUFFALO
STATE UNIVERSITY OF NEW YORK

Office of the Senior Vice President
for University Services
520 Capen Hall
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State University of New York at Buffalo
REGIONAL TELEPHONE DIRECTORY POLICY

BACKGROUND

The University at Buffalo, as a matter of sound management principles, seeks to identify practices that involve damage to the environment and encourage new practices that are consistent with environmental protection.

Campus offices are currently supplied with a regional phone book published by either NYNEX or the White Directory.

In addition to consuming natural resources (trees, energy, etc.) and generating pollution (air and water emissions, etc.) in their production, these phone books are currently difficult to recycle. Thus, their disposal may contribute to New York State's landfill problem and add to the University's trash disposal costs.

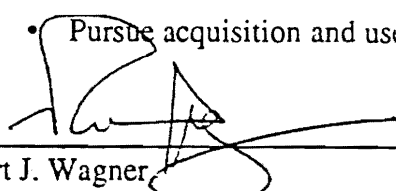
Few members of the University community have a business need for a directory of regional telephone listings; thus many unnecessary copies of the NYNEX/White Directory are distributed on campus.

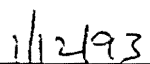
POLICY

The University at Buffalo will reduce the number of NYNEX/White Directory phone books it distributes on campus. It is anticipated that an approximately ninety percent reduction in phone book use can be accomplished over the short term. The long-range goal, if possible, is to stop ordering entirely any regional telephone directories by taking advantage of new electronic directory formats as they become available.

In order to accomplish these reductions, the following steps are encouraged:

- Provide no more than one (1) regional phone book per office suite or department (as opposed to one per individual office or phone set) except in those relatively few offices or departments where the regional phone book is required by business necessity.
- Provide new regional phone books only every other year.
- Encourage the use of smaller, reduced-print version of regional phone directories as well as white and/or yellow sections only for appropriate departments.
- Discourage the use of any non-recyclable covers.
- Give preference to vendors using the highest percentage of recycled materials in their directory, and who also collect and recycle the old copies of the directories at the end of the year.
- Pursue acquisition and use of electronic format directory information wherever it is feasible.


Robert J. Wagner
Senior Vice President for University Services


Date



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State University of New York at Buffalo

CAMPUS MAIL POLICY

BACKGROUND

The University at Buffalo, as a matter of sound management principles, continuously reviews its internal administrative processes and procedures with the goal of optimizing the use of resources, maximizing service levels, and minimizing waste and costs. Included in this important objective are services related to the processing of campus mail.

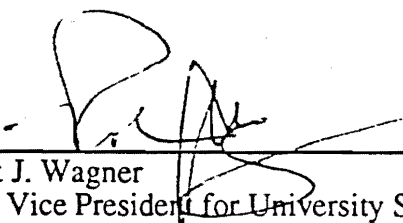
The goal for the processing of campus mail is to provide a reliable and prompt level of service at a minimum cost in terms of dollars, labor, and physical and natural resources.

POLICY

The University at Buffalo recognizes the need to provide campus mail services in a cost effective and environmentally sound way.

In order to meet this goal, internal campus mailings should be processed in accordance with the following guidelines.

- Whenever practical and possible, internal communications should be accomplished via electronic mail utilizing computer systems.
- Whenever it is necessary to communicate by hard copy, reusable campus mail envelopes or a self-mailer design should be used.
- Mailers should attempt to send written communications to only those individuals who need the information and not simply make a "GENERAL" announcement.
- Sealable envelopes should only be used for confidential mailings.
- Address lists used should be carefully screened to eliminate redundancies, and should be updated periodically to include address corrections.
- As often as possible, mailings to other State agencies should be accomplished via the Interagency Mail System (Albany Shuttle) provided by the State of New York.


Robert J. Wagner
Senior Vice President for University Services

1/12/93
Date



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State University of New York at Buffalo

CAMPUS NEWSPAPER POLICY

BACKGROUND

The University at Buffalo seeks to create sound management policies which are also protective and supportive of the natural environment.

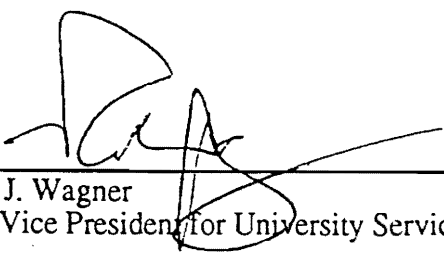
Several regularly-published newspapers are produced on campus, including the *REPORTER* and the *SPECTRUM*. The production of these publications (as well as other periodicals), involves the consumption of natural resources as well as the generation of pollution. Unfortunately, recycled newsprint is not yet available for short printing runs such as these. Newsprint is, however, recyclable but the University is currently unable to recycle quantities of newsprint waste.

Newspapers delivered in excess quantities to many campus drop-off sites are wasted each week and discarded, adding to the landfill problem and increasing the University's solid waste disposal costs.

POLICY

The University is responsible for the number of papers printed and distributed, and should do the following:

- Promote an ethic of newspaper sharing, i.e. asking their readers to pass copies along to colleagues or to return already read papers to the newspaper pile so they can be available to others.
- Keep page numbers to the minimum necessary for each issue's content.
- Monitor distribution of their papers at all sites and use the data gathered to minimize the number of excess copies printed and distributed.
- Utilize recycled newsprint when availability permits and use water-based soy inks.
- Cooperate with University Facilities in the development of a campus newspaper recycling program.


Robert J. Wagner
Senior Vice President for University Services

1/12/93
Date

BUILDING CONSERVATION CONTACT NETWORK

A Program of the University's Environmental Task Force

The UB Environmental Task Force (ETF) develops policies and programs designed to increase UB's Environmental responsibility and awareness. However, the mere existence of these policies and programs will not result in their implementation throughout the University. Achieving greater environmental responsibility at UB primarily depends on informed, voluntary cooperation and personal commitment from members of the University community. For this reason the Environmental Task Force has organized a network of localized contacts in each building who will work to instill a sense of personal and departmental environmental responsibility through face-to-face, personal contact.

The Building Conservation Contact Network is comprised of individuals who serve as Building Conservation Contacts (BCC's) for their office or department. Each BCC makes the members of his or her department, office, etc. environmentally aware and fully participant in UB's environmental program, including recycling and energy conservation. The BCC network was organized during 1994 and 1995 and, as of January 1996, has over 160 members. Our goal is at least one active BCC for every area on both UB campuses.

The primary responsibilities of a Building Conservation Contact include the following:

- Disseminating information about University environmental policies and programs to members of his or her department, office, etc. and encouraging participation and involvement.
- Informally monitoring participation levels and identify problem areas which impede conservation efforts.
- Acting as liaison between his or her unit and the Environmental Task Force, Conserve UB Energy Conservation Program and the University's Recycling Program.

The BCC Network is supported by the University's Environmental Task Force and by the University Facilities energy and recycling programs. If you are interested in becoming a member of the BCC Network or would like more information, please contact Walter Simpson, University Energy Officer (645-3528) or Vicki Sorvillo (645-3916), Student Assistant for the BCC Network.



UNIVERSITY AT BUFFALO
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May 9, 1994

MEMORANDUM

TO: Provost, Vice Presidents, Deans, Directors, Department Chairs

FROM: Robert J. Wagner
Senior Vice President University Services

RE: Summer 1994 Air Conditioning Policy

Outlined in this memorandum is the campus policy for air conditioning for this summer. It is, essentially, the same policy that we have had over the last few summers.

During the normal working day, all air conditioned offices (8:00 AM - 5:00 PM), classrooms, libraries and labs (8:00 AM - 10:00 PM) will be cooled to 76°F. Reheat systems will be bypassed in the air conditioning process whenever possible. During the evening and on weekends and holidays, the temperature will be allowed to rise (except in those rooms with scheduled classes on Saturday). Please call University Facilities Customer Service Office at 71 (or from off campus at 645-2025) to report any air conditioning deficiencies.

University Facilities will monitor building temperatures to determine which air conditioning systems should be enabled first. We expect that all systems will be fully operational by May 15. Special purpose spaces and facilities will be monitored to determine if modifications to the policy are warranted.

We are pursuing short-term and long-term capital projects and gas conversion projects that will help with our energy conservation efforts. CES/Way (an energy services firm) is currently undertaking a comprehensive energy conservation analysis for all facilities at UB. CES/Way has grant funding available from Niagara Mohawk which can be utilized to offset the costs of energy conservation projects implemented on campus.

If you see any opportunities for energy savings or wish to suggest an energy conservation project, please call Mr. Walter Simpson, the University's Energy Officer at 645-3636. Any questions regarding this policy or our efforts in the energy conservation area should be directed to Mr. Ronald Nayler, Associate Vice President for Facilities, at 645-3643. Mr. Nayler also serves as Chairman of the University's Energy Policy Committee.

Please share this memorandum with your staff. Supervisors are encouraged to accommodate reasonable requests from employees for relaxation for wearing more casual clothing because of increased temperatures.

RJW/nak

cc: President William R. Greiner
Senior Vice Chancellor William H. Anslow
THE REPORTER
THE SPECTRUM



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October 9, 1995

MEMO TO: Provost, Vice Presidents, Deans, Directors, Department Chairs

FROM: Robert J. Wagner *[Signature]*
Senior Vice President

RE: 1995/96 Campus Heating Policy

Outlined in this memorandum is the campus policy for energy conservation for this winter. It is, essentially, the same policy that we had in previous years.

Offices will be heated to 68° F from 8:00 AM to 5:00 PM and classrooms will be heated to this temperature from 8:00 AM to 10:00 PM. For the rest of the time, and on weekends and holidays, the temperature will be allowed to drop to 55° F before heating occurs. In most spaces, the temperature will not drop to that level before the normal working day heating cycle begins again. However, during a severe cold snap or during an extended weekend/shutdown, or due to the particular characteristics of some of our facilities, there will be instances when the temperature will drop to 55° F.

Heating for academic program purposes will be provided on off-hours and weekends as needed. Each Dean's Office should provide the University Facilities Customer Service Department with a list of individuals in each departmental office authorized to request off-hour/holiday heating. The request for off-hour/holiday heating must be received by Customer Service (extension 71 or 645-2025) by 12:00 PM of the preceding business day. University Facilities will utilize the most energy efficient means of supplying heat for approved off-hour/holiday requests.

Due to an inability to precisely control temperatures, it may be the case that some spaces may be warmer than planned. It may also be the case that central controls will not permit us to raise the temperature in specific spaces to 68° F without significantly increasing the temperature in the rest of the facility. In those situations, University Facilities will permit the use of portable space heaters. Please note, however, that portable heaters not authorized by University Facilities will be removed. Please call University Facilities, Customer Service (extension 71 or 645-2025) in the event you experience heating problems. Please report overheated as well as underheated areas.

If you see any opportunities for energy savings or wish to suggest an energy conservation project, please call Mr. Walter Simpson, the University's Energy Officer (645-3528). Any general questions regarding our efforts in the energy conservation area should be directed to Mr. Ronald Nayler, Associate Vice President for University Facilities (645-3643), who is also Chairman of the University's Energy Policy Committee.

Please share this memorandum with members of your staff and advise them to dress appropriately for the intended building temperatures.

RJW/nak

cc: President William R. Greiner
Senior Vice Chancellor William H. Anslow
THE REPORTER
SPECTRUM

Date Issued: May 3, 1990

Approved By: Vice Chancellor for
Administrative Affairs

- D. Make the program cost-effective through cost avoidance, with the ultimate goal of becoming as self-supporting as possible.

II. PROCUREMENT OF PRODUCTS MADE WITH RECYCLED MATERIALS

The University will purchase products with recycled material content whenever cost, specifications, standards, and availability are comparable to products without recycled content. The University will identify those items that are frequently purchased for which items with recycled content can be substituted. Additional preference will be given to the specification of items with the highest content of recycled material.

Examples of products and materials covered by this policy include, but are not limited to, office supplies, paper products, building materials, lubricants of all types, reprocessed chemicals, remanufactured parts, landscape products (yard wastes), and materials used in pavement construction projects. The use of recycled materials should also be encouraged when orders are placed for brochures, catalogs, books, letterheads, business cards, etc. In addition, to ensure that a larger percentage of the University's waste stream can be recycled, the procurement policy will seek to eliminate the purchase of nonrecyclable materials when suitable substitutes exist.

To implement this policy, the campus and the Purchasing Division will:

- A. Act to identify and project needs that exist within the University for equipment, supplies, and services for which recycled and/or recyclable products might be available.
 - 1. By reviewing prior and current requests for equipment, supplies, and services to determine the present usage of recycled and/or recyclable products.
 - 2. By examining future needs to determine the extent to which they might involve requests for equipment, supplies, and services that might be met by the procurement of recycled and/or recyclable products.
- B. Actively and diligently strive to identify vendors that can competitively supply recycled products.
 - 1. By reviewing bid responses to determine the availability of commodities manufactured with recycled content.
 - 2. By utilizing commercial directories and federal, state, and local sources of information to identify marketed products that are manufactured using recycled materials.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

CAMPUS ADMINISTRATIVE MANUAL
Use of Services and Stores
Policies

Date Issued: May 3, 1990
Approved by: Vice Chancellor for
Administrative Affairs

Section VII/B - 9

Page 1 of 4

RECYCLING, RECYCLED PRODUCTS PROCUREMENT, AND WASTE REDUCTION

These Policies Implement the University's Commitment
to Recycling and Waste Reduction

The University of Illinois at Urbana-Champaign implemented the University Recycling Program in February 1989 for both environmental and economic considerations. Recycling has become an important waste management activity, which conserves natural resources and landfill space and also reduces waste disposal costs. The University recognized that recycling is only one part of a complete waste reduction program and that in the long term, recycling efforts cannot be successful if there is not a strong demand for recycled products. Therefore, the program has been expanded into a Recycling and Materials Reduction Program (RMRP) to reflect a unified approach to campus waste management. The RMRP is assigned to the building operation section of the Operation and Maintenance Division.

The three policies below should save resources, reduce our waste stream, and improve the market for recycled materials. Each individual's active participation is crucial if the University's program is to be successful.

I. RECYCLING

The University continues to expand campuswide recycling collection and supports the development and implementation of recycling collection for all campus units.

To implement this policy, the campus will:

- A. Ensure that all units, including residential facilities, departments, schools, colleges, laboratories, and offices, develop programs for recycling. These programs may begin with paper and paper products and should expand to include other recyclable materials, such as cans, glass, and plastic.
- B. Educate faculty, staff, and students about recycling. University employees and students are expected to participate in and support all aspects of the RMRP.
- C. Collect and review recycling operational data. Because individual units may require various recycling strategies, operational data should establish the most acceptable and effective recycling program for each campus unit. After a recycling program is instituted in a unit, the program should be periodically reevaluated to determine its effectiveness in removing materials from the waste stream and for acceptability to the employees and students in the unit.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Date Issued: May 3, 1990
Approved By: Vice Chancellor for
Administrative Affairs

CAMPUS ADMINISTRATIVE MANUAL
Use of Services and Stores
Policies
Section VII/B - 9

Page 4 of 4

- B. Share magazines and catalogs so that unnecessary subscriptions can be cancelled.
- C. Use reusable products if at all possible. Examples are ceramic coffee mugs, glass drinking cups, metal silverware, rechargeable batteries, and campus mail envelopes.
- D. Purchase products that have a long useful life. By design, some items have greater reliability or are easier to repair than other similar items.
- E. Whenever possible, control the packaging of purchased material. For example, units that buy in bulk quantities often can reduce packaging waste.

Further questions or suggestions concerning the Recycling and Materials Reduction Program should be directed to the campus Recycling and Materials Reduction Coordinator, (244-SAVE).

- C. Make extra efforts to communicate to campus users the opportunities to meet requirements through the procurement of recycled and/or recyclable products, recognizing that the primary goal of purchasing such products is to reduce waste.
 - 1. By reviewing specifications and intended product usage to determine if recycled products are available that will competitively and adequately meet identified needs and comply with established state and campus policies and procedures.
 - 2. By supporting the campus Recycling and Materials Reduction Coordinator in the identification of recycled products for evaluation and testing to determine their suitability for campus use.
 - 3. By working with the campus Recycling and Materials Reduction Coordinator to develop and publish a campus recycled products list; only products from that list will be purchased unless substantial written justification can be made for a nonrecycled product.
 - 4. By coordinating procurement of recycled products with campus users to ensure satisfactory performance, recognizing that if recycled products do not perform satisfactorily, they become waste.

III. WASTE REDUCTION

The first priority of waste management is volume reduction at the source, reducing the original consumption of material. Using less material will reduce material expenses and waste disposal costs and will diminish the solid waste problem. Campus waste reduction can be effected by the application of a few simple guidelines.

- A. Paper and paper products represent by far the major portion of the campus waste stream. Methods of reducing waste are:
 - 1. Encouraging two-sided copying and printing. All copying and printing requirements should be two-sided by default. Single-sided copying should be specifically requested.
 - 2. Limiting printing needs to the actual requirements for distribution. Overruns should be eliminated. Units should routinely review the distribution lists of reports and limit them to essential persons. Campus mailing lists should be continually updated to eliminate unnecessary mailings. Bulletins and brochures can often be posted in a prominent location or circulated within the unit, rather than distributed to individuals.

University of Illinois
at Urbana-Champaign

Purchasing Division
207 Henry Administration Building
Mail Code 364

Office of Business Affairs

August 13, 1996

TO: R.C. Baker

FROM: J.M. Skinner *J.M. Skinner*

SUBJECT: Purchases of Products Having Recycled Content, Third and Fourth Quarters FY96 and Year-To-Date Totals

Significant changes in the statistics are as follows:

1. Purchases of Paper and Paper Products (Attachment 1) having recycled content are up to 43%, as compared with 41% for FY95. Individual items that contributed to this favorable increase are as follows:

<u>Item</u>	<u>FY95 (%)</u>	<u>FY96 (%)</u>
a. Forms (checks, parking tickets, business, etc.)	2%	20%
b. Computer paper	70%	72%

2. Printing Paper Stocks for Books, General Printing, Catalogs and Market Oriented Publications as Specified by the University and Supplied through Outside Printing Subcontractors for On-Campus Use and Off-Campus Sale and/or Distribution (Attachment 2) has increased to 39% for FY96 from 36% for FY95. Individual items that contributed to this increase are as follows:

<u>Item</u>	<u>FY95 (%)</u>	<u>FY96 (%)</u>
a. Office of Publications	76%	79%
b. University Press publications	5%	11%
c. Office of Printing Services	38%	50%

3. Purchases of Recycled Products (Other than Paper) (Attachment 3) has decreased to 46% for FY96, as compared to 49% in FY95. This decrease was due to the following: (a) the reduction in dollars spent for reloaded copier and laser toner cartridges (from \$74,168.00 in FY95 to \$67,055.00 in FY96) and the reduction in dollars spent for mattresses (from \$109,390.00 in FY95 to \$0 in FY96) due to reduced campus requirements for these items.

4. Concerning Candidates for Purchase as Recycled Commodity (Attachment 4), passenger vehicle tires continue to remain the only commodity under consideration.
5. The Summary of Recycled Purchases for FY90, 91, 92, 93, 94, 95, and 96 (Attachment 6) reflects the overall percentage increased to 42% for FY96, as compared to 40% for FY95. Also, the FY96 amount spent for products with recycled content increased in total dollar value as compared to FY95. Additionally, the Purchases of Paper and Paper Products portion of overall purchases having recycled content increased by 2% for FY96 as compared to FY95.

In spite of tight University budgets, these FY96 statistics reflect that campus users, centralized services and the Purchasing Division continue to specify and buy recycled products whenever it is economically feasible. The FY96 total dollars spent (\$2,551,903.00) for products with recycled content exceeds all previous fiscal years reported and indicates that progress is being made despite the University's limited resources.

JMS:aeb

6 Attachments

1. Purchases of Paper and Paper Products
2. Printing Paper Stocks
3. Purchases of Recycled Products (Other than Paper)
4. Candidates for Purchases as Recycled Commodity
5. Summary of Recycled Purchases (FY96)
6. Summary of Recycled Purchases (FY90, 91, 92, 93, 94, 95, and 96)

cc: R.G. Rossman
T.M. Hoss
R.L. King
S.C. Kiser
K.J. Kral
Buyers and Buying Section Supervisors

RECYCLING REPORT **FY96**

Printing Paper Stocks for Books, General Printing, Catalogs, and Market Oriented Publications as Specified by the University and Supplied through Outside Printing Subcontractors for On-Campus Use and for Off-Campus Sale and/or Distribution

Commodity and Specifications	Third & Fourth Quarters		YTD		Price Differential of Recycled Compared to Nonrecycled Product	Comments Column
	Total Purchases	Portion of Total Purchase Having Recycled Content	Total Purchases	Portion of Total Purchase Having Recycled Content		

University Press publications	\$ 603,688	\$ 73,970	12%	\$ 974,474	\$107,596	11%	10%	As with the Office of Publications, many projects require a coated paper for marketability or quality reproduction that is not available in recycled content. It is estimated that 30%-40% of stock requirements are coated or matte finish.
Printing Service publications	\$ 514,252	\$272,860	53%	\$1,008,612	\$502,342	50%	10%	In many types of paper that customers require, recycled stock is in limited supply. Although the variety of recycled paper has increased, mill production of recycled paper is still low and creates availability problems for low volume high quality paper stock needs. In recent bids, recycled paper prices have been somewhat closer to nonrecycled paper, recycled being approximately 8% to 10% higher. The difference in prices for recycled paper vs. nonrecycled is less on jobs requiring large volumes of paper. Due to budget constraints, additional costs for recycled paper may still be unacceptable to departments.

Office of Publications, general printing	\$ 157,629	\$136,580	87%	\$ 339,283	\$268,194	79%	10%	See Printing Comments above.
Newspapers and Periodicals, purchased for resale	\$ 18,588	\$ 18,588	100%	\$ 40,788	\$ 40,788	100%		Papers and periodicals purchased for resale are both recycled and recyclable.

FY96 TOTALS	\$1,294,167	\$601,998	39%	\$2,363,167	\$918,920	39%		Figures received from Carrie O'Guinn (Publications), Mary Lou Menches (Univ Press), and Kim Cox (Printing Svcs).
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NOTE: The specifications of printing paper stocks generally are dictated by the customers of the University, Printing Services, and the Office of Publications and are therefore largely outside of our control. Sale and/or distribution of these publications is generally off campus.

RECYCLING REPORT **FY96** **Purchases of Paper and Paper Products**

Third & Fourth Quarters				YTD			
Commodity and Specifications	Portion of Total		Total Purchases	Portion of Total		Price Differential of Recycled Compared to Nonrecycled Product	Comments Column
	Total Purchases	Purchase Having Recycled Content		Total Purchases	Purchase Having Recycled Content		
Envelopes (padded, brown kraft, and white)	\$ 64,000	\$ 17,000 27%	\$ 111,404	\$ 24,106 22%	+15 to 20%	Continue to get quote for both nonrecycled and recycled on special whites. Recycled tends to be cost prohibitive. Brown kraft cost and availability is a concern. Padded nonrecycled are not available.	
Forms (checks, parking tickets, business, etc.)	\$ 115,786	\$ 23,000 20%	\$ 263,022	\$ 53,000 20%	One part white, possibly no increase	One part white only is a possibility. Any multi part readability may be compromised. Fifty percent of the multi-part forms dollars not possible to buy recycled.	
Paper (photocopy, printing, duplicating and laser cut sheets)	\$ 1,030,732	\$ 333,357 32%	\$ 1,914,561	\$ 598,224 31%	+10 to +20%	Approximately 10% to 20% of this volume is coated paper for which recycled is not acceptable to the user.	
Computer Paper (laser continuous and cut sheet letterhead)	\$ 80,383	\$ 63,000 78%	\$ 172,286	\$ 123,376 72%	-11 to +10%	Functional concerns remain (on compatibility to laser printers and high speed copiers) as well as tearability of continuous perforations and lint residue.	
Miscellaneous Office Supplies (folders, writing pads, calendars)	\$ 114,728	\$ 27,231 24%	\$ 231,488	\$ 52,918 23%	+12 to +20%	Approximately 40% of this volume is colored paper products for which recycled is not available.	
Exam Booklets	\$ 15,500	\$ 15,500 100%	\$ 15,500	\$ 15,500 100%	Same Price	50% recycled content.	
Art Paper	\$ 1,044	\$ 0 0%	\$ 1,355	\$ 0 0%	+1 to +5% more	Approximately 80% is colored paper which is not available as recycled. White recycled may not meet users' brightness requirements.	
Boards (mat board, illustration board, poster board, timberstrand)	\$ 642	\$ 642 100%	\$ 1,913	\$ 1,913 100%	No Difference		
Toilet Tissue	\$ 33,297	\$ 33,297 100%	\$ 115,354	\$ 115,354 100%	-10%		
Paper Towels	\$ 40,834	\$ 40,834 100%	\$ 100,709	\$ 100,709 100%	-10%	Nonrecycled not available.	
Corrugated Cartons	\$ 40,535	\$ 40,535 100%	\$ 41,996	\$ 41,996 100%	-20%		
Wipes	\$ 14,172	\$ 14,172 100%	\$ 20,470	\$ 20,470 100%	-20%		
Bags and Wrapping	\$ 16,477	\$ 16,477 100%	\$ 30,653	\$ 30,653 100%	-2%	Nonrecycled not available.	
Napkins (food service)	\$ 128,275	\$ 128,275 100%	\$ 156,742	\$ 156,742 100%	-24%		
Facial Tissue	\$ 21,548	\$ 21,548 100%	\$ 43,333	\$ 43,333 100%	23%	Bid indicated +23% for recycled product.	
Facsimile Paper	\$ 0	\$ 0 0%	\$ 0	\$ 0 0%			
Animal Bedding	\$ 0	\$ 0 0%	\$ 0	\$ 0 0%		100% recycled content from newspapers.	
FY96: TOTALS	\$ 1,717,953	\$ 774,868 45%	\$ 3,220,786	\$ 1,378,294 43%			

RECYCLING REPORT

FY96

Purchases of Recycled Products (Other than Paper)

Commodity and Specifications	Third & Fourth Quarters			YTD			Price Differential of Recycled Compared to Nonrecycled Product	Comments Column
	Total Purchases	Portion of Total Purchase Having Recycled Content		Total Purchases	Portion of Total Purchase Having Recycled Content			
Roller Towels	\$ 4,307	\$ 4,307	100%	\$ 14,272	\$ 14,272	100%	57%	Although Roller Towels are more costly than paper towels, they do not take up landfill space and do have recycled content.
Shop Towels	\$ 22,880	\$ 22,880	100%	\$ 44,701	\$ 44,701	100%	50%	Although shop towels are more costly than wipers, they do not take up landfill space and have recycled content.
Automotive Oil	\$ 5,366	\$ 4,580	85%	\$ 11,352	\$ 9,798	86%	46%	South Garage (O&M) Carpool tests have revealed that re-refined oil can be utilized in engines using unleaded regular gasoline. The Carpool is presently testing usage in diesel vehicles.
Washroom Partitions	\$ 0	\$ 0	0%	\$ 0	\$ 0	0%	-40%	Partitions are made from recycled plastic milk bottles. These are known for their resistance to vandalism and long life compared to metal partitions. Only the mounting hardware is not made from recycled materials.
Plastic Lockers	\$ 0	\$ 0	0%	\$ 0	\$ 0	0%	35%	Lockers are made from recycled plastic milk bottles. These are known for their resistance to vandalism and long life compared to metal lockers which may rust in this application.
Railroad Ties (used)	\$ 0	\$ 0	0%	\$ 0	\$ 0	0%		Nonrecycled product not available.
Mattresses	\$ 0	\$ 0	0%	\$ 0	\$ 0	0%	0%	Foam and steel springs from trade-in mattresses is reused in fabrication of new mattresses.
FY96 TOTALS	\$ 295,415	\$ 144,749	49%	\$ 556,277	\$ 254,689	46%		

RECYCLING REPORT FY96

Purchases of Recycled Products (Other than Paper)

Commodity and Specifications	Third & Fourth Quarters			YTD			Price Differential of Recycled Compared to Nonrecycled Product	Comments Column
	Total Purchases	Portion of Total Purchase Having Recycled Content		Total Purchases	Portion of Total Purchase Having Recycled Content			
Personal Copier Toner Cartridges	\$ 900	\$ 100	11%	\$ 1,643	\$ 293	18%	-52%	1) If refurbished toner cartridges are used during the warranty period, it could invalidate the warranty. 2) New cartridges have to be purchased and then they can be refurbished several times. 3) The toner used in the refurbished cartridges is not the manufacturer's brand. Quality may or may not be equal.
Micro Fiche	\$ 4,215	\$ 4,215	100%	\$ 7,101	\$ 7,101	100%	-39%	Cartridges can only be recycled once or twice at most. New ones must be purchased sometimes.
Computer Ribbon Reloading	\$ 1,180	\$ 1,180	100%	\$ 1,522	\$ 1,522	100%	0% to 2%	Users who demand name brand ribbons would not participate in reloading. Some new generic ribbon prices are cheaper than cost to reload the cartridge with generic ribbon product.
Bagliners	\$ 26,916	\$ 26,916	100%	\$ 43,387	\$ 43,387	100%		Nonrecycled product not available.
3M Floor Pads	\$ 5,414	\$ 5,414	100%	\$ 11,130	\$ 11,130	100%		Nonrecycled product not available.
Plastic Containers	\$ 25,960	\$ 25,960	100%	\$ 35,618	\$ 35,618	100%		Nonrecycled product not available.
Laser Toner Cartridges	\$ 182,580	\$ 37,975	21%	\$ 356,555	\$ 66,762	19%	-57%	
Truck Tires/Farm Tires	\$ 5,975	\$ 1,500	25%	\$ 10,510	\$ 1,619	15%	43%	Purchases of recapped tires are made from truck carcasses furnished by the University to the vendor.
Soft Drink Cans (Bid specifies recyclable cans only)	\$ 9,722	\$ 9,722	100%	\$ 18,486	\$ 18,486	100%	0%	Only the container (not the product) is made of recycled material which is approximately 5% of the cost. Therefore, these figures represent 5% of the total cost of the soft drinks purchased. Most food products are packaged in containers made with some (cardboard or metal) recycled material.

SUMMARY OF RECYCLED PURCHASES FOR FY96

	First & Second Quarters			Third & Fourth Quarters			FY96 Total		
	Total Purchases	Portion of Total Purchase Having Recycled Content		Total Purchases	Portion of Total Purchase Having Recycled Content		Total Purchases	Portion of Total Purchase Having Recycled Content	
Purchases of Paper and Paper Products	\$ 1,502,833	\$ 603,426	40%	\$ 1,717,953	\$ 774,868	45%	\$ 3,220,786	\$ 1,378,294	43%
Printing Paper Stocks for Books, General Printing, Catalogs, and Market Oriented Publications as Supplied through Outside Printing Subcontractors for On-Campus Use and Off-Campus Sale and/or Distribution	\$ 1,069,000	\$ 416,922	39%	\$ 1,294,157	\$ 501,998	39%	\$ 2,363,157	\$ 918,920	39%
Purchases of Recycled Products (Other than Paper)	\$ 260,862	\$ 109,940	42%	\$ 295,415	\$ 144,749	49%	\$ 556,277	\$ 254,689	46%
FY96 TOTALS	\$ 2,832,695	\$ 1,130,288	40%	\$ 3,307,525	\$ 1,421,615	43%	\$ 6,140,220	\$ 2,551,903	42%
Candidates for Purchase as Recycled Commodity	\$ 5,380			\$ 10,721			\$ 16,101		

RECYCLING REPORT

FY96

Candidates for Purchase as Recycled Commodity

Commodity and Specifications	Third & Fourth Quarters		YTD		Price Differential of Recycled Compared to Nonrecycled Product	Comments Column
	Total Purchases	Portion of Total Purchase Having Recycled Content	Total Purchases	Portion of Total Purchase Having Recycled Content		
Passenger Vehicle Tires	\$ 10,721		\$ 16,101		0%	Most fleet vehicles are traded within 2 years with an average of 45,000 miles. Therefore, there is not a great demand for replacement passenger vehicle tires at this time. Apparently, there are very few, if any, vendors dealing in retread passenger tires.
FY96 TOTALS	\$ 10,721		\$ 16,101			

SUMMARY OF RECYCLED PURCHASES FOR FY90, 91, 92, 93, 94, 95, AND 96

	FY94			FY95			FY96		
	Total	Portion of Total		Total	Portion of Total		Total	Portion of Total	
	Purchases	Purchase Having	Recycled Content	Purchases	Purchase Having	Recycled Content	Purchases	Purchase Having	Recycled Content
Purchases of Paper and Paper Products	\$ 2,474,430	\$ 886,905	36%	\$ 2,735,251	\$ 1,117,545	41%	\$ 3,220,786	\$ 1,378,294	43%
Printing Paper Stocks for Books, General Printing, Catalogs, and Market Oriented Publications as Supplied through Outside Printing Subcontractors for On-Campus Use and Off-Campus Sale and/or Distribution	\$ 2,515,020	\$ 747,145	30%	\$ 2,457,458	\$ 879,009	36%	\$ 2,363,157	\$ 918,920	39%
Purchases of Recycled Products (Other than Paper)	\$ 618,187	\$ 354,538	57%	\$ 615,148	\$ 303,025	49%	\$ 556,277	\$ 254,689	46%
TOTALS:	\$ 5,607,637	\$ 1,988,588	35%	\$ 5,807,857	\$ 2,299,579	40%	\$ 6,140,220	\$ 2,551,903	42%
Candidates for Purchase as Recycled Commodity	\$ 19,716			\$ 28,215			\$ 16,101		

SUMMARY OF RECYCLED PURCHASES FOR FY90, 91, 92, 93, 94, 95, AND 96

	FY90			FY91			FY92			FY93		
	Total	Portion of Total		Total	Portion of Total		Total	Portion of Total		Total	Portion of Total	
	Purchases	Purchase Having		Purchases	Purchase Having		Purchases	Purchase Having		Purchases	Purchase Having	
		Recycled Content			Recycled Content			Recycled Content			Recycled Content	
Purchases of Paper and Paper Products	\$ 2,663,370	\$ 428,173	16%	\$ 2,644,851	\$ 588,420	22%	\$ 2,231,497	\$ 602,265	27%	\$ 2,474,856	\$ 713,767	29%
Printing Paper Stocks for Books, General Printing, Catalogs, and Market Oriented Publications as Supplied through Outside Printing Subcontractors for On-Campus Use and Off-Campus Sale and/or Distribution	\$ 2,454,139	\$ 61,303	2%	\$ 2,294,511	\$ 133,207	6%	\$ 2,693,323	\$ 492,500	18%	\$ 2,674,788	\$ 426,568	16%
Purchases of Recycled Products (Other than Paper)	\$ 393,696	\$ 164,751	42%	\$ 396,639	\$ 150,515	38%	\$ 546,506	\$ 316,558	58%	\$ 538,933	\$ 290,017	54%
TOTALS:	\$ 5,511,205	\$ 654,227	12%	\$ 5,336,001	\$ 872,142	16%	\$ 5,471,326	\$ 1,411,323	26%	\$ 5,688,577	\$ 1,430,352	25%
Candidates for Purchase as Recycled Commodity	\$ 25,610			\$ 15,791			\$ 14,044			\$ 14,259		

**COURSES WITH AN ENVIRONMENTAL COMPONENT OFFERED AT THE
UNIVERSITY OF TENNESSEE, KNOXVILLE**

AGRICULTURAL ECONOMICS CONTACT: 974-7231

AG ECON 470 - Natural Resource Economics (Park)
AG ECON 570 - Advanced Natural Resource Economics (Jakus)
AG ECON 670 - Seminar in Natural Resource Economics (Park)

AGRICULTURAL ENGINEERING CONTACT: 974-7266

AG ENGR 340 - Soil & Water Conservation (D. Yoder)
AG ENGR 341 - Soil & Water Engineering Laboratory (D. Yoder)
AG ENGR 423 - Irrigation and Waste Management System Design
AG ENGR 575 - Applied Microbiology & Bioengineering

AGRICULTURAL ENGINEERING TECHNOLOGY CONTACT: 974-7266

AG ENGR TECHNOLOGY 442 - Agricultural Waste Management & Pollution Control (Mote)
AG ENGR TECHNOLOGY 462 - Agricultural Chemical Application Technology (Hart)
AG ENGR TECHNOLOGY 532 - On-Site Domestic Water Supply & Wastewater Renovation (Mote)

ANTHROPOLOGY CONTACT: 974-4408

ANTHRO 312 - Appalachian Culture (Howell)
ANTHRO 440 - Cultural Ecology (Klippel)
ANTHRO 514 - Anthropology of Development (Howell)

ARCHITECTURE CONTACT: 974-3243

ARCH 312 - Materials & Methods of Construction
ARCH 341 - Environmental Control Systems I
ARCH 342 - Environmental Control Systems II
ARCH 404 - Preservation Technology
ARCH 410 - History & Theory of Urban Form
ARCH 421 - History of Landscape Architecture
ARCH 435 - Planning & Design of Tall Buildings
ARCH 443 - Building Energy Analysis
ARCH 444 - Advanced Environmental Control Systems
ARCH 445 - Advanced Lighting
ARCH 469 - Codes, Zoning & Fire Protection

BIOCHEMISTRY CONTACT: 974-5748

BIOCHEM 561 - Environmental Toxicology (Farkas)
BIOCHEM 604 - Current Topics in Environmental Toxicology (Farkas)

BIOLOGY CONTACT: 974-6841

BIOL 230 - General Ecology (Staff)

BOTANY CONTACT: 974-2265

BOT 110 - General Botany (Staff)
BOT 120 - General Botany (Staff)
BOT 309 - Biology of Human Affairs (Heilman)
BOT 346 - Introduction to Oceanography (W.O. Smith)
BOT 371 - Undergraduate Seminar (Amundsen)

BOT 372 - Undergraduate Seminar (Amundsen)
BOT 401 - Field Studies in Botany (Staff)
BOT 402 - Field Studies in Botany (Staff)
BOT 431 - Plant Ecology (Clebsch)
BOT 441 - Undergraduate Research Participation (Staff)
BOT 442 - Undergraduate Research Participation (Staff)

CHEMICAL ENGINEERING CONTACT: 974-2421

ChE 489 - Design Internship in Industrial Pollution Prevention (Counce)
ChE 575 - Applied Microbiology and Bioengineering
ChE 581 - Industrial Pollution Prevention (Counce)

CIVIL ENGINEERING CONTACT: 974-2503

CE 380 - Intro. to Water & Waste Treatment (Cox, B. Robinson, K. Robinson)
CE 390 - Hydraulics (Smoot, Tschantz)
CE 395 - Hydrology (Smoot, Tschantz)
CE 480 - Water & Waste Transport. (Cox, B. Robinson)
CE 490 - Water Resources Project Design (Tschantz)
CE 494 - Urban Drainage Engineering (Tschantz)
CE 495 - Water Resources Development & Management (Smoot, Tschantz)

ECOLOGY CONTACT: 974-3065

ECOL 370 - Environmental Conservation (Staff)
ECOL 510 - Special Problems in Ecology
ECOL 520 - Ecology for Planners and Engineers (Amundsen)
ECOL 530 - Implementation of Environmental Policy (Hildenbrand, Reed)
ECOL 537 - Natural Resource Mgmt. and Env. Assessment in Developing Nations (McCormick)
ECOL 552 - Development Planning in the Third World (McCormick)
ECOL 555 - Environmental Planning (McCormick)
ECOL 561 - Environmental Toxicology (Farkas)
ECOL 573 - Population Biology
ECOL 574 - Communities and Ecosystems
ECOL 604 - Current Topics in Environmental Toxicology (Farkas)
ECOL 610 - Special Topics in Ecology
ECOL 620 - Seminar in Ecology
ECOL 637 - Applied Ecology (McCormick)

ECONOMICS CONTACT: 974-3303

ECON 462 - Economics of Resources and Environmental Policy (Kahn)
ECON 677 - Environment and Natural Resource Economics (Kahn)
ECON 678 - Economics of Environmental Policy (Russell)

ENTOMOLOGY & PLANT PATHOLOGY CONTACT: 974-7135

ENTOM 525 - Medical and Veterinary Entomology (Gerhardt)
PLANT PATHOLOGY - Introductory Plant Pathology (Hilty)

ENVIRONMENTAL ENGINEERING CONTACT: 974-2503

ENVR ENGR 510 - Environmental Protection (Staff)
ENVR ENGR 520 - Open Channel Hydraulics (Smoot, Tschantz)
ENVR ENGR 524 - Sediment Transport (Smoot, Tschantz)
ENVR ENGR 525 - Soil Erosion & Sediment Yield (Smoot, Tschantz)

FWF 313 - Measurements and Sampling (Rennie)
FWF 315 - Forest Soils and Watershed Management
FWF 316 - Managing Natural Resource Organizations (Ostermeir)
FWF 317 - Principles of Wildlife and Fisheries Management (Strange, Buehler)
FWF 416 - Planning and Management of Forest, Wildlife Fisheries Resources (Wells)
FWF 525 - Management of Forestry, Wildlife and Fisheries Resources

GEOGRAPHY CONTACT: 974-2418

GEOG 131 - Geography of the Natural Environment (Horn, Harden)
GEOG 132 - Geography of the Natural Environment (Horn, Harden)
GEOG 334 - Meteorology (Blasing)
GEOG 433 - The Land-Surface System (Harden)
GEOG 434 - Climatology (Blasing)
GEOG 435 - Biogeography (Horn)
GEOG 436 - Water Resources (Harden)
GEOG 437 - North American Plant Geography (Horn)
GEOG 445 - Geography of Resources (Harden, Jumper)
GEOG 450 - Process Geomorphology (Clark)
GEOG 533 - Topics in Physical Geography (Harden)
GEOG 535 - Topics in Biogeography (Horn)
GEOG 550 - Regional Geomorphology (Clark)
GEOG 577 - Biological Conservation (Foresta)
GEOG 633 - Seminar in Physical Geography (Harden, Horn)
GEOG 635 - Seminar in Biogeography (Horn)

GEOLOGICAL SCIENCES CONTACT: 974-2366

GEOL 103 - Environmental Geology (Misra, McKinney)
GEOL 202 - Earth as an Ecosystem (McKinney)
GEOL 346 - Introduction to Oceanography (Williams)
GEOL 380 - Resource Crises (Misra)
GEOL 450 - Process Geomorphology (Clark)
GEOL 455 - Basic Environmental Geology (Byerly)
GEOL 485 - Principles of Geohydrology (McKay)
GEOL 535 - Ground Water Hydrology (same as Env. Eng. 535)
GEOL 550 - Regional Geomorphology (Clark)
GEOL 556 - Quaternary Geology of North America (Delcourt)
GEOL 557 - Quaternary Paleoecology (Delcourt)
GEOL 590 - Landscape Ecology (Delcourt, Turner)

HEALTH, LEISURE, & SAFETY CONTACT: 974-5041

PUB HEALTH 310 - Environmental Mgmt. & Control (Shanks)
PUB HEALTH 510 - Environmental & Occupational health (Liu)
PUB HEALTH 513 - Industrial Hygiene Instrumentation and Sampling (Duncan)

INDUSTRIAL ENGINEERING CONTACT: 974-3333

IE 304 - Human Factors Engineering (Hungerford)
IE 423 - Industrial Safety
IE 519 - Human Factors I (Hungerford)
IE 520 - Human Factors Engineering II (Hungerford)
IE 521 - Human Factors Methodology

ENVR ENGR 530 - Stormwater Modeling (Tschantz)
 ENVR ENGR 535 - Ground Water Hydrology (Smoot)
 ENVR ENGR 551 - Physicochemical Unit Processes (Cox, Ghosh, B. Robinson)
 ENVR ENGR 552 - Biological Treatment Theory (K. Robinson, Reed)
 ENVR ENGR 553 - Environmental Engineering Chemistry (Cox, K. Robinson, B. Robinson)
 ENVR ENGR 556 - Hazardous Waste Management (Miller)
 ENVR ENGR 570 - Air Quality Management/Pollution Control (Davis)
 ENVR ENGR 571 - Design of Air Pollution Control Systems (Davis)
 ENVR ENGR 572 - Air Quality Dispersion Modeling (Miller)
 ENVR ENGR 573 - Sampling of Air Pollutants (Davis, Miller)
 ENVR ENGR 575 - Applied Microbiology & Bioengineering (P. Bienkowski)
 ENVR ENGR 595 - Environmental Engineering Chemistry (Ghosh)
 ENVR ENGR 651 - Industrial Waste Unit Operations & Processes (K. Robinson)
 ENVR ENGR 652 - Advanced Physicochemical Treatment (Ghosh, B. Robinson)
 ENVR ENGR 653 - Pollutant Fate Modeling & Risk Assessment (Reed)
 ENVR ENGR 675 - Microbial Systems Analysis (Staff)
 ENVR ENGR 691 - Advanced Dispersion Modeling (Miller)
 ENVR ENGR 691 - Advanced Special Topics (Staff)

FORESTRY CONTACT: 974-7126

FOR 310 - Forest and Wildland Resource Economics (Ostermeir)
 FOR 321 - Forest Recreation (Peabody)
 FOR 322 - Applied Silviculture (Hay)
 FOR 323 - Forest Management and Recreation Practices (Peabody)
 FOR 324 - Forest Resource Analysis (Wells)
 FOR 325 - Forest Resource Inventory and Surveying (Rennie, Little)
 FOR 421 - Forest and Wildland Resource Economics
 FOR 422 - Forest and Wildland Resource Policy
 FOR 423 - Forest Recreation Planning and Management (Winistorfer)
 FOR 492 - Off-Campus Internship in Forestry
 FOR 493 - Independent Study in Forestry
 FOR 511 - Problem Analysis in Forest Resources (Staff)
 FOR 512 - Seminar (Hay)
 FOR 520 - Advanced Forest Tree Biology
 FOR 530 - Advanced Forest Resource Management
 FOR 540 - Genetics in Forestry (Schlarbaum)
 FOR 550 - Recreation Planning for Forests and Associated Lands
 FOR 555 - Forest Recreation Research Methods
 FOR 560 - Industrial Forestry I
 FOR 565 - Industrial Forestry II
 FOR 570 - Management & Policy of Forest Resource Organization
 FOR 580 - Advanced Silviculture (Hay)
 FOR 581 - Cytogenetics (Schlarbaum)
 FOR 585 - Advanced Forest Biometry (Rennie)

FORESTRY, WILDLIFE & FISHERIES CONTACT: 974-7126

FWF 211 - Introduction to Forestry, Wildlife & Fisheries (Hay, Dearden)
 FWF 250 - Conservation (Strange)
 FWF 300 - Current Issues in Renewable Natural Resources (Winistorfer)
 FWF 311 - Dendrology/Ecology/Silvics (Buckner)
 FWF 312 - Silviculture (Hay)

SOCIOLOGY CONTACT: 974-6021

SOC 360 - Environment and Resources (Cable)

SOC 464 - Urban Ecology (Wallace)

SOC 560 - Environmental Sociology (Cable, Hood)

SOC 661 - Theory and Method of Human Ecology (Wallace)

SOC 665 - Advanced Studies in Energy, Environment and Natural Resources Policy (Hood, Cable)

WILDLIFE & FISHERIES SCIENCE CONTACT: 974-7126

WFS 341 - Law Enforcement and Public Relations (Dearden)

WFS 441 - Wildlife and Fisheries Techniques (Minser, Wilson)

WFS 443 - Fisheries Science (Strange)

WFS 444 - Ecology and Management of Wild Mammals (Pelton)

WFS 445 - Ecology and Management of Wild Birds (Dimmick)

WFS 493 - Independent Study in Wildlife and Fisheries Science

WFS 512 - Seminar in Wildlife in Fisheries Science (Hay, Rennie)

WFS 520 - Planning and Administration of Fisheries and Wildlife Programs (Dimmick)

WFS 530 - Wildlife Diseases

WFS 540 - Predator Ecology (Pelton)

WFS 550 - Fish Physiology (Strange)

WFS 560 - Advanced Topics in Wildlife and Fisheries Science (Buehler)

ZOOLOGY CONTACT: 974-2371

ZOOL 573 - Population Biology

Prepared for the UT Environmental Research and Education Committee by the Energy, Environment and Resources Center, 327 South Stadium Hall. Contact: Gail Farris (974-4251)

JOURNALISM CONTACT: 974-5155

JOUR 416 - Environmental Reporting (Everett)

JOUR 516 - Seminar in Journalism Issues - Risk Communication (Miller)

LAW CONTACT: 974-6790

LAW 866 - Environmental Law and Policy

LAW 867 - Environmental Law Seminar

LAW 869 - Natural Resource Law

MICROBIOLOGY CONTACT: 974-3441

MICBIO 470 - Microbial Ecology (Stacey)

MICBIO 570 - Applied and Environmental Microbiology (Sayler, Stacey, White)

MICBIO 575 - Applied Microbiology and Bioengineering (Sayler)

MICBIO 670 - Advanced Topics Environmental Microbiology (Sayler, White)

NUTRITION CONTACT: 974-5445

NTR 100 - Introductory to Nutrition (Zemel)

NTR 412 - Food and Nutrition Resource Management (Haughton)

NTR 513 - Community Nutrition I (Haughton, Zemel)

NTR 514 - Community Nutrition II (Haughton, Zemel)

NTR 520 - Nutritional Ecology (Haughton)

ORNAMENTAL HORTICULTURE & LANDSCAPE DESIGN CONTACT: 974-7324

OHL 110 - Environmental Horticulture (Wilson)

OHL 280 - Fundamentals of Landscape Design (Rogers)

PHILOSOPHY CONTACT: 974-3255

PHIL 346 - Environmental Ethics (Nolt, Hamlin)

PLANNING CONTACT: 974-5227

ARCH 555 - Environmental Planning (Prochaska)

PLANT & SOIL SCIENCE CONTACT: 974-7101

PSS 210 - Introduction to Soil Science (Mullin)

PSS 311 - Soil Fertility and Fertilizers (Lessman)

PSS 312 - Soil and Water Conservation (Mullin)

PSS 313 - Soil and Water Conservation Laboratory (Mullin)

PSS 411 - Soil Microbiology (Mullin)

PSS 412 - Soil Genesis, Classification and Mapping (Ammons)

PSS 413 - Soil Chemistry (Essington)

PSS 414 - Soil, Land Use and the Environment (Foss)

PSS 415 - Soil Water Relations (Wilson)

PSS 431 - Crop Physiology and Ecology (Logan)

PSS 432 - Bioclimatology (Logan)

PSS 512 - Pedology (Ammons)

PSS 514 - Soil Physics (Wilson)

PSS 613 - Advanced Soil Chemistry (Lewis)

POLITICAL SCIENCE CONTACT: 974-2261

POL SCI 311 - Contemporary Issues in American Public Policy (Fitzgerald)

SECOND NATURE

EDUCATION FOR SUSTAINABILITY ON-SITE CLINICS

- *Are you interested in integrating environmental and sustainability perspectives into your courses?*
- *Would you like to give students the skills, knowledge, and attitudes to live sustainably on the planet, but don't know how to start?*
- *Have you been trying to build a movement on your campus with fellow colleagues, but have been challenged in your efforts?*
- *Do you want your institution to interact more closely with the local community to make the connections between classroom learning and practical applications more real for your students?*

If the answer to any of these questions is yes, then Second Nature can help you take the next steps!

The Role of Higher Education

College and university campuses provide a unique setting in which society's present and future teachers, managers, and decision-makers can explore the complex connections between human activities and the natural environment. Individuals can learn to think critically and systemically about their activities, and can begin to make environmentally just and sustainable decisions.

Our on-site clinics are designed to add energy and momentum to campus activities that are just beginning, or which have been underway for many years. Because these on-site clinics provide skills, and resources that lead to concrete actions, they offer opportunities for a range of individuals who want to explore and apply sustainability concepts in the higher education setting.

"[Second Nature has] greatly succeeded in providing me with appropriate materials and methods as well as the motivation in not only improving my courses but in assisting others at Southern University to do so."

— Dr. Nusrat Naquvi, Southern University



Format and Facilitators

Clinics are conducted by a team of facilitators who bring knowledge, experience and creativity to help individuals and institutions move toward sustainability. We will help you develop your objectives for the clinic, identify key faculty, administrators, and students to involve, and coordinate logistical support. Half-day or full-day sessions are available.

Topics

We will work with you to tailor the content of the clinic to meet your institution's needs. Potential topics include:

- ***Introduction to Sustainability and the Role of Higher Education***
- ***Using a Scientifically-derived Framework (The Natural Step) for Moving Your Institution Toward Sustainability***
- ***Transforming Curriculum by Integrating Sustainability***
- ***Skills for Working Together in Your Community***

Cost

The fee for a full-day clinic for 30 participants is \$2,500 plus travel and accommodations. Fees are negotiable. Please contact us if you are interested.

Second Nature

Second Nature is a non-profit organization that has, in just 2 years, reached more than 500 faculty and administrators at 25 colleges and universities across the US and in Brazil. As a result, we have influenced the educational experience of approximately 25,000 students.

For information, contact:

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