



# *Environmental Progress Report*

**June 2011**

**To Chancellor Jimmy G. Cheek and  
Vice Chancellor for Finance and Administration Chris Cimino**

**By the Committee on the Campus Environment**

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# Introduction

This Environmental Progress Update Report summarizes environmental stewardship activities implemented at the University of Tennessee, Knoxville since the Committee on the Campus Environment (CCE) published its first Environmental Progress Report in 2005 (see Appendix A for a complete listing of campus environmental reports).

The report is divided into four sections, the first of which summarizes notable achievements (“milestones”) in UT Knoxville’s sustainability efforts since 2005. Section 2 compares the recommendations of the 2005 report with what has actually been accomplished since its publication. The short answer is: a lot, but there is always much more to do. Section 3 updates data for the ten indicators of environmental progress that were used in the 2005 report and adds three new indicators: student involvement, greenhouse gas emissions and development efforts for sustainability initiatives. Section 4 offers new recommendations from CCE, based on the findings in the earlier sections of the report.

The Committee on the Campus Environment gratefully acknowledges the support of Chancellor Jimmy G. Cheek in providing funds for a research assistant to help with the preparation of this report. John Regan ably filled that role during the spring semester 2011. Many members of the committee contributed to this document, but special thanks go to Gordie Bennett for his outstanding efforts. The committee’s work was also assisted by students Joshua Richeson and Maria Rosales, as well as UT alumnus Reagan Richmond.

# 1. Milestones since 2005

## **Student Facilities Fee (2005)**

In fall 2005, by request of student vote during SGA elections, the Student Facilities Fee was increased to establish funding for campus sustainability initiatives. Among other things, the environmental portion of the Student Facilities Fee has generated funding to reduce water consumption in campus facilities, fund student energy conferences, purchase hybrid electric and all-electric vehicles for use on campus, purchase recycling bins for student rooms and faculty/staff offices, fund two Make Orange Green graduate assistants, and provide materials for awareness education (see Appendix B for a full list of projects supported by the Student Facilities Fee). The Student Environmental Initiatives Committee, which is comprised of faculty, staff and students, meets as needed to recommend how to allocate funds generated for campus sustainability projects by the Student Facilities Fee.

One notable sustainability project funded through the Student Facilities Fee is a complete lighting retrofit at Stokely Management Center. Prior to the retrofit, the older inefficient lighting fixtures could only be turned on and off one half of one floor at a time. With labor donated by the UT Knoxville Facilities Services, the project funded the purchase of new lighting fixtures and controls that use about one-third less electricity and eliminate the need for excessive lighting in the building. In addition, the funding added daylight harvesting technology to the building so that the lighting dims as sunlight shines enters a space. Based on 2003 electric rates, these improvements are estimated to save approximately \$56,000 per year.

## **Campus Environmental Stewardship Fund (2005)**

Created at the request of the Committee on the Campus Environment, the Campus Environmental Stewardship Fund encourages and enables anyone from the community to donate money to UT Knoxville sustainability initiatives. The fund is intended to support and advance projects similar to those backed by the Student Environmental Initiatives Fee.

## **Green Power Purchase (2005)**

Since its inception, the environmental portion of the Student Facilities Fee has been used to support the purchase of “green” power. The fee currently funds the purchase of 5,000 blocks of certified Green-e® renewable energy certificates (RECs) through the TVA/KUB Green Power Switch Program. The 5,000 blocks or 750,000 kWh/month-purchase offsets approximately 367 metric tons of carbon dioxide equivalent (MTCDE) each month. This is the equivalent of removing 864 cars from the road each year<sup>1</sup>. The purchase is also equivalent to 3.6% of campus' annual purchased electricity, making UT Knoxville a member of the EPA Green Power Partner Program.

## **Make Orange Green (2006)**

Make Orange Green, the Knoxville campus' environmental sustainability initiative, was launched during fall 2006. A collaborative effort between the Committee on the Campus

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<sup>1</sup> Source: USEPA Greenhouse Gas Equivalencies Calculator. Accessed May 26, 2011 from <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>.

Environment, Facilities Services (including the Office of Sustainability), and the Office of Communications and Marketing, Make Orange Green projects and programs are intended to reduce the university's environmental impact while building a culture of sustainability among faculty, staff, students and campus visitors. See <http://environment.utk.edu/>.

### **Sustainable Building Policy (2007)**

UT Knoxville adopted a Sustainable Building Policy in September 2007. The policy establishes the United States Green Building Council's Leadership in Energy and Environmental Design (LEED™) as the standard for Knoxville campus construction and renovation projects costing more than \$5 million. For all such projects, design and construction shall be designed to meet the minimum requirements of LEED for New Construction and Major Renovations (LEED-NC). In addition, small scale renovations shall utilize the LEED for Commercial Interiors (LEED-CI) rating system as applicable.

### **Presidents' Climate Commitment/Climate Action Plan (2007)**

In fall 2007, Chancellor Crabtree signed the American College and University Presidents' Climate Commitment (ACUPCC). The ACUPCC is an effort by higher education leaders nationwide to reduce their institutions' impact on global climate change and integrate sustainability and climate change into the curriculum. UT Knoxville and other signatories of the ACUPCC are required to take two immediate, tangible actions to reduce greenhouse gas emissions. For UT Knoxville, the tangible actions include the participation of campus in the national RecycleMania waste minimization competition and the subsidization of public transportation for faculty, staff and students.

As part of the ACUPCC, UT Knoxville must conduct a greenhouse gas inventory every other year and publicly report total emissions on the Association for the Advancement of Sustainability in Higher Education's (AASHE) website. With the help of honors student (now UT Knoxville alumnus) Leslie Chinery, the Office of Sustainability completed the first campus greenhouse gas emissions inventory in 2007. The Office has completed additional inventories in 2008 and 2009.

Also, in accordance with the ACUPCC, the campus has adopted a Climate Action Plan. The plan, which was approved by Chancellor Jimmy G. Cheek in January 2010, aims for "climate neutrality", or zero net greenhouse gas emissions, by 2061. The plan is posted at:

[http://rs.acupcc.org/site\\_media/uploads/cap/483-cap.pdf](http://rs.acupcc.org/site_media/uploads/cap/483-cap.pdf)

The next step for campus will be to implement the Climate Action Plan and publicly report progress (in terms of greenhouse gas emission reduced or offset, and integration of sustainability and climate change into the curriculum) on the Association for the Advancement of Sustainability in Higher Education's (AASHE) website.

### **Conceptual Energy Plan (2007)**

At the request of Chancellor Crabtree, the Committee on the Campus Environment in collaboration with researchers from Oak Ridge National Laboratory created a 25-year Conceptual Energy Plan for UT Knoxville. The plan was partially funded by a \$25,000 Renew America grant from the U.S. Department of Energy. It was submitted to Chancellor Crabtree on

August 31, 2007. The Energy Plan may be accessed at:  
<http://www.cce.utk.edu/energyplan/energyplan.pdf>

### **Office of Sustainability (2007)**

Established in summer 2007, the Office of Sustainability aims to foster sustainable development and promote environmental stewardship at the University of Tennessee, Knoxville by strategically bridging the gap between campus operations, teaching, research, and outreach. Sustainability Manager Gordie Bennett has directed activities of the Office of Sustainability since fall 2008. Gordie has led efforts to reduce the university's ecological footprint by tracking and reporting campus emissions, developing sustainability outreach materials, and encouraging sustainable campus operations.

### **Switch Your Thinking (2008)**

The Switch Your Thinking campaign, initiated by the Chancellor's Office in fall 2008, is an effort to encourage energy conservation practices among UT Knoxville faculty, staff, students and visitors. The campaign calls for these individuals to support Make Orange Green by adopting four simple steps:

- Turning off lights when not in the office for more than one hour.
- Turning off computers when not in the office for more than an hour.
- Using a power strip in the office, and turning it off at the end of each day.
- Turning off window AC units at the end of each day.

To date, Switch Your Thinking has helped the Knoxville campus avoid consuming over \$1 million in electricity, while preventing the environmental impacts associated with producing this power. The campaign is ongoing, and in January 2011, Chancellor Jimmy G. Cheek challenged the campus community to further reduce energy use during the 2011 calendar year by 10 percent.

### **Energy Conservation Policy (2008)**

UT Knoxville's Energy Conservation Policy was approved by Interim Chancellor Simek in December 2008. The policy established a host of energy-saving measures, including ENERGY STAR purchasing and indoor air temperature guidelines (68 degrees F for heating; 76 degrees F for cooling) for all campus buildings. The complete text of the Energy Conservation Policy is available at <http://www.pp.utk.edu/policies/Energy%20Conservation%20Policy.pdf>.

### **Campus Composting Program (2010)**

UT Recycling, the Knoxville campus recycling program, has launched a food composting program to transform otherwise wasted food into nutrient-rich fertilizer. A pilot program with pre-consumer food waste - unsold or uneaten items, such as leftover bagels and coffee grounds - started in May 2010. The food waste is collected from campus dining locations and taken to a composting site off Cherokee Trail, where it is mixed with wood chips from campus tree trimmings. By early fall 2010, UT Recycling was collecting 1,000-1,200 pounds of food waste per week for composting.

### **Campus Master Plan (2011)**

The draft 2011 Campus Master Plan contains goals and strategies for promoting environmentally friendly forms of transportation, including bicycling and walking. Recommendations included in the current draft include establishing an extensive system of bicycle lanes, paths, and “sharrows” (shared-lane markings). Additionally, the draft emphasizes the need for moving vehicles and parking spaces to the periphery of campus, and it recommends establishing an extensive corridor of green space along what is now Andy Holt Avenue.

### **Overall Improvement**

As a result of measures implemented over the last six years, the environmental indicators introduced in the 2005 Environmental Progress Report point to a general trend of improvement. The details of this trend are documented in Section 3 of this report.

## 2. Progress on Recommendations of 2005 Report

The original Environmental Progress Report contained an extensive list of “short-term” (within five years) and “longer-term” (five or more years) recommendations for improving the sustainability of campus operations. The table below describes progress that UT Knoxville has made in implementing these recommendations since 2005. There has been substantial progress on most of the short-term goals and on many of the longer-term goals. Although these achievements have put the Knoxville campus more solidly on the path toward sustainability, we still have a long way to go.

### General Recommendations

Recommendations of 2005 Report	Achievements since 2005
Create an Environmental Coordinator position within Facilities Services to coordinate with such areas as Facilities Planning, Development, Parking Services, Dining Services, University Housing, and Environmental Health and Safety.	UT Knoxville has created an Environmental Coordinator position to manage the campus recycling and waste reduction program. In addition, a Sustainability Manager has been hired to promote energy conservation and efficiency programs, as well as education/outreach activities that communicate campus’ environmental commitment. Both positions are housed and funded through the Facilities Services.
Calculate the “payback” periods of “green” equipment and facility designs with relatively low O&M costs, and factor payback periods into decisions	Calculations regarding the return on investment, or “pay-back” periods, of “green” equipment and facility designs are being factored into procurement decisions.
Establish an “environmental stewardship fund” to support environmental improvements.	Campus Environmental Stewardship Fund established in 2005 (see “Milestones”).
Make environmental stewardship a selling point when seeking private donations for the University.	Not implemented.

### Energy Consumption in Buildings

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Continue use of energy efficient ballasts and lamps in fluorescent fixtures or their components are replaced.	Facilities Services and University Housing use energy-efficient lighting for routine repairs and replacements. Magnetic ballasts are being replaced with electronic ballasts and fluorescent light fixtures are being upgraded from T12s to T8s.
Replace incandescent lighting with fluorescent or more energy-efficient lighting.	UT Recycling and the Office of Sustainability host an annual light bulb exchange in campus residence halls to encourage students to use energy-efficient compact fluorescent light bulbs rather than incandescent bulbs.
Post “Kill-a-Watt” signs on light switches.	Thousands of “Make Orange Green” switch plates have been distributed on campus to encourage building occupants to conserve energy by switching off overhead lights.

## Energy Consumption in Buildings

Recommendations of 2005 Report	Achievements since 2005
Provide incentives to students to save energy in residence halls. In general, start a more concentrated effort on “energy conservation” behavioral training aimed at students, faculty, staff, and the administration.	Launched in 2005, the Make Orange Green POWER Challenge promotes energy conservation and other sustainability best practices among students who live in a campus residence hall. The Challenge encourages friendly competition between the halls to see who can reduce electricity use and water use, while increasing recycling rate, by the most during the month of October. To encourage participation with the competition, weekly prizes are given to Resident Assistants who host programs and other activities that educate students about the importance of environmental stewardship.
<b>Longer Term</b>	
Add motion sensors to lighting for, e.g., rooms, corridors, and parking lots.	Facilities Services routinely installs occupancy sensors to power off lights when rooms are unoccupied. In the coming years, the Department plans to install thousands more sensors on campus.
Expand the use of energy management control systems in existing buildings for HVAC and lighting systems.	Campus is making progress towards establishing a centralized energy management system. Campus buildings are being equipped with meters to allow energy consumption data to be wirelessly transferred to a central collection point. This system will allow for regular audits of energy consumption and provide the data necessary to pinpoint further opportunities for energy savings in UT Knoxville buildings.
After implementing basic energy improvements that are known to be needed, conduct energy audits to identify further opportunities for energy savings in UT Knoxville buildings.	UT Knoxville is working with the Tennessee Valley Authority (TVA), and the Knoxville Utilities Board (KUB) to develop a 10-Year Strategic Energy Road Map for campus. As part of this project, TVA and its contractors are identifying energy savings opportunities in up to 10 campus buildings.
Complete conversion to regional chiller plants for air conditioning.	Facilities Services installs regional chiller plants as old or inefficient chillers are replaced.
Explore using geothermal cooling where appropriate.	Campus is employing geothermal heating and cooling in the new Sorority Village.
In new construction or renovation, design to maximize the use of natural lighting, use new technologies for energy-efficient lighting as they become financially feasible, and design for lower HVAC loads – e.g., by incorporating passive solar and natural ventilation features.	These practices and technologies are encouraged, though not required, by the campus’ Sustainable Building Policy (see “Milestones”) and the State of Tennessee Sustainable Design Guidelines.
Explore the financial and technical feasibility of adding photovoltaic (PV) panels to selected roofs and surface parking areas; encourage UT Knoxville and UT/Battelle research on solar panels and other alternative energy technologies; work in collaboration with TVA’s Generation Partners program.	During fiscal year 2009-10, the Student Environmental Initiatives Committee voted to support a \$400,000 four-year project that will place a large PV on campus, possibly on the roof of the Neyland Drive (G-10) Parking Garage.

## Air Pollution

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Increase investment in TVA's Green Power Switch ® program.	UT Knoxville currently purchases nine million kWh per year of green power through the TVA/KUB Green Power Switch® Program. This is up from the 6,075,000 kWh of green power purchased through the same program during fiscal year 2005-06.
Continue conversion to biodiesel for service vehicles.	Not implemented by Facilities Services because of problems with biodiesel thickening and becoming difficult to dispense when stored for long periods of time or in cold weather.
Install a dry scrubber at the Steam Plant to help meet new mercury emissions regulations.	Not implemented. Mercury emissions at the Steam Plant (tested at 0.0000085 lbs/MMBtu) comply with current environmental regulations.
Become an air quality leader: Anticipate the need for regulation of carbon dioxide by establishing a task force to explore options for reducing fossil fuel use; also anticipate more stringent nitrogen oxide and PM 2.5 emissions standards	Not implemented.
<b>Longer Term</b>	
Conduct lifecycle analyses of the costs and environmental impacts of energy technologies that could reduce dependence on the fossil-fuel-powered Steam Plant.	Not implemented.
Shift the UT Knoxville passenger vehicle fleet to hybrid electric vehicles.	UT Knoxville currently has five hybrid electric vehicles and 12 all-electric vehicles in its fleet. Of the 671 vehicles in the UT Knoxville fleet, at least 247 are flex-fuel vehicles (FFVs). Transportation Services fuels all FFVs with E85 fuel (pumped on campus) six months or more each year.
Explore incorporating passive solar water heating into buildings.	During fiscal year 2010-11, the Student Environmental Initiatives Committee voted to support the purchase of a photovoltaic (PV) array that would heat water while generating power. A location for this recommended PV array has not been determined.
Explore the technical and financial feasibility of onsite biodiesel generation from UT Knoxville agricultural waste products, with the biodiesel to be used in campus service vehicles.	The Southern Alliance for Clean Energy (SACE) has partnered with the UT Institute of Agriculture to open a 380,000 gallon-per-year waste-oil biodiesel plant at the UT Johnson Agricultural Research and Teaching Unit (JARTU). Facilities Services is not pursuing using this or other biodiesel for its vehicles because of the problems mentioned earlier in this table.

## Water and Sewer Use

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Continue to replace old plumbing fixtures with low-flow versions.	Facilities Services installs low-flow shower heads where possible. In addition, University Housing has installed "water saver" shower heads in all resident bathrooms.

## Water and Sewer Use

Recommendations of 2005 Report	Achievements since 2005
Continue to evaluate waterless urinals and other water-saving devices.	Campus buildings constructed or renovated since about 2000 have water-efficient single flush toilets (1.6 gallons per flush - gpf) and urinals (0.6 gpf). In buildings currently under the construction, even more efficient single flush toilets and urinals are being installed. These fixtures are rated at 1.28 gpf and 0.125 gpf, respectively.
Post signs encouraging water conservation in showers, rest rooms, kitchens, and laboratories.	Not implemented.
<b>Longer Term</b>	
Install automatic turnoff faucets.	Facilities Services installs low-flow automatic faucets where possible.
Explore using timers on showers in UT Knoxville recreational facilities.	Not implemented.
Explore reusing "gray water."	Several new construction projects employ storm water cisterns for the collection and use of grey water for future irrigation.

## Water Pollution

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Continue work on sediment control, as has been done recently at the Steam Plant to divert runoff from the coal storage area.	The Knoxville campus has a Storm Water Pollution Prevention Plan (SWPPP) for the Steam Plant. This plan identifies sources and activities at the plant that may contribute pollutants to storm water and commits the campus to specific control measures.
Continue implementation of the Spill Prevention, Control, and Countermeasures (SPCC) plan.	A monthly inspection and annual detailed review are conducted to identify any storm water run-off issues at the Steam Plant. These procedures are supplemented by a visual check at the Steam Plant on a quarterly basis, and an annual detailed chemical analysis of storm water from the plant.
Improve management of the riverbank and associated riparian corridor on the UT Knoxville farm property west of the Alcoa Highway ("Buck Karns") Bridge, along the Tennessee River.	Improvements of the riverbank and riparian corridor on Cherokee Farm are being addressed. Most recently, a project has been implemented that includes the construction of a greenway and the introduction of riverbank flora to the area.
<b>Longer Term</b>	
Design new buildings and major renovations to capture storm water runoff for perimeter landscaping.	Several new campus buildings are designed to feature cisterns for capturing storm water collected from the project sites.
Continue the conversion from surface parking to structured multilevel parking.	This is being implemented and is included in the draft 2011 Campus Master Plan.
Where surface parking lots are used, explore using permeable surfaces.	Not implemented.
Explore "green roof" technologies.	In 2009, UT Plant Sciences researchers and local high school students constructed a demonstration green roof on top of a shed (also built by the students) at the Agricultural Campus. Additionally, the environmental portion of the Student Facilities Fee is being used to construct a green roof at the Student Services building.

## Water Pollution

Recommendations of 2005 Report	Achievements since 2005
Plant floral species active in phytoremediation to absorb aqueous pollutants present in storm water runoff.	A demonstration rain garden has been installed next to Agricultural Campus green roof (see “Explore ‘green roof’ technologies”).

## Solid and Hazardous Waste

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Continue to publicize the hierarchy of “reduce, reuse, and then recycle.”	Efforts to publicize and increase the visibility of campus recycling have been supported by programs such as Good Sports Always Recycle and RecycleMania.
Continue to increase the visibility of UT Knoxville’s recycling program, as well as its educational program – in general and as targeted to residence halls. Develop material on recycling that can be included with new faculty and staff orientation.	The Office of Sustainability publishes <i>The Green Leaf</i> quarterly newsletter to inform campus about opportunities to participate in environmental programs and to provide them with updates about ongoing sustainability projects.
Make reusable dishware an option at all dining facilities.	UT Volunteer Dining has removed trays from many campus dining locations, saving approximately 49,500 gallons of water per week. A pilot program by UT Volunteer Dining allows faculty, staff, and students to purchase and use reusable take-out containers at the Southern Kitchen dining facility. The program has been so successful that UT Volunteer Dining is exploring the idea of offering more such containers for sale.
Explore options for recycling additional materials such as electronic equipment, Styrofoam, and ash from the Steam Plant.	UT Knoxville’s recycling program has been expanded to include electronic equipment, batteries, scrap metal, printer cartridges, and many more materials.
Continue to expand special event recycling opportunities.	UT Recycling fosters and coordinates several recycling-themed events over the course of each school year. In 2010, campus participated in the EPA Game Day Challenge, a friendly competition to see which college or university can recycle and reduce waste the most during one home football game in October. UT Recycling offers composting at a number of special events, including the Freshman Picnic in August and select meals during the Destination Imagination Global Finals in May.
Develop guidelines for ways to minimize the use of hazardous chemicals in laboratories.	In February 2011, Environmental Health and Safety implemented a Mercury Reduction policy. The policy is intended to reduce the generation of mercury waste to the extent that is technically and economically feasible. Other objectives include: improved environmental compliance, reduced risk to employees, and resource conservation.
<b>Longer Term</b>	
Explore substitutes for individually bottled water, such as metered “for pay” spring water dispensers.	UT Knoxville is doing its part to limit waste from bottled water by providing water refill stations in high-traffic campus buildings. To date, stations have been installed at the Aquatic Center, TRECS, Hodges Library and the University Center.
Implement a campus food waste composting program using local composting resources.	Campus composting program launched in 2010 (see “Milestones”)

## Solid and Hazardous Waste

Recommendations of 2005 Report	Achievements since 2005
Implement measures such as recycling in tailgate areas during football games, and the placement of outdoor recycling bins.	On football game days, UT Recycling and student volunteers place hundreds of recycling bins in tailgate areas. Outdoor recycling bins are available between the Volunteer Boulevard Parking Garage and Apartments Residence Hall, and behind Fraternity Row. In spring 2011, UT Recycling started a pilot with one walkway recycling bin at each of the following campus locations: Pedestrian Mall, Money Wall, and The Hill.

## Procurement

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Require that recycled content paper be used for all printers and copiers.	Although not required to do so, Facilities Services and several other departments on campus have switched to 30-percent post-consumer recycled content paper.
Investigate the “green” procurement practices of other universities.	Not implemented.
Include “green purchasing” information when campus contract purchasing information is distributed – e.g, information such as “certified wood products should be preferred in procurement practices, all other things being equal.”	Not implemented.
Make organic and regionally grown food available on campus.	Packaged organic food items are sold on campus at PCB Grocery. UT Volunteer Dining is exploring opportunities to offer food items prepared from the native herbs and spices grown at the UT Culinary Institute’s Spice Garden.
Provide access to fair trade certified products (e.g., coffee, bananas, and cotton).	Students, faculty, and staff may purchase fair trade coffee in dining locations across campus.
<b>Longer Term</b>	
Develop and implement a set of “green” procurement guidelines for UT Knoxville.	<p>The Energy Conservation Policy specifies that ENERGY STAR qualified equipment, systems and appliances shall be purchased whenever such products are available and the following two conditions are satisfied:</p> <ol style="list-style-type: none"> <li>1) The quality and function of the ENERGY STAR qualified product is equal or superior to that of non-ENERGY STAR qualified products; and,</li> <li>2) The additional upfront cost of the ENERGY STAR qualified product is less than its resulting lifecycle energy savings.</li> </ol> <p>The Energy Conservation Policy also states that energy-efficient flat panel computer monitors shall be purchased unless medical, instructional, research or other special requirements necessitate the use of less efficient CRT monitors.</p>

## Motorized Transportation

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Aggressively pursue a “Smart Trips” program for UT Knoxville.	UT Knoxville is a member of Knox Smart Trips. This program is designed to improve the region’s air quality by easing traffic congestion. Faculty and staff who sign up for Smart Trips and regularly log their alternative commutes are eligible for free emergency rides home, as well as ‘Commuter of the Month’ prizes, courtesy of Smart Trips. In November of 2010, Smart Trips awarded campus with the “Green Spirit” award for its participation with Smart Trips’ annual Commuter Challenge.
<b>Longer Term</b>	
Create incentives to reduce the number of solo drives to campus, such as lower-cost parking passes with limited use.	Faculty, staff and students may purchase subsidized transit passes for use on most Knoxville Area Transit fixed routes. A van pool program offers one large van for lease to UT Knoxville employees on a monthly basis.

## “Green” Buildings

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Formally adopt the policy that on all new construction and renovation of major buildings, LEED certification will be sought.	Sustainable Building Policy established for campus in 2007 (see “Milestones”). In addition, the State of Tennessee Sustainable Building Guidelines are based on the LEED v.2.2 rating system. However, there is no campus policy that requires LEED certification.
Encourage and provide funds for LEED training and certification for UT Knoxville employees such as Building Representatives and staff in Facilities Services, Housing, etc.	Facilities Services has two LEED-AP certified staff members.
<b>Longer Term</b>	
Locate and construct new buildings to maximize their use of green siting and building techniques, as well as the feasibility of “smart trips” to and around campus.	Not implemented.
Retrofit older buildings to meet LEED certification guidelines.	The renovation of Ayres Hall, completed in January 2011, was done to LEED standards and is slated for LEED certification.

## Landscaping

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Emphasize using native plant species.	The UT Gardens has a section dedicated to growing native plant species on campus.
In ornamental planting, use drought resistant species.	For campus landscaping projects, Grounds/Transfer & Hauling selects plant species that are appropriate for the East Tennessee climate.
When renegotiating mowing/leaf cleanup contracts, require that equipment meet strict environmental standards for low noise and low air emissions.	Since spring 2009, Grounds/Transfer & Hauling has been responsible for most mowing and leaf cleanup on campus. Grounds/Transfer & Hauling uses only low noise (less than 65 db) leaf blowers.
Investigate ways to reduce the number of acres mowed.	Not implemented.

## Landscaping

Recommendations of 2005 Report	Achievements since 2005
<b>Longer Term</b>	
Transition to turf and other permeable surfaces that require little or no mowing.	Not implemented.

## Green Spaces; Accommodations for Pedestrians and Bicycles

Recommendations of 2005 Report	Achievements since 2005
<b>Short Term</b>	
Establish a task force to plan for improvement of bicycle access throughout the campus and to work with city government to link campus and off-campus bicycle commuting routes.	A working group of the Campus Planning Advisory Committee has completed surveys of bicycling patterns on campus in an effort to improve access and conditions for bicyclists traveling to and from the Knoxville campus. The draft 2011 Campus Master Plan includes recommendations for extending and expanding the Pedestrian Mall, as well as, a pedestrian footbridge to The Hill area.
Continue to expand the network of walkways and outside meeting places on campus.	This will be addressed in the 2011 Campus Master Plan.
For walkways, use permeable surface material where feasible.	The Gate 21 Plaza at Neyland Stadium features permeable pavement and Silva Cells that allows trees to grow in uncompacted soils and permits on-site infiltration of storm water run-off.
Continue new and replacement tree planting.	Approximately 100 trees get planted on campus each year.
Anticipate global climate change by planting drought resistant tree species.	For campus landscaping projects, Grounds/Transfer & Hauling selects tree species that are appropriate for the East Tennessee climate.
<b>Longer Term</b>	
Create a system of dedicated bike trails in the campus area.	The draft 2011 Campus Master Plan includes a recommendation for creating a major east-west bicycle route through the center of campus.
Create dedicated bicycle lanes on roads, in order to permit safe travel among major destination point throughout the campus and to link with off-campus bicycle commuting routes.	The draft 2011 Campus Master Plan calls for establishing an extensive system of bike lanes, with improved connections to the Knoxville greenway system.

### 3. Environmental Indicators

The 2005 Environmental Progress Report provided indicators of environmental progress on the Knoxville campus for the following:

- I. Energy consumption in buildings (electricity, coal, natural gas)**
- II. Air pollution**
- III. Water and sewer use**
- IV. Water pollution**
- V. Solid and hazardous waste**
- VI. Procurement**
- VII. Motorized transportation**
- VIII. “Green” buildings**
- IX. Landscaping**
- X. Green spaces; accommodations for pedestrians and bicycles**

For purposes of continuity and comparison, we have retained these indicators, but have also included three new ones in the present report:

- XI. Student Involvement**
- XII. Greenhouse Gas Emissions**
- XIII. Development Efforts**

Much of the information below is presented as “per student” or “per square feet,” to enable comparisons over time. Where quantitative information was not available, indicators are discussed qualitatively.

All of this information is to be understood in the context of campus growth. Currently, the Knoxville campus (main campus and Agricultural campus) includes over 550 acres with over 200 buildings.

Student enrollment has not changed much over the past 20 years:

- 1989-90:* 25,611 students enrolled
- 1999-00:* 25,981 students enrolled (1% increase from 1989-90)
- 2009-10:* 27,107 students enrolled (4% increase from 1999-00)

However, campus building space has grown significantly during this same time period:

- 1989-90:* 11,203,307 square feet
- 1999-00:* 13,006,937 square feet (16% increase from 1989-90)
- 2009-10:* 14,734,337 square feet (13% increase from 1999-00)

This amounts to 448 square feet per student in 1989-90, 501 square feet per student in 1999-00, and 544 square feet per student in 2009-10.

University acreage is expected to expand by an additional 204 acres with the inclusion of the new Sorority Village (16 acres) and the Cherokee Farm (188 acres). The latter, though a University of Tennessee (“UT”) system operation, draws resources from UT Knoxville.

With ongoing construction and continued improvements to existing facilities, campus building space is likely to continue to grow. Nevertheless, UT Knoxville has made considerable progress over the last few years in reducing both consumption of energy and materials and preventing pollution. The indicators below paint a generally improving picture.

## I. Energy Consumption in Buildings

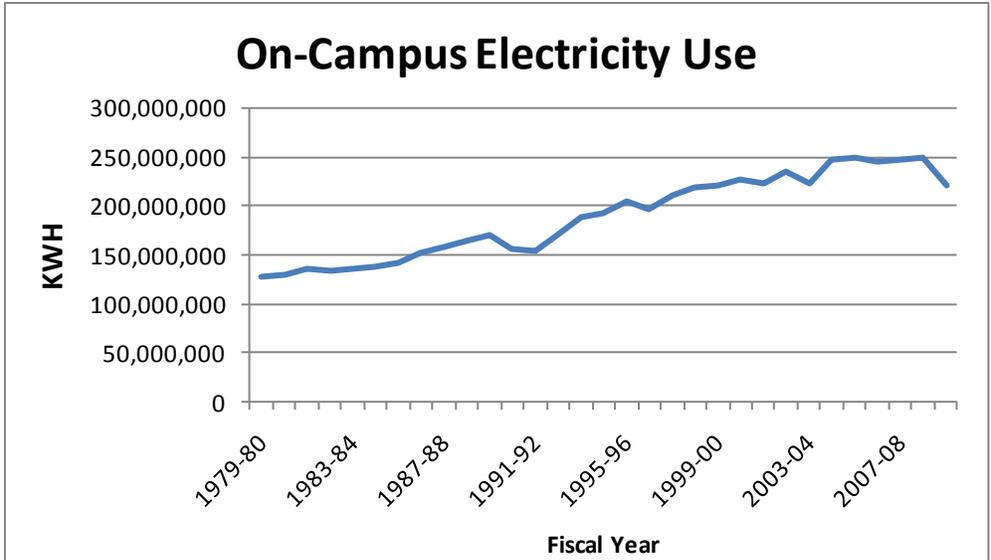
### *On-Campus Electricity*

UT Knoxville’s electricity is supplied by the Tennessee Valley Authority (TVA) through the Knoxville Utilities Board (KUB). The UT Knoxville Steam Plant also operates a five megawatt electrical power generator when it is economical to do so.

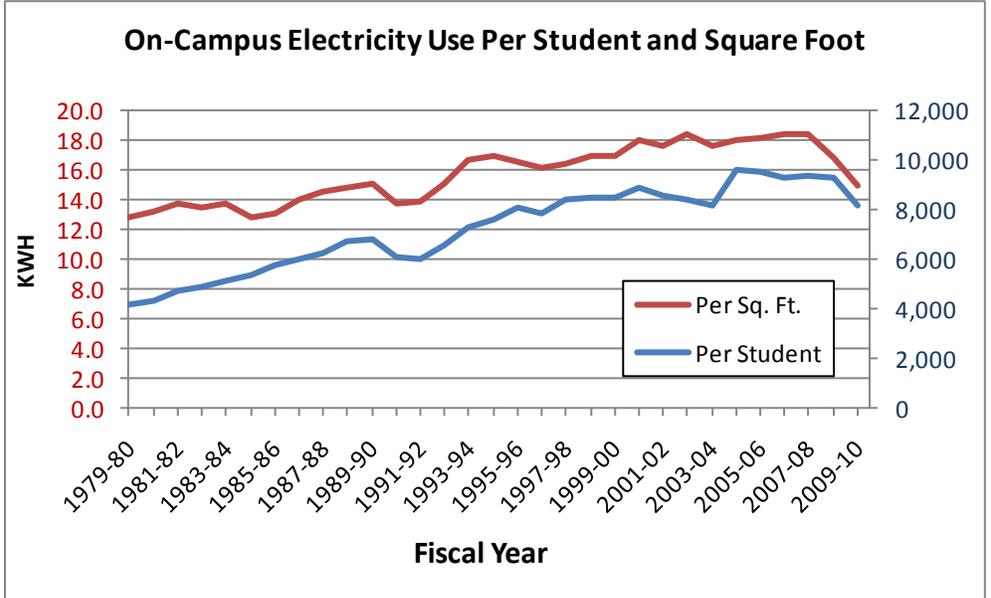
Electricity is used mainly in campus buildings for lighting, computers, air conditioning, etc., but also outside for street lighting, etc. The campus had seen continuous growth in electricity use until this past year. In fiscal year 2009-10, there was a significant drop in on-campus electricity consumption from the previous year. The recorded on-campus electricity use for 2009-10 is the lowest recorded number in the past decade.

### **On-Campus Electricity Consumption (kilowatt-hours)**

	<b>1979-80</b>	<b>1989-90</b>	<b>10 yr. change</b>	<b>1999-2000</b>	<b>10 yr. change</b>	<b>2009-2010</b>	<b>10 yr. change</b>
Total	127,037,382	169,424,595	+33%	220,464,333	+30%	220,963,070	0%
Per Student	4,180	6,773	+62%	8,486	+25%	8,152	-4%
Per Sq. Ft.	12.9	15.1	+18%	16.9	+12%	15.0	-12%



The recent overall drop in on-campus electricity consumption can be attributed to energy efficiency improvements, the use of energy efficient appliances, and a growing awareness of environmental stewardship on campus. Further concentration on fostering a culture of awareness can only lead to future decreases in electricity consumption on campus. Recent efforts to spread awareness have produced some noticeable effects. As the chart below shows, the campus has achieved decreases in total on-campus electricity consumption on a per student and a per square foot basis.



*Coal*

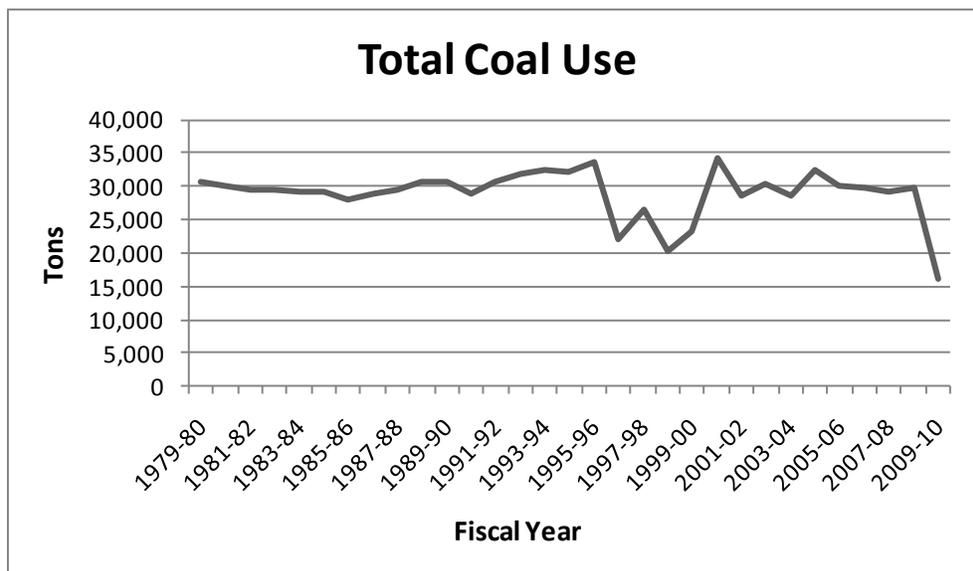
UT Knoxville’s Steam Plant provides steam for building heating, for domestic hot water, and for laboratory sterilization needs. In recent years, the plant has been powered mainly by natural gas, but coal is used as well. The plant has two coal-fired boilers, one natural gas-fired boiler, one boiler that can be fired with either coal, fuel oil, or natural gas, and one

boiler that can be fired with natural gas or fuel oil #2 (diesel). Steam is supplied to on-campus buildings through a campus owned and operated distribution system.

At the Steam Plant, the use of coal has drastically declined relative to natural gas over the past two decades, especially in the past 20 years with the installation of natural gas-fired equipment in the mid-1990s and the recent installation of boiler #5. During fiscal year 2009-10, UT Knoxville burned less coal than in any year since 1979. The decision to use coal or natural gas is driven by market factors.

### Coal Consumption (tons)

	1979-80	1989-90	10-yr. change	1999-00	10-yr. change	2009-10	10-yr. change
Total	30,605	30,717	+0.37%	23,278	-24%	16,136	-31%
Per Student	1.01	1.23	+21%	0.90	-27%	0.60	-34%
Per Sq. Ft.	.0031	.0027	-12%	.00179	-35%	.0011	-39%



### Natural Gas

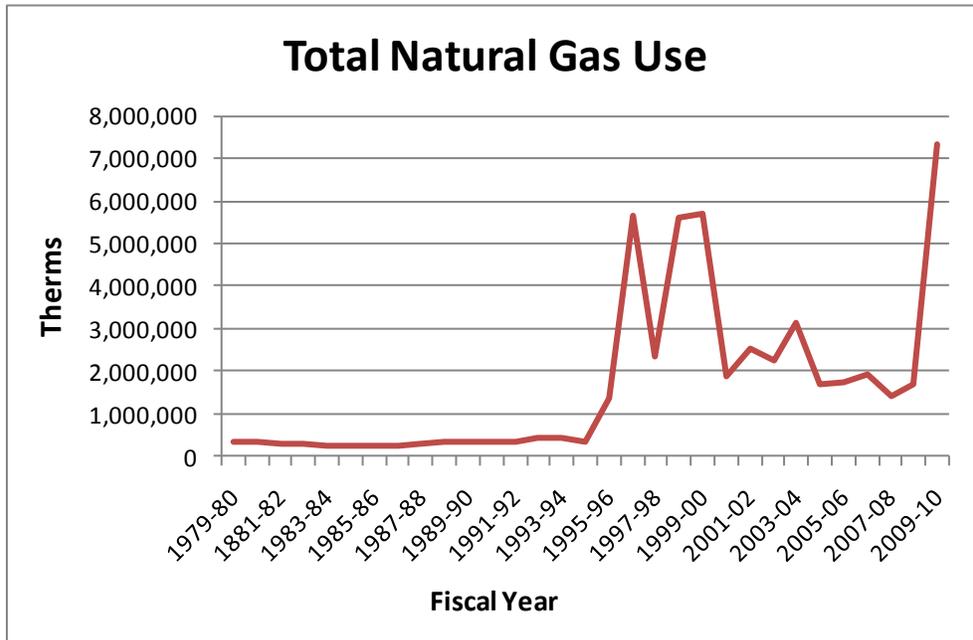
Natural gas is cleaner to burn than coal. It produces fewer pollutants such as sulfur dioxide, nitrogen oxides, particulate matter, and mercury. The cost of natural gas fluctuates regularly: in 1989-90, natural gas was \$0.54/therm; in 1999-00, \$0.34/therm; in 2009-10 back to \$0.54/therm. (Adjusted to 2010 dollars using Consumer Price Index inflation adjustment factors of 1.668 for 1990 and 1.266 for 2000, the cost per therm in 1989-90 and 1999-00 would be \$.90 and \$.43 respectively.) The historic average for the period 1979-2010 is \$0.64/therm. Despite constant fluctuation, the price of natural gas will remain reasonably stable in the foreseeable future. The United States Energy Information Administration (EIA) estimates a 0.08% increase in overall production of natural gas in 2011. However, the EIA expects the market to tighten slightly beginning in 2012 due to increased consumption.

UT Knoxville's use of natural gas has increased substantially in the past two decades,

especially in the last 15 years:

### Natural Gas Consumption (Therms)

	1979-80	1989-90	10-yr. change	1999-00	10-yr. change	2009-10	10-yr. change
Total	340,115	332,892	-2%	5,675,407	+1605%	7,323,560	+29%
Per Student	11.19	13.31	+19%	218.44	+1542%	270.17	+24%
Per Sq. Ft.	0.034	0.030	-14%	0.436	+1368%	0.497	+14%

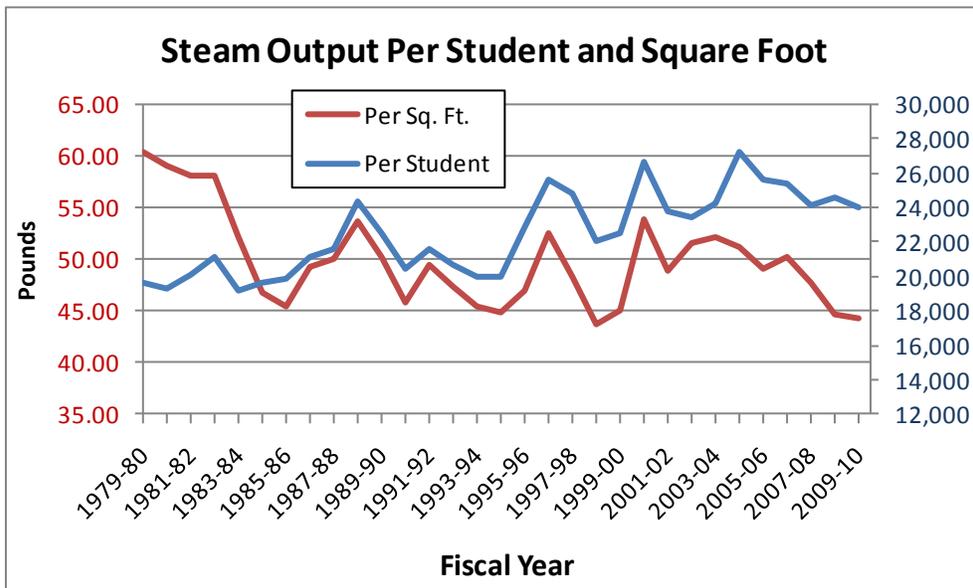
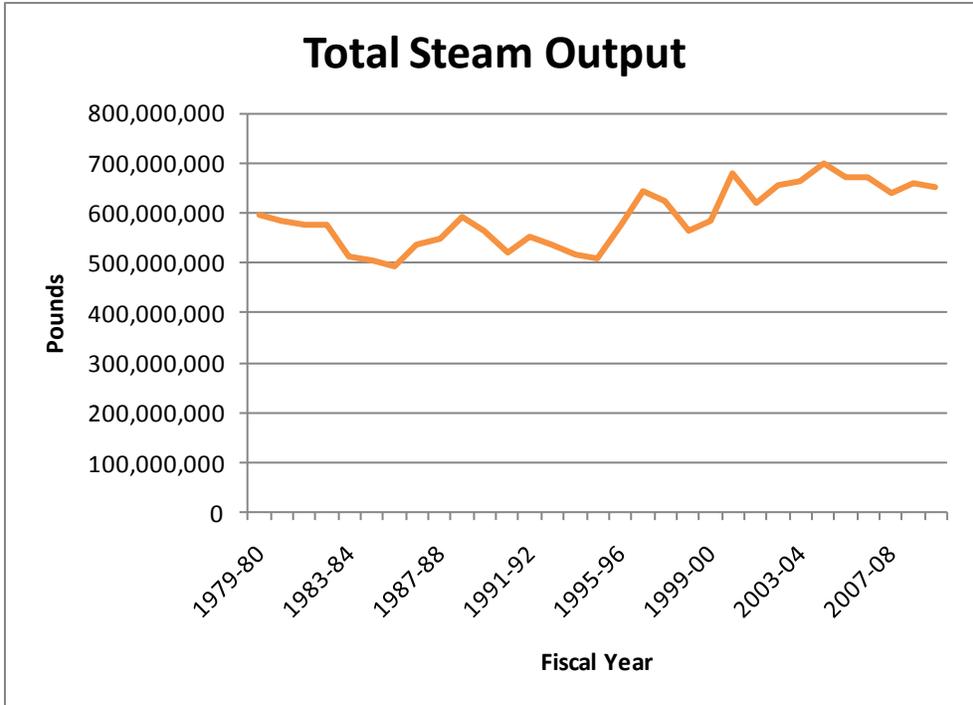


### Translating Coal and Natural Gas into Their Outputs

Together, coal and natural gas used at the campus Steam Plant produced the following amounts of steam over the past four decades:

### Steam (Pounds)

	1979-80	1989-90	10-yr. change	1999-00	10-yr. change	2009-10	10-yr. change
Total	596,952,379	563,338,000	-6%	584,840,834	4%	651,360,000	11%
Per Student	19713	22519	14%	22510	-0.04%	24029	7%
Per Sq. Ft.	60.5	50.3	-17%	45.0	-11%	44.2	-2%



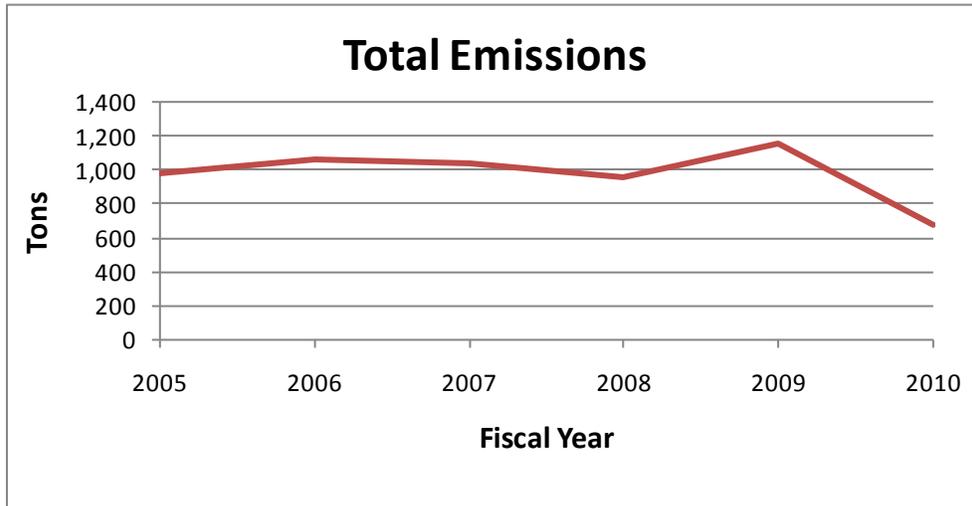
## II. Air Pollution

Air pollution comes from stationary sources, such as the UT Knoxville Steam Plant; from on-road mobile sources, such as vehicles traveling to and from UT Knoxville; and from off-road mobile sources, such as construction and landscaping equipment. There are few large industrial plants or power generation sources in Knox County, which leaves the UT Knoxville Steam Plant as one of the largest stationary sources of air emissions in the county. Its emissions of “criteria” air pollutants (air pollutants identified for regulation under Title V of the federal Clean Air Act) have been as follows:

**Fiscal Year Emissions Since 2005:**

Regulated Pollutants (Limit)	EMISSIONS (Tons)					
	2005	2006	2007	2008	2009	2010
PM10 (NA)	7.47	7.15	7.05	6.79	6.90	6.51
SO <sub>2</sub> (1638)	671.26	780.10	754.18	688.01	875.70	460.96
VOC (248.9)	1.03	0.99	1.06	0.98	0.97	1.79
NO <sub>x</sub> (279)	190.19	176.15	175.10	168.63	171.39	126.66
HCl (30)	19.41	18.35	17.94	17.45	17.84	10.17
HF (10)	2.43	2.38	2.24	2.18	2.23	1.27
CO (245.9)	84.27	79.98	79.49	76.61	77.91	69.65
Total:	976.06	1,065.11	1,037.05	960.65	1,152.94	677.02

PM10=particulate matter 10 microns in diameter or greater  
 SO<sub>2</sub>= sulfur dioxide  
 VOC=volatile organic compounds  
 NO<sub>x</sub>=nitrogen oxides  
 HCl=hydrogen chloride  
 HF=hydrogen fluoride  
 CO=carbon monoxide



The emissions are estimated by applying formulas from the U.S. Environmental Protection Agency (EPA) to coal and natural gas inputs at the Steam Plant. Currently, there is no measuring device employed “at the stack.” The Knoxville campus applied to the Knox County Department of Air Quality Management for UT Knoxville’s original’s Title V permit in 1999.

The permit established emissions limits and the method of determining emissions rates. The permit allowed campus to use the EPA formulas to calculate emissions rates, rather than performing actual emissions tests.

Steam Plant emissions remained steady leading into fiscal year 2009-10. During that year, campus recorded drastic decreases in its particulate matter (PM) emissions. This drop is attributable to the fact that natural gas rather than coal was burned at the Steam Plant during 2010.

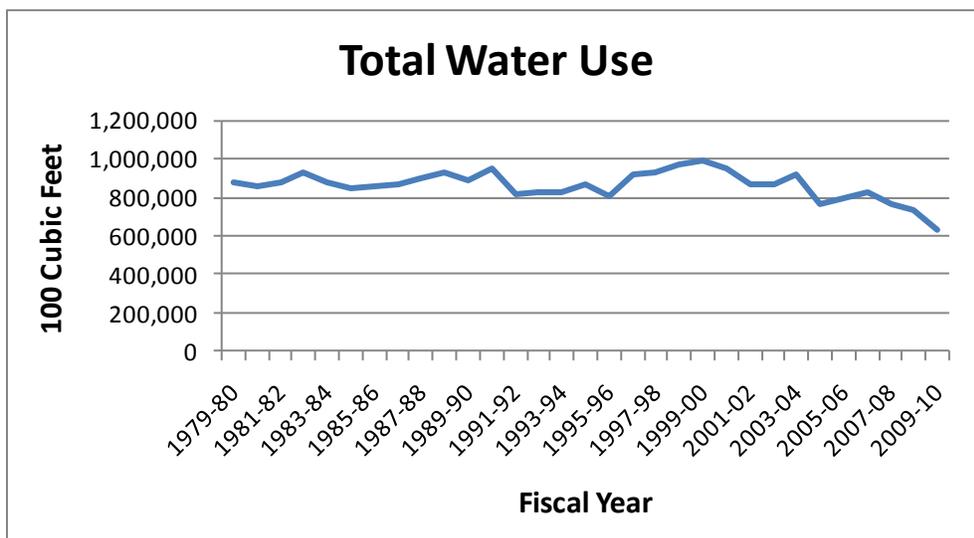
Presently, the Steam Plant Title V permit only requires controls on particulate matter (PM) emissions. That control is maintained through an electrostatic precipitator, and its efficiency is continuously monitored through opacity measurements. If opacity exceeds 20% for more than six minutes, the plant is out of compliance and must report these excursions. The excursions are mostly due to start-up and shut-down of equipment.

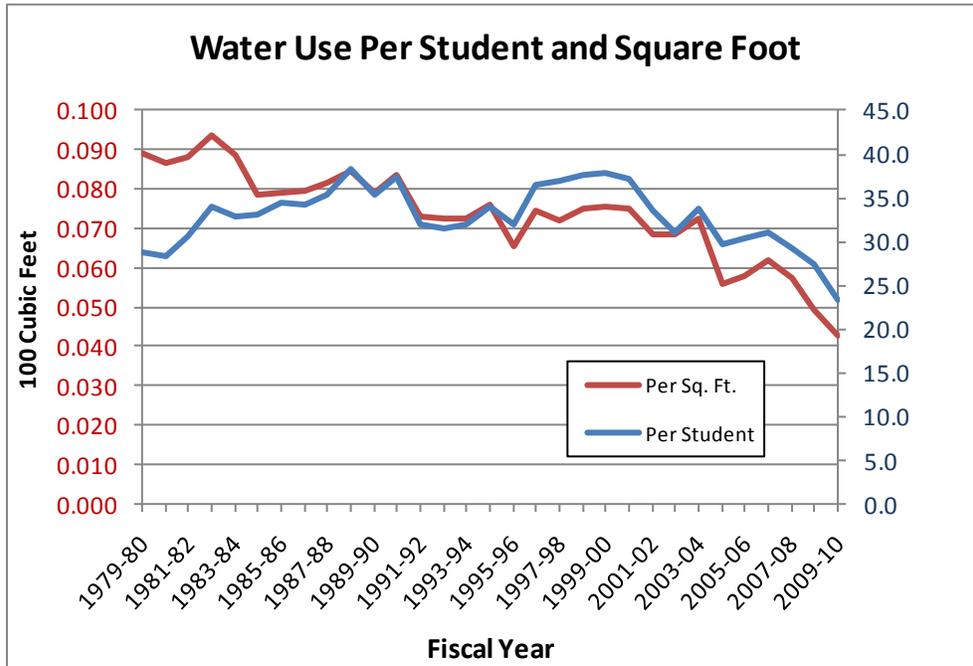
### III. Water and Sewer Use

Water at UT Knoxville is used for toilets and urinals, drinking, showering, steam production, air conditioning, landscaping, washing dishes, and so forth. Water is supplied by KUB, which also supplies sanitary sewer service to campus. The amount of water used on campus peaked at the end of the 1990's. We have seen a steady decrease in use since then including a considerable decrease in the last three years. The drop in consumption has occurred despite continued growth in campus square footage and small increases in the number of students enrolled.

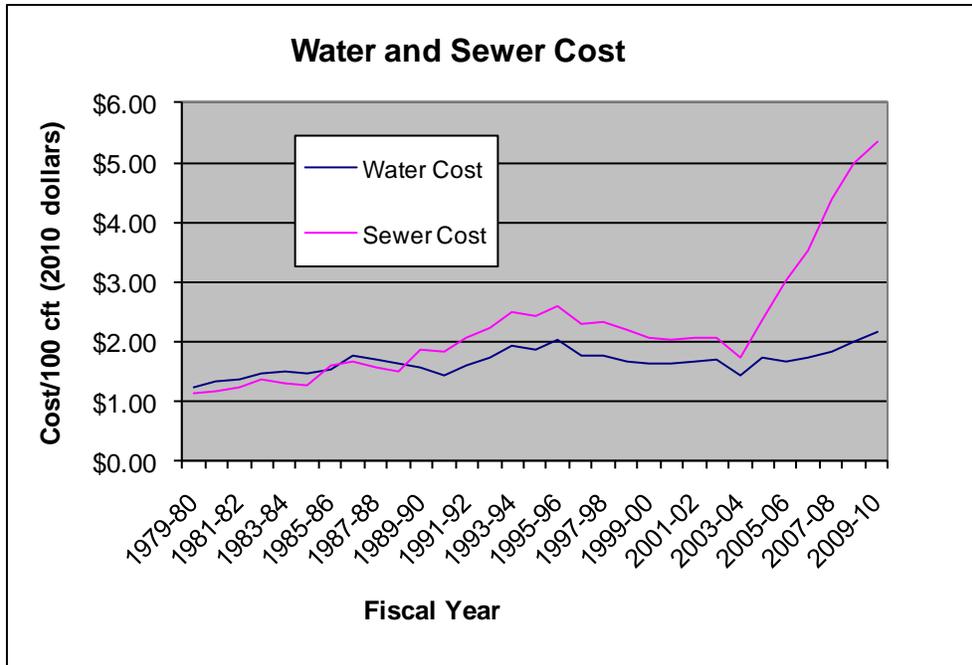
#### Water and Sewer Use

Water Use (100 Cubic Feet)							
	1979-80	1989-90	10-yr. Change	1999-00	10-yr. Change	2009-10	10-yr. Change
Total	877,927	883,088	1%	985,542	12%	630,833	-36%
Per Student	28.9	35.3	22%	37.9	7%	23.3	-39%
Per Sq. Ft.	0.089	0.079	-11%	0.076	-4%	0.043	-43%





Sewer charges to UT Knoxville are based on the amount of water consumed, adjusted for water used for air conditioning and landscaping that ends up in the air or ground rather than in the sewer system. The cost to UT Knoxville for water has risen steadily – it was \$1,086,245 in 1979-80 (adjusted to 2010 dollars) and \$1,367,657 in 2009-10. In contrast, the cost for sewer service has risen substantially in the past 5 years, from \$1,788,465 in 2005 (adjusted to 2010 dollars) to \$3,373,673 in 2009-10. This drastic increase is due to service cost increases of 50% in April, 2005 and an additional 50% increase in January, 2007. The campus should expect continued incremental increases over the next five years. The increases support ongoing system upgrades being implemented by the Knoxville Utilities Board.



#### IV. Water Pollution

UT Knoxville campus is located in three watersheds –Second Creek, Third Creek, and Fort Loudon Lake Upper. Chemicals applied to landscaping, including fertilizers, herbicides, and pesticides, can be washed away and result in additional pollutant loads to these waterways. Nutrient pollution (nitrogen and phosphorus) is the second most important non-point source in Tennessee, and results in excessive eutrophication of many waterbodies. Eutrophication is caused by the rampant growth of algae, resulting in water cloudiness and low oxygen levels, both detrimental to aquatic life. For fertilizers, best management practices include soil testing to ensure proper amounts are applied, not applying if a heavy rain is expected in the next few days, and split applications (ie. once in the spring and once in the fall). In addition, the use of slow-releasing sources such as compost or the planting of leguminous winter cover crops that provide nitrogen are beneficial to the environment. To reduce and optimize the application of insecticides and other pesticides, pest and disease scouting and analysis can determine the most effective chemical to apply. Also, rotation of annual plants, removal of plant waste, and the use of plantings to promote beneficial insects are recommended. These are all aspects of an integrated pest management plan. Herbicides, used to control weed growth, are especially detrimental to aquatic plants and must be used with caution. Alternatives to spraying include rotation of plants, and the use of mulch and cover crops. Whenever chemicals are to be used, great care should be taken to prevent them from being washed away in stormwater. (*See also* “Landscaping”)

Storm water run-off from impermeable surfaces such as roofs and paved parking lots, roads, and sidewalks can carry silt, oil, and chemicals into surface water and groundwater. Of the 556.4 acres on the Knoxville campus, an estimated 50.5% of its surface is impermeable<sup>2</sup>.

<sup>2</sup> Percent impermeable surfaces based on 217 buildings with an assumed average building footprint of 40,000 sq. ft.; 12.7 miles of streets with an assumed average width of 40 ft.; 33 miles of sidewalks with an assumed average width of 5 ft.

This represents a decrease from the 58% impermeable surface reported in the 2005 Environmental Progress Report.

*Storm water run-off: environmental improvements*

UT Knoxville has a Storm Water Pollution Prevention Plan (SWPPP) that outlines procedures for managing storm water run-off at the Steam Plant (see “Milestones”). The Department of Environmental Health and Safety (EHS) conducts monthly and quarterly visual inspections, as well as an annual detailed chemical analysis, to identify and promptly correct potential issues related to storm water run-off from the plant.

Additional storm water best management practices (BMPs) that campus is considering include: green roofs, the use of permeable materials in new construction projects, and the use of cisterns in new buildings.

## V. Solid and Hazardous Waste

*Solid waste*

In the ten years leading up to 2003, UT Knoxville had seen a substantial decrease in the amount of solid waste – non-hazardous solid products such as paper, plastics, food, construction debris, and similar items – being disposed of in Class A landfills. The campus has experienced a slight increase in waste sent to Class A landfills since 2003.

Waste Sent to Class A Landfill (tons)					
	1993	2003	2010	% Change from 1993	% Change from 2003
Total	15,700	7,850	8,505	-46%	+8%
Per Student	0.61	0.29	0.31	-49%	+8%

However, beginning in 2005, due to the growing composting and recycling programs, campus is sending slightly less solid waste to Class A, C, and D (construction and demolition, respectively) landfills, as shown by the table below:

Solid Waste per Fiscal Year (tons)						
	2005-06	2006-07	2007-08	2008-09	2009-10	% Change
Class A Landfill	8,731	9,162	7,530	8,292	8,505	-3%
C & D	3,908	3,641	4,465	4,355	3,892	-0.40%
<b>Total</b>	<b>12,639</b>	<b>12,803</b>	<b>11,995</b>	<b>12,647</b>	<b>12,398</b>	<b>-2%</b>
Per Student	0.48	0.48	0.45	0.47	0.46	-5%
Per Sq. Ft.	0.0009	0.0010	0.0009	0.0009	0.0008	-9%

Continued reductions in the waste stream are likely, although not without future support to the composting and recycling programs on campus. UT Volunteer Dining has also bolstered efforts to curb solid waste disposal in Class A landfills with the introduction of trayless dining in residential restaurants, including Presidential Court Café, Sophie’s, Morrill Hall and Varsity

Inn. However, widespread use of non-reusable paper and plastic dishware in UT Knoxville dining service facilities (see below table) remains an issue.

Facilities offering only disposable dishware	<ul style="list-style-type: none"> <li>• Both Einstein Bros.</li> <li>• The Café (Arena)</li> <li>• Rocky Top</li> </ul>
Facilities offering both reusable and non-reusable	<ul style="list-style-type: none"> <li>• Smokey's</li> </ul>
Facilities offering only reusable dishware	<ul style="list-style-type: none"> <li>• Southern Kitchen</li> <li>• All Dining Halls</li> </ul>

<b>Recyclable Materials Diverted from Landfill (tons)</b>					
	<b>2005-06</b>	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>
Paper	311.57	365.04	487.17	499.38	467.38
Plastic/Aluminum	15.59	26.22	57.06	79.59	95.13
Printer's Scrap	65.51	128.67	96.35	132.83	130.9
Cardboard	108.04	120.39	199	235.28	239.43
Electronics	0	1.9	17.04	10.9	25.74
Leaves	65	65	65	65	65
Yard Waste	112.82	146.67	31.5	11.74	0
Scrap Metal	17.26	35.62	88.18	64.47	117.97
Batteries	1.7	0.92	2.11	3.86	5.77
Ink Cartridges	1.78	3.86	3.24	7.81	7.21
Light Bulbs	2.22	4.19	17.4	16.56	23.41
Wood Pallets	0	0	1.1	1.26	17.42
Food (composting)	0	0	2.26	0	7.89
Misc.	27.78	37.59	19.69	15.62	21.43
<b>Total</b>	<b>729.3</b>	<b>936.1</b>	<b>1087.1</b>	<b>1144.3</b>	<b>1224.7</b>

This is a 60% increase in recycled material diverted from the landfill since FY 2006

*Hazardous waste*

UT Knoxville purchases, uses, and must eventually dispose of small quantities of hazardous chemical waste, mainly through its science, engineering, and other research laboratory work on the main campus. The table below illustrates the total pounds of hazardous waste disposed on Main Campus from 2005-2010.

## Hazardous Waste Disposed

Hazmat Waste Disposed (Main Campus)		
Fiscal Year	In Pounds	In Tons
2005-06	37,501	18.8
2006-07	35,531	17.8
2007-08	38,225	19.1
2008-09	65,388	32.7
2009-10	31,635	15.8

As shown in the table, there was a 7% increase in the volume of total waste disposed on the main campus between 2007 and 2008. This was due to a large scale one-time lab cleanout that occurred in February 2008. Furthermore, the 47% increase in total waste disposed from 2008-2009 resulted from a one-time demolition project in which approximately 15 tons of lead contaminated building materials were disposed. If the volume of lead demolition waste is removed, the main campus actually had a 5% decrease in volumes of hazardous waste disposed from 2008-2009 and a 14% reduction from 2009-2010. Nonetheless, the volume of hazardous waste disposed on the main campus continues to remain consistent.

### *Hazardous waste: environmental improvements*

The UT Knoxville EHS department strives to promote pollution prevention and responsible waste disposal among the campus community. EHS maintains a Chemical Exchange Program, in which unused, unopened, unexpired chemicals are exchanged to other departments instead of being disposed. In addition, EHS recently implemented a Mercury Reduction Policy, in which the goal is to eliminate 80% of the nonessential mercury and mercury containing equipment from the Knoxville campus by 2015.

## VI. Procurement

Currently UT Knoxville does not have any campus-wide procurement policies that use environmental criteria to guide the purchase of goods and services by UT Knoxville departments and contractors.

As of early 2011, 23 percent of the paper products carried by the UT Book and Supply Store were made from recycled content paper. The products are generally grouped together. However, further efforts to highlight the products can easily be implemented. The bookstore also purchases and distributes 6,000 reusable water bottles each year to spread recycling awareness.

## VII. Motorized Transportation

(see also X. Accommodations for Pedestrians and Bicycles)

### *Private vehicles*

Faculty, staff, and students use their own vehicles to make trips to, from, and around campus. Parking Services provided the following number of permits issued to UT Knoxville drivers from 2006-2010:

**Parking Data (by Fiscal Year)**

<b>Parking Permits In Use</b>				
	2006-07	2007-08	2008-09	2009-10
Student Fall/Spring	14,237	15,110	15,456	16,301
Student Summer	2,430	2,447	2,745	3,316
Motorcycle	141	141	166	136
Faculty/Staff	5,400	5,567	5,472	5,501

<b>Ratio of Permit Sales To Parking Spaces</b>				
	2006-07	2007-08	2008-09	2009-10
Student Fall/Spring	14,237	15,110	15,456	16,301
Student Spaces	8,990	9,574	9,674	9,826
Ratio	<b>1.58</b>	<b>1.58</b>	<b>1.60</b>	<b>1.66</b>
Faculty/Staff	5,400	5,567	5,472	5,501
F/S Spaces	5,569	5,837	5,605	5,576
Ratio	<b>0.97</b>	<b>0.95</b>	<b>0.98</b>	<b>0.99</b>

In the last five years the combined ratio of permit sales to actual spaces is 0.97 to 1 for faculty and staff parking and 1.6 to 1 for student commuter and non-commuter parking. Over this timeframe the Knoxville campus has averaged 5,647 and 9,516 parking spaces for faculty/staff and students, respectively. The permit figures do not include special, vendor, or temporary permits, or off-campus parking.

**Commuting Patterns**

A survey of UT Knoxville commuting patterns was conducted by the Office of Sustainability in spring 2010. Approximately 850 faculty, staff and students, or about 2.5 percent of the fall 2009 campus population, participated in the survey. Undergraduate students were underrepresented in the survey, so responses were weighted by campus group (undergraduate/graduate/faculty/staff).

The table below summarizes how survey respondents most often travel between campus and home:

<b>2009 Calendar Year Commuting Patterns</b>						
<b>Group</b>	<b>Drive Alone</b>	<b>Carpool</b>	<b>Ride the Bus</b>	<b>Motorcycle/ Moped</b>	<b>Bicycle</b>	<b>Walk</b>
Faculty	79%	8%	7%	0%	5%	1%
Staff	83%	10%	3%	0%	2%	1%
Graduate	76%	9%	6%	0%	4%	5%
Undergraduate	58%	7%	5%	1%	10%	19%

Results from the 2010 commuting survey mirror those obtained from a fall 2004 survey conducted by the Knoxville Transportation Planning Organization (TPO). This survey, which had 4,439 responses, revealed that 74 percent of the campus community drives alone

when commuting to campus. The fact that so many faculty, staff and students drive to campus is reflected in the growing demand for parking permits and spaces, as mentioned in the parking data above.

#### *Mass transit vehicles*

UT Knoxville contracts its mass transit operations on campus to Knoxville Area Transit (KAT). These operations include:

- 15 buses on dedicated campus routes
- 4 buses and 1 free trolleys (Green and Orange lines) running to and from campus
- 3 vans running dedicated campus and “campus-part-of-Fort-Sanders” routes

In addition, KAT operates a bus system that connects the Knoxville campus with other parts of Knoxville. Students, faculty, and staff can purchase a KAT pass for \$50. These passes are valid for 140 days from the first use, and are available all year long. KAT also provides incoming freshman with free passes, valid for the fall semester of their first year in school.

Since a hitting a peak of 751 in fall 2004, KAT bus pass sales have declined. According to the most recently available data, 362 passes were purchased by students, faculty, and staff in fall 2009. However, there was also an additional 122 express passes purchased by UT Knoxville students, faculty, and staff. Each pass is valid for 20 rides. UT Knoxville bus passes were swiped a total of 251,591 in the 2009 calendar year on the KAT fixed routes. When combined with the express route passes, the total number of rides by UT Knoxville students, faculty, and staff on the KAT on fixed routes amounts to over 254,000 rides. During this same time period, the T system carried 1,003,118 passengers, comprised mainly of students, faculty, and staff.

#### *Transportation Service vehicles*

The UT Knoxville Transportation Services Department is obligated to employ the following Tennessee state alternative fuel and fuel-efficient vehicle acquisition and use requirements:

All state agencies, universities, and community colleges that have more than 10 state-owned vehicles in their fleet are required to incorporate alternative fuel, hybrid electric, or other fuel-efficient or low emission vehicles into their fleet in order to reduce or displace at least 20% of the fleet's consumption of petroleum by January 1, 2010. If the fleet includes vehicles modified for educational, emergency, or public safety purposes or vehicles used for emergency or law enforcement purposes, the fleet must provide for a minimum 10% petroleum use reduction.

Further, state fleets are encouraged to make every effort to ensure that at least 30% of newly purchased motor vehicles are energy-efficient vehicles. Energy-efficient vehicles are defined as passenger vehicles that are: alternative fuel vehicles as identified by the Energy Policy Act of 1992 including those using ethanol, biodiesel, or other alternative fuel; hybrid electric vehicles; or conventional gasoline vehicles achieving an average fuel economy of at least 25 miles per gallon. State agencies should strive to use ethanol and biodiesel in appropriate state-owned vehicles whenever possible and should support the development of biofuels fueling infrastructure. The Tennessee Commissioner of General Services is required to compile and maintain information on motor vehicles owned and leased by the state including a categorization of vehicles by an energy-efficiency rating.

(Source: Tennessee Code 4-3-1109, 4-22-101, and 4-22-102, and Executive Order 33, 2006)

The Knoxville campus fleet includes vehicles available for loan to faculty and staff, as well as, those used by Facilities Services. They include car, light-duty trucks, heavy-duty trucks, scooters, vans, mini-vans, police-cruisers, etc.

<b>UT Knoxville Campus Fleet</b>	
Total Vehicles	671
Flex-Fuel Vehicle	311
Hybrid Electric	5
Electric	12

The number of alternative fuel vehicles purchased by Transportation Services has been steadily increasing over the years. Several more E85 trucks have been ordered for 2011. At this time, there are no plans to purchase additional hybrid electric vehicles.

### **VIII. “Green” Buildings**

The industry standard for green building design is the U.S. Green Building Council’s LEED (Leadership in Energy and Environmental Design) certification program. In 2007, UT Knoxville adopted a policy that requires new buildings costing more than \$5 million and major renovations to be meet current LEED certification as a minimum requirement under the LEED for New Construction and Major Renovations standard (<http://environment.utk.edu/policy.html>). Small scale renovations are required to utilize the LEED for Commercial Interiors rating system as applicable.

In 2005 UT Knoxville had no LEED-certified buildings. But the recently-completed Ayers Hall renovation and the Min Kao Electrical Engineering and Computer Science Building are both slated to be LEED-certified.

### **IX. Landscaping**

#### *Grass mowing, leaf clean up and composting*

Approximately 200 acres of UT Knoxville land are mowed. This includes grassy areas on the main campus, the agricultural campus, the University Club, the President’s Residence, and 4848 Lyon’s View Pike.

The campus is currently responsible for mowing nearly all of the 200 acres, both on the main campus and agricultural campus. Only a small portion of campus grounds, amounting to approximately 10 acres, is mowed by outside contractors. This is substantial change since 2005, wherein all of the 200 acres were mowed by outside contractors. There is no policy regarding environment requirements for the contracted work, and projects are given to the lowest qualified bidder.

In fall 2003, UT Knoxville began composting or mulching in all of UT Knoxville’s fall leaf waste. The compost generated was used primarily for landscaping projects on University property. Between 2005 and 2007, the campus also started collecting coffee grounds from both Starbucks locations on campus. Additionally, in the summer 2010, pre-consumer food scraps were combined with the coffee for collection and composting. The scraps are mixed

with the leaves and wood chips produced by campus tree trimming projects to produce compost. Since its genesis, the composting program has collected over 60,000 pounds of wood chips or brush and over 30,000 pounds of food waste.

The compost site, initially on Morgan Hill, has moved twice since 2005. Ongoing construction and expansion has pushed the site to its current one-acre location near the UT Medical Center. The compost is used on campus where possible, and although the project is still in its early stages, it will play an integral role on the UT Organic Farm off of John Sevier Highway.

*Fertilizer Use*

The following amounts of synthetic fertilizer were applied to campus grounds by Facilities Services since 2005-06:

Fertilizer Use		
Fiscal Year	Synthetic Fertilizer (pounds)	% Nitrogen
2005-06	8,250	0.14
2006-07	11,750	0.127
2007-08	10,300	0.149
2008-09	7,300	0.115

*Weed and pest management*

The following kinds and amounts of herbicides were applied by Facilities Services in 2010:

Herbicide Use, Fiscal Year 2009-10	
Type	Concentrated Quantity Applied
Quik Pro WSG	272 lbs.
Cornerstone Plus	27.5 gallons
Prosedge	2.66 oz.
Sahara DG	50 lbs.
MSMA	0.5 gallons
Snapshot 2.5G	100 lbs
Dimension .15%	300 lbs

**X. Green Spaces; Accommodations for Pedestrians and Bicycles**

Bicycling and pedestrian conditions on campus were improved with the completion of the Joe Johnson/John Ward University Mall in 2008. This vehicle-free pathway provides bicyclists and pedestrians with a safe, convenient route between east Volunteer Boulevard and Andy Holt Avenue. In addition, several green spaces were created with the construction of the mall.

Unfortunately, in some cases new construction has diminished campus green space. For example, the ongoing construction of Sorority Village has significantly reduced a large wooded green space to the west of campus.

The draft 2011 Master Plan would extend the Joe Johnson/John Ward University Mall to the west, closing the remainder of Andy Holt drive and adding significant green space in the heart of the campus. To the east, it would extend the Mall to the base of the Hill by converting Andy Holt Avenue to a pedestrian/bike path. A new pedestrian/bike bridge is proposed over Phillip Fulmer Way.

Bicycle access to the campus has not improved significantly since the 2005 report. But the draft 2011 Master Plan contemplates major improvements, including the following:

- Phillip Fulmer Way would be widened to a four-lane boulevard with bicycle lanes to accommodate the increase in vehicular traffic.
- Volunteer Boulevard would also be modified from four lanes to two lanes with an improved connection to Peyton Manning Pass and added bicycle lanes.
- A bike path would be constructed south of Neyland Stadium to connect Neyland Drive and Second Creek Greenway to the center of campus.

## **XI. Student Involvement**

Students have provided one of the most important contributions to sustainability at UT Knoxville. In the early 2000's, Students Promoting Environmental Action in Knoxville (SPEAK) initiated an SGA referendum that established the environmental portion of the Student Facilities Fee (see "Milestones" and "Development Efforts"). Since fall 2005, this fund has supported an impressive array of campus sustainability projects, which are listed in Appendix B.

During 2010-2011, SPEAK continued to be engaged with campus sustainability activities. With university funding, the group hosted a week-long educational event in fall 2010 that focused on water, composting, sustainable foods and waste. During spring 2011, SPEAK collaborated with other campus organizations to host Eric Schlosser, author of Fast Food Nation and co-producer of Food, Inc. SPEAK also hosted their annual Earth Day Festival on campus, providing free local/organic food to students and other visitors.

## **XII. Greenhouse Gas Emissions**

As a signatory of the American College and University Presidents' Climate Commitment (ACUPCC), UT Knoxville is taking action to reduce, and eventually eliminate or offset, campus greenhouse gas (GHG) emissions. Campus GHG emissions steadily increased from fiscal year 1990-91 to 2004-05. Between fiscal year 2004-05 and 2008-09, however, total emissions have decreased by nine percent – despite a seven percent increase in campus building space. This suggests that Facilities Services is operating campus facilities more efficiently, and that faculty, staff and students are taking steps to reduce their carbon footprints.

Key findings from the UT Knoxville fiscal year 2008-09 GHG emissions inventory:

- **Scope 1 Emissions:** Scope 1 emissions represent 28% of campus’ GHG emissions. These emissions come from coal and natural gas burned in the campus Steam Plant, and from gasoline and diesel fuel burned to operate university-owned vehicles. Scope 1 emissions continue to decrease from their peak of 77,897 MTCDE<sup>3</sup> in fiscal year 2000-01.
- **Scope 2 Emissions:** Scope 2 emissions remain the largest contributor to UT Knoxville’s carbon footprint, accounting for approximately 49% of GHG emissions. These off-campus emissions are attributable to fossil fuels burned to provide the university with electricity. Since fiscal year 2004-05, Scope 2 emissions have remained relatively constant. Compared to fiscal year 1990-1991, however, Scope 2 emissions have increased by 59%.
- **Scope 3 Emissions:** Historically, Scope 3 (commuting, air travel and solid waste) emissions have comprised around 20-23% of UT Knoxville’s total GHG emissions. The vast majority of Scope 3 emissions are attributable to faculty, staff and students commuting to campus.
- **Other Sources of Emissions:** Greenhouse gas emissions from fertilizers and refrigerants together comprise only about 1-2% of total emissions in any given fiscal year.

The table below presents the results of GHG emissions inventories conducted by several peer institutions. These results were obtained from the ACUPCC Reporting System website<sup>4</sup>. Emissions shown are for fiscal year 2008-09 or calendar year 2009 – whichever was available.

<b>Institution</b>	<b>Total Emissions (MTCDE)</b>	<b>Per Full-Time Enrollment</b>	<b>Per 1,000 Square Feet</b>
University of North Carolina at Chapel Hill	452,272	16.9	24.3
University of Maryland College Park	284,950	8.3	21.2
University of Florida	350,312	7.3	17.5
<b>University of Tennessee, Knoxville</b>	<b>246,814</b>	<b>9.5</b>	<b>16.7</b>

Overall, UT Knoxville’s total GHG emissions are lower than those of the selected peer institutions. Total emissions per full-time equivalent student are lower than UNC-Chapel Hill but higher than the other peer institutions. Total emissions per 1,000 gross square feet are the lower than all of the peer institutions. Again, this suggests that UT Knoxville has been successful at limiting its greenhouse gas emissions.

While the Climate Action Plan (see “Milestones”) focuses on measures aimed at reducing or offsetting UT Knoxville’s carbon footprint, campus planning efforts must also take into account the need to adapt to climatic changes that we cannot prevent. Many universities, especially those in climate-sensitive areas, are now engaged adaptation planning. There is a good bit of

<sup>3</sup> MTCDE stands for ‘metric tons of carbon dioxide equivalent.’

<sup>4</sup> ACUPCC Reporting System website: <http://acupcc.aashe.org>. Accessed 5/31/11.

speculation regarding potential increases in violent weather (e.g., hailstorms or tornadoes), but current evidence is insufficient to either confirm or refute such a tendency. Given the uncertainty, prudence would recommend consideration of this possibility in campus planning. Climate models do however, clearly predict two trends over the coming decades for the southeastern United States:

1. More intense and frequent heat waves and
2. Intensification of summer rainfall variability, increasing the likelihood of both anomalously wet and anomalously dry summers.<sup>5</sup>

Landscaping and building plans should take these predictions into account.

### **XIII. Development Efforts**

UT Knoxville's most successful green development effort was initiated by students. The environmental portion of the Student Facilities Fee (see "Milestones", above) was initiated in 2004 by an SGA referendum and currently generates \$10 per semester for full-time in-state students and \$30 per semester for full-time out-of-state students. Since its inception in fall 2005 it has raised more than \$2.4 million for sustainability projects at UT Knoxville (see Appendix B for a list of the many projects it has funded).

Also in 2005, the Office of Development created at the request of the Committee on the Campus Environment a companion fund, the Campus Environmental Stewardship Fund, to accept donations from faculty, staff, alumni and other donors, including corporate donors. However, this fund has to date has raised only about \$11,000, mainly from faculty and staff.

Many public universities, particularly those among the top 25, have been more successful in creating funding for sustainability projects from corporate and alumni donations. For example, at the University of Pittsburgh cumulatively since 1997, over 900 donors have contributed more than \$33 million to 60 funds focused on green or sustainable efforts (<http://www.greenreportcard.org/report-card-2011/schools/university-of-pittsburgh/surveys/campus-survey#funding>.)

There are several ways to promote and improve the Campus Environmental Stewardship Fund:

***Encourage investment in specific projects*** One of the most effective ways to improve the fund may be to highlight specific projects to which corporate or alumni donors can contribute—for example, a major solar or wind energy initiative, a green roof project or green spaces on campus. Some donors may wish to fund enduring institutions. A good example is the Graham Environmental Sustainability Institute at Michigan State (<http://www.graham.umich.edu/about/donor.php>).

***Set up a revolving fund*** Most successful green funds are revolving, reinvesting money that is saved or gained through the investments into further projects. A revolving fund enables donations

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[http://www.redorbit.com/news/science/1939473/climate\\_change\\_linked\\_to\\_variable\\_southeast\\_summer\\_rainfall/index.html](http://www.redorbit.com/news/science/1939473/climate_change_linked_to_variable_southeast_summer_rainfall/index.html)

to continue to give and grow. More than half of the Top 25 schools with a green fund have revolving funds. The Sustainable Endowments Institute's 2011 Report "Greening the Bottom Line" ([http://www.endowmentinstitute.org/gbl/Greening\\_the\\_Bottom\\_Line.pdf](http://www.endowmentinstitute.org/gbl/Greening_the_Bottom_Line.pdf)) is an excellent source of information on revolving green funds in higher education.

**Recognize donors** UT Knoxville can encourage donors by giving them recognition for being green. For example, at the University of Pittsburgh:

"the Office of Institutional advancement will begin to annually recognize donors who make charitable contributions to green initiatives at the University of Pittsburgh through the recently established Blue Gold and Green Honor Roll. The list will be published annually on Earth Day (April 22) on the Pitt Giving Web site. This unique honor roll will be created with the goal to steward Pitt donors who "think green", and with the hope that it will encourage others to consider supporting the various green research and educational initiatives at the University of Pittsburgh."<sup>6</sup>

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6 <http://www.greenreportcard.org/report-card-2011/schools/university-of-pittsburgh/surveys/campus-survey>

## 4. Recommendations

Much has been done in recent years to improve the campus environmental stewardship of UT Knoxville, but there is much room for improvement. The 2010-11 Committee on the Campus Environment offers the recommendations listed below to further advance campus sustainability efforts. These recommendations are organized according to the ten indicator categories of the 2005 report and the three new categories introduced in this one: Student Involvement, Greenhouse Gas Emissions and Development.

### I. Energy consumption in buildings (electricity, coal, natural gas)

- Launch an Energy Managers program
- Adopt energy use intensity (EUI) standard for new buildings and major renovations
- Take all feasible measures to reduce coal use; use natural gas in preference to coal whenever economically possible at the Steam Plant; explore enabling campus to produce steam using only natural gas
- Plan for an eventual transition to some non-fossil-fuel power source for the campus
- Continue to increase in the use of motion sensor lighting
- Install smart power strips in residence halls
- Consider scheduling classes outside of peak electricity use times
- Provide continuing education to faculty, staff and students on reducing electricity use during peak use times
- Consider chill water storage system to transfer electricity use away from peak times
- Improve efficiency of chill water systems and install more efficient cooling equipment in buildings
- Continue actively to explore incorporating passive solar water heating into buildings
- Install more energy-efficient lighting in parking garages
- Use portion of ‘Green Fee’ to launch major energy efficiency project
- Reinvest savings from ARRA projects into a major energy efficiency project
- Expand the use of energy management control systems in existing buildings for HVAC and lighting systems
- Add photovoltaic (PV) panels to selected roofs and surface parking areas in collaboration with TVA’s Generation Partners program
- Conduct lifecycle analyses of the costs and environmental impacts of energy technologies

### II. Air pollution

- Broadcast air quality alerts on campus
- Reduce car commuting miles per year to 25% below FY 2007-08 average

### III. Water and sewer use

- Explore installing devices to curb water and energy use on showers in UT Knoxville recreational facilities (i.e. low-flow shower heads, timers, etc)
- Explore further uses for “gray water”
- Continue to evaluate waterless urinals and other water-saving devices

- Post signs encouraging water conservation in showers, rest rooms, kitchens, and laboratories
- Use permeable pavement on surface parking lots

#### **IV. Water pollution**

- Plant floral species active in phytoremediation to absorb aqueous pollutants present in storm water run-off
- Utilize green roof technologies

#### **V. Solid and hazardous waste**

- Compost 100% of green waste
- Divert 20% of waste from landfill by FY 2020-21
- Develop green guidelines for proper sale and disposal of Surplus equipment
- Develop material on recycling that can be included with new faculty and staff orientation
- Purchase a recycling pallet grinder for composting purposes

#### **VI. Procurement**

- Develop a campus wide procurement policy that would require:
  1. Recycled content paper be used for all printers and copiers
  2. Including “green purchasing” information when campus contract purchasing information is distributed
- Establish access to more locally grown organic products
- Negotiate with paper product providers to offer access to a wider variety of recycled content products (currently 23% of products in the bookstore have recycled content)
- Utilize recycled content paper in products bearing the UT/UT Knoxville trademark, especially time-sensitive materials, such as day planners
- Introduce a recycled content “kiosk” in the bookstore to highlight products using recycled content material
- Improve and increase sustainable initiatives in operations of UT Volunteer Dining
- Create a task force on green purchasing that would study current purchasing practices, compare them with best practices and make recommendations

#### **VII. Motorized transportation**

- Meet 20% fleet fuel demand with alternative fuels
- Propose an Environmental fee added to parking fees, to be used to:
  1. Fund green transportation initiatives
  2. Fund an alternative transportation coordinator
- Increase purchase of higher fuel-efficiency vehicles for the motor pool to continually to meet or exceed annual fuel efficiency targets (meet the CAFÉ standards)
- Continue to explore new options for the use of alternative fuels in service vehicles
- Reconsider the approach to parking on campus (which has been to accommodate whatever demand is there)
- Move parking onto the periphery of campus
- Provide an incentive program for individuals willing to park in alternative lots

- Provide flexible parking permit options (e.g., partial permits, tiered permits, car-pool permits, “EZ pass” option in garages) so that faculty and staff are charged per use, rather than paying for a pass that is used only intermittently
- Consider commuter habits in the next few decades, not just current patterns

### **VIII. “Green” buildings**

- Encourage and provide funds for LEED training for UT Knoxville employees
- Require that all new campus buildings meet LEED silver standards or better
- Incorporate geothermal heating and cooling systems in new buildings wherever appropriate
- In new construction or renovation, design to maximize the use of natural lighting, use new technologies for energy-efficient lighting as they become financially feasible, and design for lower HVAC loads – e.g., by incorporating passive solar and natural ventilation features
- Locate and construct new buildings to maximize their use of green siting and building techniques, as well as the feasibility of “smart trips” to and around campus

### **IX. Landscaping**

- Consider hiring a dedicated full time landscape architect to plan campus beautification projects
- Construct a larger spice garden including both organic and native species (currently only native)
- Transition to turf and other permeable surfaces that require little or no mowing
- Consider funding and implementing further “beautification” projects

### **X. Green spaces; accommodations for pedestrians and bicycles**

- Give priority to implementation of bicycle and pedestrian accommodations as described in the 2011 Campus Master Plan

### **XI. Student Involvement**

- Work with SPEAK and other student organizations to encourage greater student involvement in sustainability efforts at UT Knoxville

### **XII. Greenhouse Gas Emissions**

- Foster and coordinate on-campus carbon offset projects (e.g., expansion of campus composting program, reforestation of campus-owned properties)
- Require first-year students to live on campus to reduce commuting emissions
- Encourage combining trips, carpooling and using public transit for university-sponsored travel
- Encourage driving versus flying for university-sponsored trips that are within 300 miles of Knoxville
- Allow for increasing periods of heat, drought and heavy rainfall in the design of campus buildings and in campus landscaping
- Consider making campus buildings and landscaping more resistant to violent storms
- See also recommendations under “Energy consumption in buildings”

**13. Development Efforts**

- Create a list of high-visibility sustainability projects, and initiate a campaign within the Development Office to solicit funds for these projects from alumni and, especially, corporate donors
- Establish special forms of recognition for green donors
- Use part of the environmental portion of the Student Facilities Fee or the Environmental Stewardship Fund to set up a revolving green fund
- Better promote the Environmental Stewardship Fund to faculty and staff on campus

# APPENDICES

## Appendix A: Past UT Knoxville Environmental Reports

### **1970 Report of the Self-Study Committee on the University and the Environment**

The first environmental report on UT Knoxville dates back to 1970. On July 9 of that year a faculty “Self-Study Committee on the University and the environment” chaired by W. L. Shouse issued a report recommending a number of environmental improvements. The purpose of the recommendations was to make the University of Tennessee “a model Environment for its own people, the larger community, and the state.” While this report did not summarize data, its recommendations are worthy of note. These were:

1. Eliminate the use of Styrofoam and plastic objects which are not biodegradable.
2. Use biodegradable cleaners and other products.
3. Recycle paper and other waste products.
4. Cut down on excessive consumption (paper and other supplies).
5. Eliminate air pollution sources on campus.
6. Promote non-polluting mass transportation systems.
7. Eliminate non-service vehicles from the campus area and provide peripheral parking for commuters.
8. Provide green spaces and malls on campus.
9. Acquire natural landscapes on the campus periphery.
10. Unify student and community services (legal aid clinic, psychology clinic, counseling center, financial aids, etc.)
11. Encourage departmental cooperation in interdisciplinary courses through adequate funding, consideration of faculty work load, promotions, and raises.
12. Involve all segments of the University community in creating this model Environment.
13. Encourage good teaching by equating it with the gains from good research.

Forty-one years later, many of these recommendations have been or are being implemented but others (e.g. eliminate air pollution sources on campus) still need solutions. The report concludes:

In order to effectuate the ... recommendations, it will be necessary to set up an ongoing committee on the Environment. This committee’s functions would include investigating implementation procedures for both the general and specific recommendations made, expanding these recommendations in the light of future data and resources, and working with other Environmentally concerned committees already in existence (for example, the Architectural Review Board) in order to coordinate and give direction to future campus plans.

Today the Committee on the Campus Environment fills this role.

### **The Greening of Big Orange**

During the late 1990s, two undergraduates, Mary Anne Peine (now Mary Anne Hitt) and Jamie

Pizzirusso, mentored by John Nolt, did a College Scholars project for which they created an ambitious report entitled *Environmental Blueprint for the Twenty-First Century: The Greening of Big Orange*. Their report was completed in spring 1997 and presented to Chancellor Bill Snyder in a revised version in spring 1998. It documented environmental conditions and policies on campus, compared them with conditions and policies at other universities, and issued numerous specific recommendations under the following headings:

- A University Environmental Policy Solid Waste and Recycling Radioactive and Hazardous Waste Energy
- Purchasing Policy
- Landscaping, Grounds Maintenance and Campus Design
- Transportation
- Education

It was partly in response to *The Greening of Big Orange* that Chancellor Snyder created the Committee on the Campus Environment in 1999 and charged it with, among other things, the task of recommending an environmental policy for the Knoxville campus.

The *Greening of Big Orange* report concludes:

The next step of this process is implementation. ... At least two 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 possibility of using activities fee money as a source of funds for environmental initiatives should be explored.

With the creation of the full-time positions of Sustainability Manager and Environmental Coordinator, and the establishment of the Student Environmental Fee, these goals have been achieved.

Mary Anne Hitt, by the way, has since become a figure of national political importance, directing the Sierra Club's Beyond Coal Campaign. In 2009 she received the UT Notable Woman Award.

### **2005 Environmental Progress Report**

In 2005 the Committee on the Campus Environment, co-chaired by Mary English and John Nolt produced its first Environmental Progress Report:

<http://www.cce.utk.edu/documents/05progressreport.pdf>

This report provided a synopsis of environmental stewardship on the Knoxville campus as of 2004, including:

- baseline information on various environmental indicators, with additional information on areas where environmental progress is being made;
- a synopsis of how other universities are fulfilling their roles as environmental stewards, and
- suggestions for ways in which UT Knoxville could continue to improve its environmental stewardship on campus.

The present report is an update of that 2005 document.



Project	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7	
	2005-06		2006-07		2007-08		2008-09		2009-10		2010-11		2011-12	
	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
Balance:						\$66,864								
Green Power Purchase							\$144,000	\$144,000						
Stokely Management Center Lighting Upgrade							\$125,000	\$125,000						
Steam Valve Controls							\$13,000	\$0						
Graduate Assistants							\$50,000	\$24,168						
AASHE Membership							\$1,500	\$1,500						
Compact Fluorescent Lamp Swap							\$7,000	\$5,104						
MOG Education, Publicity, & Support							\$20,000	\$17,583						
Recycle Bins for New Residence Halls							\$4,000	\$7,000						
Green Roofs							\$50,000	\$50,000						
Tailgate Recycling Bins							\$5,300	\$5,280						
Humanities Recycling							\$5,000	\$4,716						
Light Switch Plates							\$10,000	\$9,912						
Motion Sensor Light Switches							\$10,000	\$8,831						
Recycling Bins for Offices							\$24,000	\$23,971						
Compost Equipment for Students						cancelled	\$5,000	\$0						
Unassigned:														
Balance:							\$18,064	\$64,799						
Green Power Purchase									\$144,000	\$144,000				
Stokely Management Center Lighting Upgrade									\$125,000	\$9,666				
Graduate Assistants									\$50,000	\$38,949				
AASHE Membership									\$1,500	\$1,500				
MOG Education, Publicity, & Support									\$60,000	\$14,121				
Recycling Equipment								tentative	\$102,000	\$102,000				
Photovoltaic Systems (1 of 4)								tentative	\$100,000	\$100,000				
Bicycle Program								tentative	\$12,000	\$12,000				
Water Dispensers								tentative	\$10,000	\$10,000				
Relocate Solar Display (\$3K matching/McKinney)								tentative	\$25,000	\$25,000				
Low Flow Plumbing Fixtures								tentative	\$40,000	\$37,762				
Vet School Library Lighting								tentative	\$75,000	\$75,000				
Student Competition								tentative	\$30,000	\$30,000				
Additional Green Power Purchase								tentative	\$36,000	\$36,000				
Student Workers								tentative	\$8,000	\$8,000				
Taylor Law Low Flow Plumbing Fixtures								tentative	\$65,000	\$65,000				
Timers for Water Heaters and Small HVAC								tentative	\$30,000	\$30,000				
Unassigned:														
Balance:									\$26,299	\$200,801				
Green Power Purchase										tentative	\$216,000	\$216,000		
Graduate Assistants										tentative	\$50,000	\$50,000		
AASHE Membership										tentative	\$1,500	\$1,500		
MOG Education, Publicity, & Support										tentative	\$60,000	\$60,000		
Photovoltaic Systems (2 of 4)										tentative	\$100,000	\$100,000		
Electric Bike PV System										tentative	\$20,000	\$20,000		
Living Light - Solar Decathlon										tentative	\$40,000	\$40,000		
Recycling Support										tentative	\$58,000	\$58,000		
Steam Line Insulation										tentative	\$40,000	\$40,000		
Cooling Tower VFDs										tentative	\$40,000	\$40,000		
Low Flow Aerators for Faucets										tentative	\$30,000	\$30,000		
Low Flow Plumbing Fixtures										tentative	\$40,000	\$40,000		

Project	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7	
	2005-06		2006-07		2007-08		2008-09		2009-10		2010-11		2011-12	
	Budget	Actual	Budget	Actual	Budget	Actual								
Hodges Library Bottle Stations										tentative	\$700	\$700		
Dining Services Ozzi Machine										tentative	\$5,800	\$5,800		
Organic Crops Farmers Market										tentative	\$15,000	\$15,000		
Exterior Lighting Upgrades - Building Mounted										tentative	\$50,000	\$50,000		
Steam System Flash Tanks										tentative	\$20,000	\$20,000		
Electric Vehicle Project Support										tentative	\$100,000	\$100,000		
Bottle Filling Stations										tentative	\$20,000	\$20,000		
Computer Room Energy Improvements										tentative	\$20,000	\$20,000		
Solar Combination Project										tentative	\$147,000	\$147,000		
Low Impact Development										tentative	\$2,000	\$2,000		
Unassigned: Balance:											-\$199	-\$199		
Green Power Purchase											tentative		\$216,000	\$216,000
Graduate Assistants (1 of 3)											tentative	\$72,000	\$72,000	\$72,000
AASHE Membership											tentative	\$1,500	\$1,500	\$1,500
MOG Education, Publicity, & Support											tentative	\$60,000	\$60,000	\$60,000
Photovoltaic Systems (3 of 4)											tentative	\$100,000	\$100,000	\$100,000
Living Light - Solar Decathlon											tentative	\$15,000	\$15,000	\$15,000
Steam Line Insulation (1 of 5)											tentative	\$40,000	\$40,000	\$40,000
Low Flow Plumbing Fixtures (1 of 5)											tentative	\$40,000	\$40,000	\$40,000
AmeriCorps Volunteers											tentative	\$15,000	\$15,000	\$15,000
Grinder for Recycling (Contingent on NR11 match)											tentative	\$130,000	\$130,000	\$130,000
GA for Media Relations to Support MOG/SWT											tentative	\$27,000	\$27,000	\$27,000
Unassigned: Balance:													\$158,301	\$158,301

## Appendix C:

### Comprehensive Table of Historical Consumption of Coal, Electricity, Natural Gas, Water, etc.

*Numbers in bold italics are estimated from actual data available in years hence. Coal tonnage is actual tons burned. Coal cost is actual cost for coal received. All dollars are unadjusted for inflation.*

Fiscal Year	Number of Students	Square Footage	Coal		Electricity		Water & Sewer			Natural Gas		Steam		Total BTU	BTU per SFT	Total Cost \$	Cost per SFT \$	Million BTU per Student	Cost per Student \$	Constant Slope	Running Average
			Tons	Cost \$	KWH	Cost \$	100 CFT	Water Cost \$	Sewer Cost	Therms	Cost \$	Pounds	Cost \$								
79-80	30,391	9,872,974	30,605	828,315	127,037,382	3,634,031	877,927	410,477	378,016	340,115	109,889	<b>596,952,379</b>	<b>1,585,388</b>	1,261,669	127,790	6,946,116	0.70	41.51	228.56	127,790	127,790
80-81	30,282	9,872,974	29,938	1,096,178	130,616,885	4,473,078	857,819	478,229	422,199	339,444	123,910	<b>583,942,504</b>	<b>1,550,836</b>	1,256,430	127,260	8,144,430	0.82	41.49	268.95	127,862	127,525
81-82	28,709	9,913,265	29,576	1,221,035	136,486,191	5,255,613	875,353	533,393	479,990	313,876	135,479	<b>576,881,672</b>	<b>1,532,084</b>	1,264,417	127,548	9,157,594	0.92	44.04	318.98	127,934	127,533
82-83	27,321	9,913,265	29,546	1,167,963	134,041,248	5,432,839	927,258	619,939	583,976	298,941	162,199	<b>576,296,520</b>	<b>1,530,530</b>	1,253,830	126,480	9,497,446	0.96	45.89	347.62	128,007	127,269
83-84	26,718	9,866,910	29,293	1,065,345	136,192,800	5,764,420	877,155	621,829	543,453	270,193	156,763	513,825,000	<b>1,364,618</b>	1,251,693	126,858	9,516,428	0.96	46.85	356.18	128,079	127,187
84-85	25,619	10,763,275	29,128	1,060,108	138,314,242	5,978,932	848,323	621,407	523,191	258,328	152,442	503,303,000	<b>1,336,674</b>	1,253,429	116,454	9,672,754	0.90	48.93	377.56	128,151	125,398
85-86	24,870	10,861,141	27,862	934,845	142,442,288	6,365,879	858,927	658,694	684,332	242,079	132,300	493,545,000	<b>1,310,758</b>	1,232,924	113,517	10,086,808	0.93	49.57	405.58	128,223	123,701
86-87	25,290	10,853,010	28,740	948,199	151,983,085	7,064,690	864,943	796,766	750,532	268,472	142,981	535,228,000	<b>1,421,460</b>	1,290,830	118,937	11,124,628	1.03	51.04	439.88	128,295	123,105
87-88	25,349	10,934,870	29,473	967,402	158,846,175	7,414,410	893,407	822,829	750,842	310,889	169,929	547,511,000	<b>1,454,081</b>	1,337,464	122,312	11,579,493	1.06	52.76	456.80	128,367	123,017
88-89	24,390	11,047,505	30,549	979,442	163,644,258	7,663,732	932,407	857,509	788,117	328,620	173,706	593,485,000	<b>1,576,179</b>	1,383,526	125,234	12,038,685	1.09	56.73	493.59	128,440	123,239
89-90	25,016	11,203,307	30,717	981,398	169,424,595	7,965,016	<b>883,088</b>	827,772	986,974	332,892	179,915	563,338,000	<b>1,496,115</b>	1,407,975	125,675	12,437,190	1.11	56.28	497.17	128,512	123,460
90-91	25,414	11,353,307	28,894	1,158,752	155,371,175	7,352,827	<b>950,616</b>	857,305	1,096,210	361,714	211,104	520,068,000	<b>1,381,198</b>	1,315,677	115,885	12,057,396	1.06	51.77	474.44	128,584	122,829
91-92	25,598	11,182,957	30,559	1,116,405	154,631,635	7,310,901	818,667	841,395	1,082,797	357,044	228,314	553,005,000	1,422,415	1,355,986	121,255	12,002,227	1.07	52.97	468.87	128,656	122,708
92-93	25,998	11,364,218	31,878	1,214,651	170,630,171	7,048,535	821,467	941,923	1,208,127	418,424	272,588	537,922,000	1,300,387	1,450,813	127,665	11,986,211	1.05	55.80	461.04	128,728	123,062
93-94	25,890	11,366,393	32,536	1,288,666	188,847,792	7,879,162	826,473	1,085,413	1,397,748	443,617	315,845	516,715,000	1,395,820	1,532,380	134,817	13,362,654	1.18	59.19	516.13	128,800	123,846

## Appendix C (continued)

Fiscal Year	Number of Students	Square Footage	Coal		Electricity		Water & Sewer			Natural Gas		Steam		Total BTU	BTU per SFT	Total Cost \$	Cost per SFT \$	Million BTU per Student	Cost per Student \$	Constant Slope	Running Average
94-95	25,412	11,371,125	32,198	1,213,444	193,048,731	8,864,993	866,639	1,118,874	1,466,372	359,303	229,265	508,944,000	1,309,409	1,529,444	134,502	14,202,357	1.25	60.19	558.88	128,873	124,512
95-96	25,251	12,257,514	33,765	1,461,282	203,479,827	9,342,035	805,012	1,164,640	1,509,572	1,347,927	593,027	576,378,863	1,425,612	1,704,514	139,059	15,496,168	1.26	67.50	613.69	128,945	125,368
96-97	25,086	12,257,514	22,035	1,075,647	197,080,382	8,426,252	913,322	1,194,606	1,556,928	5,651,182	1,782,696	644,310,652	1,452,892	1,808,101	147,510	15,489,021	1.26	72.08	617.44	129,017	126,598
97-98	25,039	12,894,555	26,544	1,166,493	210,714,106	9,331,818	926,765	1,225,107	1,619,283	2,341,741	1,538,275	621,935,042	1,658,205	1,640,746	127,243	16,539,181	1.28	65.53	660.54	129,089	126,632
98-99	25,611	12,894,555	20,235	1,047,664	218,153,153	9,341,804	966,370	1,236,346	1,615,799	5,624,887	2,051,298	563,630,212	1,710,440	1,830,319	141,945	17,003,351	1.32	71.47	663.91	129,161	127,397
99-00	25,981	13,006,937	23,278	1,210,138	220,464,333	9,578,386	985,542	1,260,351	1,596,965	5,675,407	1,915,800	584,840,834	1,746,106	1,922,347	147,794	17,307,746	1.33	73.99	666.17	129,233	128,369
00-01	25,474	12,632,539	34,353	1,565,085	227,298,332	10,809,315	945,992	1,253,503	1,573,024	1,871,057	1,366,801	680,465,253	1,576,585	1,853,098	146,692	18,144,313	1.44	72.74	712.27	129,306	129,201
01-02	26,033	12,697,520	28,531	1,701,578	222,941,427	11,064,905	872,088	1,201,423	1,474,420	2,538,186	1,416,171	620,054,701	1,982,546	1,753,625	138,108	18,841,043	1.48	67.36	723.74	129,378	129,589
02-03	27,971	12,697,520	30,515	1,409,285	234,563,915	12,074,979	869,601	1,244,676	1,522,949	2,256,471	1,304,304	655,554,559	1,779,527	1,816,554	143,064	19,335,720	1.52	64.94	691.28	129,450	130,150
03-04	27,281	12,697,520	28,530	1,331,212	223,331,935	11,770,334	923,182	1,155,602	1,388,687	3,137,317	2,336,377	661,615,271	1,910,828	1,814,840	142,929	19,893,040	1.57	66.52	729.19	129,522	130,661
04-05	25,627	13,666,859	32,348	2,470,513	246,208,960	13,060,894	760,908	1,168,202	1,601,831	1,680,516	1,577,429	699,196,812	2,086,019	1,846,210	135,087	21,964,888	1.61	72.04	857.10	129,594	130,831
05-06	26,197	13,686,124	29,973	2,601,821	249,049,225	14,238,654	795,608	1,236,071	2,209,592	1,722,275	1,939,142	671,662,235	1,976,108	1,798,293	131,395	24,201,388	1.77	68.64	923.82	129,666	130,852
06-07	26,476	13,353,161	29,897	2,697,689	244,975,745	14,928,467	824,425	1,357,181	2,767,286	1,934,117	2,042,408	671,906,602	2,021,584	1,803,651	135,073	25,814,615	1.93	68.12	975.02	129,738	131,003
07-08	26,400	13,374,767	29,088	2,598,367	246,586,365	15,842,633	768,906	1,402,576	3,337,117	1,424,705	2,019,991	638,537,000	1,713,384	1,737,152	129,883	26,914,068	2.01	65.80	1,019.47	129,811	130,964
08-09	26,808	14,811,658	29,733	5,188,764	248,154,114	19,098,033	733,025	1,429,819	3,602,676	1,683,998	1,945,521	660,064,000	1,987,067	1,785,182	120,525	33,251,880	2.24	66.59	1,240.37	129,883	130,617
09-10	27,107	14,734,337	16,136	2,656,313	220,963,070	15,661,570	630,833	1,367,657	3,373,673	7,323,560	3,970,398	651,360,000	2,242,230	1,903,166	129,165	29,271,841	1.99	70.21	1,079.86	129,955	130,570