

The Impacts of Campus Activities on the Environment
2004 Update
 April, 2005
 Environmental Affairs Committee, University of Missouri-Columbia

INTRODUCTION

In April 2003, the Environmental Affairs Committee released its initial study, “The Impacts of Campus Activities on the Environment.” This initial report was the Committee’s first attempt to address resource use and environmental issues at the University of Missouri-Columbia (MU) in a comprehensive manner. Since this initial report, the Committee has conducted annual updates. This report presents data for 2004.

Questionnaires were distributed to various campus departments in the early months of 2005 to collect follow up information from the initial report and the previous year’s update report. Attempts were made to collect information to compare with data previously collected. In addition, follow up questions were also asked to better define resource usage and impacts. This report contains a summary of the collected information and makes comparisons with previous reports, when possible and appropriate.

FINDINGS—GENERAL CAMPUS STATISTICS

There are at least two ways of interpreting environmental information. One way is to look at gross resource usage statistics. Another way is to put the information in context based on statistics such as number of students, number of employees, number of buildings, budget and other factors. Though such information was not collected for the initial report, some general statistics were collected for the 2003 update. These statistics for FY2004 are as follows:

	<u>FY04</u>	<u>FY03</u>
Number of student (full-time equivalents):	23,055	22,550
Number of faculty and staff (full-time equivalents):	10,522	10,489
Campus expenditures (excludes Hospital):	\$745,175,000	\$697,816,000
Gross square feet of buildings (excludes Hospital):	12,607,378	12,976,507

It should be noted that the Committee has had difficulty getting meaningful and accurate numbers for some of these parameters—particularly number of employees and gross square feet of buildings. As a result, we suggest the reader focus on the gross impacts described below rather than trying to adjust impacts based on number of students, staff, budget or gross square feet.

FINDINGS—RESOURCES

Energy

Energy Management, a unit within Campus Facilities, is responsible for providing energy to campus. The service area is the Columbia campus and University Hospital and Clinics. Steam, but no electricity is provided to the VA Hospital. Ellis Fischel Cancer Center and Columbia Regional Hospital obtain energy from the City of Columbia.

In FY2004, the campus consumed 204 million kilowatt hours of electricity and 2.5 billion pounds of steam. These numbers reflect essentially no change when compared with FY2003. Compared with FY2000, these numbers represented an increase of 4% (electricity) and a decrease of 4% (steam), respectively. In FY2004, energy was provided from the following sources: coal – 75%, natural gas – 6%, tire derived fuel – 2%, and purchased electricity – 17%. In FY04, the Committee requested information on chilled water and were informed that 25.7 million ton-hours of chilled water were consumed by campus.

Energy Management has a continuing program of energy conservation projects. In FY2004, projects were completed in Animal Sciences Research Center, Ellis Library, and Memorial Union, and included replacement of cooling units, improving the efficiency of ventilation systems, and installation of occupancy sensors/automatic lighting controls. Energy Management has replaced more than 99% of all exterior lighting and more than 90% of all interior lighting with energy efficient lighting. Overall, Energy Management has reduced the campus energy bill by \$2.9 million annually through energy conservation initiatives since initiating its energy conservation program in the early 1990's.

In 2004, Energy Management was recognized as "System of the Year" among all colleges, universities, and district energy companies around the world by the International District Energy Association (IDEA). IDEA is a global organization of public entities and private companies with more than 700 members in 12 nations, and includes some of the largest district energy systems in the world. This award is the top honor IDEA can confer and it recognizes high energy efficiency, exemplary operating performance, and a high level of service.

Energy saving technologies are incorporated into building designs to reduce operating costs for the life of the building.

Water

Energy Management, a unit within Campus Facilities, is responsible for providing drinking water to campus and tracking wastewater discharged to the Columbia sanitary sewer system. The service area includes the Columbia campus and University Hospital. In FY2004, the campus consumed 815 million gallons of water and discharged 416 million gallons to the sanitary sewer system. These numbers represent increases of 11% and 3% over the previous year, and increases of 13% and 5%, respectively, over levels from FY2000. The most recent increase is due to water used by new facilities such as Life Sciences, Plaza 900, and the new residence halls on Virginia Avenue and water required to support increased electric generation at the MU Power Plant.

Water/wastewater efficiencies are incorporated into the designs to reduce operating costs for the life of the building. A wastewater treatment facility is being designed as part of the design of several buildings on the East Campus.

Solid Waste and Recycling

Total solid waste sent to the Columbia landfill was 6,059 tons in calendar year 2004. This was an increase of 5% over the previous year, but remained 17% below the amount in 2000. The increase in 2004 follows two years of significant decreases. No cause for last year's increase was identified, though it is likely associated with increased expenditures by the campus.

Fiber recycled in calendar year 2004 totaled 1642 tons, an increase of 22% over 2003 and 23% over 2000. Relatively small amounts of glass and metals are also recycled, and totaled over 6 tons, compared with 11 tons the previous year. Information was collected for the first time on the amount of other recycled items such fluorescent lamps (24,211 pounds), batteries (2,896 pounds), and computer monitors (16,200 pounds). As a result of the large increase in fiber recycling, the overall percent of solid waste recycled rose to 21% in 2004, the first time recycling has exceeded 20% of total solid waste generated.

In the fall of 2004, the campus implemented a program to recycle beverage containers by setting 50 bins on the MU campus. The bins were purchased with funds from the Student Fee Capital Improvement Committee. At the end of 2004, Campus Facilities hired a Solid Waste/Recycling Coordinator, a position partly funded by a grant from the Missouri Department of Natural Resources.

Hazardous Materials

Environmental Health and Safety coordinates the campus hazardous waste management program. The service area for these programs includes the Columbia campus, University Hospital and Clinics, Ellis Fischel Cancer Center, Columbia Regional Hospital, University Physicians clinics, off-site research facilities (including farms), and the Missouri Rehabilitation Center in Mt. Vernon.

In FY2004, Environmental Health and Safety disposed of the following amounts of hazardous materials: 129,000 pounds of EPA regulated hazardous waste; 227,000 pounds of regulated wastes other than hazardous waste; 443,000 pounds of infectious medical/pathological waste; 37,000 pounds of low level radioactive waste (excludes the Research Reactor); and 840 pounds of mixed (chemical and radioactive) waste (excludes the Research Reactor). In most cases, these represented decreases from FY2003. Hazardous waste generation was 39% below the amount generated in FY2000. Other regulated wastes was less than half the previous year, but almost twice the figure for FY2000; regulated wastes are highly variable due to the occurrence of remediation projects. Infectious medical waste increased 7% from the previous year and 41% over FY2000. Part of the large increase over the past four years was due to the purchase of Columbia Regional Hospital during the period. Radioactive wastes and mixed wastes have changed little since FY2000, though there have been some significant year to year variations.

Environmental Health and Safety did not report any new waste minimization initiatives. However, the very successful mercury reduction and chemical redistribution programs have continued.

FINDINGS—INFRASTRUCTURE

Purchasing

No new information was received. Purchasing is centralized under the University System offices; MU is serviced by a campus Procurement Service Center.

Printing Services

Printing Services reported a variety of resource usage statistics for calendar year 2004.

For inks, the breakdown was as follows: vegetable/soy – 5%, metallic – 5%, low VOC petroleum based – 90%. These were the same as the previous year. Paper cost was reported at \$1.48 million, a 1% increase over the previous year; however, the amount of paper purchased is not available. Digital processing accounted for 18% of the business in FY2004, compared with 12% the previous year.

Printing Services has an active recycling program. Recycled amounts are included in the numbers shown in the Solid Waste and Recycling Section above. In addition, a solvent recycling device purchased several years ago continues to be very successful at substantially reducing waste solvent production.

Residential Life

The Residential Life Master Plan continues to be implemented with the opening of the Virginia Avenue Residence and Dining Halls. Construction started on the new Southwest Campus Housing project to be located at the northeast corner of Stadium and Providence. Total capacity of residence halls is 6,026 students.

This year for the first time, the Committee asked Residential Life about resource usage by students and received the following estimates:

- 33 gallons of water per day
- 5.6 kilowatt hours of electricity per day
- 1 pound of solid waste per day

Residential Life has undertaken a number of environmental initiatives. These include assigned staff who empty recycling containers on a weekly basis. Each floor has one recycling container for paper/cardboard and another for plastic/glass/aluminum/metal. During the year a roll-off container for recycling was

relocated from Surplus Property to the Bingham loading area to facilitate campus recycling efforts. Residential Life reports that consistent education efforts aimed at residence hall students has reduced contamination in recycling containers by 75% over the past two years.

All residence halls are smoke free due to no smoking policies in place for residents.

Residential Life plans to begin implementing a multi-year program in 2005 to add recycling containers on the exterior of all residence halls and in parking lots they operate.

Landscape Services

Landscape Services, a unit within Campus Facilities, has responsibility for implementing the campus landscape master plan, maintaining grounds and landscape for most of campus, litter collection, snow removal, and the campus trash removal contract.

In FY2003, Landscape Services had 18 staff members who hold a Missouri Pesticide Applicator's license, which requires testing, periodic training and periodic recertification. This information was not updated for FY2004. In FY2004, Landscape Services estimated that it used approximately 2,200 pounds of synthetic pesticides, a number approximately double that reported the previous year. Landscape Services also purchased 62,000 pounds of inorganic fertilizer, more than double the previous year.

In FY2004, Landscape Services used the following for ice control: 72 tons of sand, 8 tons of potassium chloride ice melt compound, 125 tons of salt (NaCl), and 12 tons of magnesium chloride. Sand use was down 25% from the previous year, while the use of ice melt compounds was less than half the previous year. No cinders were used for ice control by campus in FY2004.

Landscape Services estimates that there are 5,800 landscape trees on campus. For the first time, Landscape Services made an estimate of tons of landscape waste that is mulched or otherwise recycled—2000 tons. These figures are not included in the solid waste and recycling statistics presented above.

Landscape Services reports having reclaimed approximately 25 acres of disturbed lands. They have planted an additional 5000 square feet in Missouri native prairie restoration.

Trends identified by Landscape Services as affecting their future activities are: increased emphasis on erosion control and runoff from disturbed sites.

Planning, Design and Construction (PD&C)

Planning, Design and Construction, a unit within Campus Facilities, is responsible for master planning, new building design and construction, additions, renovations, and for overseeing construction projects. In FY2004, campus construction totaled \$107 million, 7% more than the previous year. In FY2004, the following major construction projects were completed: the Life Sciences Center, Mizzou Arena, and the Virginia Avenue Housing and Dining Halls.

In FY2004, the size of the Columbia campus remained 1350 acres, of which about 500 acres (37%) is classified as green space.

The following “environmentally friendly” specifications are included in bid specifications:

- Sustainable furniture and interior finishes
- Various energy saving features, including sensors to maximize HVAC efficiency , and occupancy sensors to control lighting and ventilation
- Storm water retention and management on construction sites
- “Green roofs” have been specified for Life Sciences and the Journalism Institute

Planning, Design and Construction staff have training on environmental building design through a variety of professional organizations, including Envirodesign, Association of University Architects, and the American Institute of Architects. Staff have also received LEED training, participated in the Greening of the Heartland conference and attended Construction Specification Institute seminars.

In FY2004, Planning Design and Construction oversaw the renovation of the Mumford Hall Entrance with all environmentally friendly/sustainable materials, including linoleum, cork, rubber, low VOC paints and energy efficient lighting.

- Looking to the future, Planning Design and Construction has been pursuing the following issues:
- Defining custodial and maintenance issues with sustainable products
- Researching sources for recycled building products
- Exploring LEED type recognition
- Increase use of green building products
- Finding sources to recycle building materials from project demolition
- Look at environmentally friendly ways to build and operate structures with particular attention to laboratories (exhaust effluent controls, heat recovery, and waste issues)

FINDINGS—EDUCATION

Environmental Education at MU happens on a number of different levels, ranging from recently established environmental majors, through environmentally-related majors, environmental coursework, and out-of-classroom experiences that give students opportunities to put formal knowledge to the test. There are also several graduate programs that prepare students for research or work in the environmental area.

There are three environmental majors at MU (Environmental Geology, Environmental Soil Science, and Environmental Science [new in 2004]), both provided as emphasis areas within established programs. In 2004, the University approved Environmental Studies, an emphasis area in Interdisciplinary Studies in the College of Arts and Science.

Undergraduate students also have the opportunity to earn a Certificate in Environmental Studies. In FY2005, there were 16 students enrolled in the program, ten of whom will graduate with the certificate. Overall, students may earn environmentally-related majors or graduate degrees in the following programs: Forestry; Fisheries and Wildlife; Geology; Parks, Recreation and Tourism (no Ph.D.); and Soils, Environment and Atmospheric Sciences. At the graduate level, there are jointly coordinated programs offering graduate certificates in Conservation Biology and Resources and Development.

Faculty in a variety of instances have coordinated classroom experiences with local environmental initiatives and projects. In 2004, these included:

- Water Quality Competition for the Missouri Science Olympiad
- Earth Day Kid's Activities for Columbia Earth Day
- Statewide Environmental Education Conference at MU

Other environmental education successes in 2004 include:

- Established the Student Environmental Professions Association
- Supporting Sustain Mizzou, which had several high profile projects during the year.
- Published monthly newsletters on environmental topics
- Started a website listing all area environmental programs, organizations, etc.
- Joined the board of the Missouri Environmental Education Association

MU students had several notable achievements. Jared Cole won the 2004 MU-Peter Raven Environmental Leadership Award and was one of 80 students nationally to win a Udall Scholarship, which encourages students to pursue work on environmental issues.

Trends and needs for the foreseeable future include: more out-of-classroom experiences for students; better coordination of environmental education on campus, and better coordination of environmental education statewide.

FINDINGS—RESEARCH

Research Farms

No new information was received.

Research Reactor

The Research Reactor activities described in the initial report continued in FY2003. Radioactive releases in FY2004 to the sewer system (103 milliCuries of tritium, 109 milliCuries of all other isotopes) dropped substantially from those in FY2003. Air releases in FY2004 for Ar-41 (half-life of 1.83 hours) increased 6% over FY2003 to 1320 Curies; however, this was only 82% of the Technical Specification limit and is within normal variation. All other air releases were less than 0.1% of the Technical Specification limits.

Low level radioactive waste shipped from the Research Reactor in FY2004 totaled 21,000 pounds, a 74% increase over the previous year, but less than the FY2000 total, which was incorrectly reported in the report issued in 2003. Until FY2004, waste shipped had dropped each year since 2000. The amount generated can be greatly affected by special maintenance projects.

All persons with unescorted access to the Research Reactor receive hazardous material and basic radiation safety training. Persons working in laboratories or other restricted areas receive additional training, as appropriate.

The Research Reactor continues to maintain compliance with all applicable environmental regulations.

SUMMARY AND CONCLUSIONS

This report is intended as an annual supplement to the report issued in April 2003. The information contained herein is intended to provide information about the environmental impacts of MU activities and to stimulate discussion about these impacts and the projected trends.

The Environmental Affairs Committee notes that there are many success stories contained within this report. On the other hand, the report points toward opportunities in a number of instances. The Committee welcomes feedback about the data collected, the way the material is presented and any conclusions that are drawn.

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