

THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL  
2007 CAMPUS SUSTAINABILITY REPORT

*Act Today  
Without  
Compromising  
Tomorrow*



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# Institutionalizing Sustainability at the University of North Carolina at Chapel Hill

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# CHANCELLOR'S LETTER

## Leaders Embrace the Challenges of Sustainability

As our society grapples with environmental issues such as sustainable community design, natural resource allocation, and global warming, it is critical for the University community to be involved in new and different ways. We are called upon to address today's challenges and develop solutions that span disciplines and include new partners. Carolina's new Institute for the Environment, expanded global School of Public Health, and FedEx Global Education Center exemplify the University's growing engagement in this enterprise.

Carolina is promoting sustainability in many innovative, exciting ways. I have committed the University to reducing greenhouse gas emissions and becoming climate-neutral by 2050. We are already introducing renewable energy technologies, supporting public transportation, and making our new and existing buildings more energy efficient. Our new campus at Carolina North offers an even greater opportunity to demonstrate models of sustainability. From site protection, to energy and water infrastructure, and the buildings and activities to be established on the new campus, Carolina will demonstrate wise stewardship of our environmental and economic resources for the benefit of the university, the community, and the state.

Students, staff, and faculty are all involved. The first solar hot water system on campus started operating when students returned to campus this fall. Carolina students were the first in the southeast to approve a renewable energy fee, which will raise \$1.2 million for renewable energy projects over a six-year period. The solar hot water system is the first project paid for with this green energy fee.

Dozens of new and renovated buildings completed during the past several years, including the multiple buildings of the Science Complex, provide homes for innovative teaching and research. In the field of "green chemistry," UNC faculty have developed and commercialized substitutes for toxic solvents. They are now testing fuel cells that replace batteries in hand held equipment. They are also



improving the efficiency of photovoltaic cells that convert sunlight into electricity by configuring the surface to mimic butterfly wings.

These new buildings are innovative teachers in their own right. At the

FedEx Global Education Center, for example, stored rainwater flushes the toilets and irrigates the courtyard. Two green, or vegetated, roofs provide attractive views while preventing rainwater from causing downstream erosion and flooding after storms. The Nursing School addition is the first in the UNC system to earn LEED (Leadership in Energy and Environmental Design) certification from the US Green Building Council. Signs throughout the building alert occupants to the high performance features. The lecture hall, for instance, helps keep students alert with a carbon dioxide sensor that brings in more fresh air when the space is occupied.

Carolina is proud to be a national leader in pursuing sustainable policies, practices, and curriculum. We owe it to ourselves, the citizens of North Carolina, and our grandchildren to protect the quality of our environment, the vitality of our economy, and the welfare of our people.

James Moeser  
Chancellor

# DIRECTOR'S LETTER

## Institutionalizing Sustainability at UNC-Chapel Hill

Started as a grassroots effort in 1999, the sustainability initiative at UNC continues to grow and flourish. Per capita bus ridership in Chapel Hill is among the highest in the country. Our stormwater management practices are among the most innovative nationally. Our tree protection measures have maintained a dense tree canopy even after constructing and renovating dozens of buildings.

In 2005, the University adopted a sustainability policy establishing that “policies, practices, and curricula should, when possible, embody approaches that reduce life cycle costs, restore or maintain the functioning of natural systems, and enhance human well-being.” High performance buildings manifest these principles. They reduce energy, water, and materials consumption; respect the trees, plants, soils, and streams on the site; and provide clean air and daylight to enhance occupant health and productivity. Starting with one LEED (Leadership in Energy and Environmental Design) certified building in 2005, there are now five LEED buildings under design or construction. Three design teams aspire to obtain the highest Platinum certification from the US Green Building Council.

Advancing the goals of the campus sustainability policy is the role of the Vice Chancellor's Sustainability Advisory Committee. Led by faculty, staff, and students, this group makes policy recommendations to the Vice Chancellor for Finance and Administration. Recommendations adopted to date include phasing out incandescent light bulbs by January 31, 2008, and requiring the purchase of Energy Star™ certified equipment.

Signs of progress are evident throughout the campus. In the curriculum, a new sustainability minor weaves together environmental science, business, public policy, and planning. Reducing greenhouse gas emissions is the goal of a multi-stakeholder operations committee. Planning the new research campus at Carolina North has included hundreds of meetings with consultants, employees, and the community. The goal is to advance teaching, research,



and public service in a manner that demonstrates sustainable practices in action.

Concerns about dwindling fossil fuels, their rising cost, and their environmental impact have led to

new faculty alliances and infrastructure. A five million gallon thermal storage tank – essentially a large thermos bottle – stores chilled water at night and releases it during the day. The facility cuts our peak electric demand during hot summer afternoons by 13 percent. Automated metering of our steam and chilled water consumption, and a new enterprise building management system, will soon provide real time, web services-based information on energy use in our buildings. The first pilot project to report this information to building occupants will be installed in the renovated Morrison Residence Hall.

In addition to improved infrastructure, embracing sustainability requires new behaviors. Almost half our employee and student commuters arrive at work via a means other than single occupant vehicles. Using commuter alternatives reduces the need for expensive new parking spaces and lessens fuel consumption and air pollution. High participation in the campus recycling program results in 43 percent of our discards being turned into products of value in the marketplace. This saves money, resources, and landfill space.

The progress UNC is making on its path toward sustainability is the result of the efforts of many, many people. Your contributions to date, and those anticipated in the future, are greatly appreciated.

Cindy Pollock Shea  
Director, Sustainability Office



# ACADEMICS

## Teaching

### Center for Sustainable Enterprise

The Center for Sustainable Enterprise in the Kenan-Flagler Business School provides education, research, and outreach opportunities to MBA and undergraduate business students. During the 2006-2007 academic year, the School added two new faculty members to teach sustainable business topics. In the MBA class of 2007, 36 students graduated with a concentration in Sustainable Enterprise, double the number in the previous class. The *Sustainable Enterprise* course, previously a second year elective, is now part of the MBA “custom core” and was taken by 120 first-year students (40 percent of the class) in spring 2007. New electives offered in 2005-2006 included: *Innovation & Entrepreneurship for Developing Economies*, *Sustainability for Business Advantage*, and an expanded version of *Systems Thinking for Sustainable Enterprise*. New electives offered in 2006-2007 included: *Strategic Corporate Social Responsibility*, *Product Stewardship for Sustainability*, *Investment Strategy for Sustainability*, *International Development*, and *Social Entrepreneurship*.

UNC and the Town of Chapel Hill are the first town-gown partners anywhere to commit to a 60 percent reduction in greenhouse gas emissions by 2050.

For undergraduate business students, who had been requesting coursework on sustainability, a *Sustainable Enterprise* course was first offered in spring 2006. In spring 2007, this course was repeated and two new courses were added, *Sustainable Entrepreneurship through Microfinance* and *International Development*. In summer 2007 a competitive Carolina Microfinance Initiative internship program in Peru attracted 11 students for two, five-week



sessions. The UNC Center for International Business Education and Research offered partial scholarships to six of the interns.

Graduate students involved with the Center for Sustainable Enterprise may elect to work with volunteer mentors from private firms and non-profit organizations, who are leaders in sustainability. Students may also self-select into “practicum” teams, supervised by a faculty advisor. These short-term research projects are proposed to students by organizations within and outside the university. Recent practicum topics include the feasibility of using hog waste for fuel at the proposed Carolina North campus, a sustainability benchmarking assessment for Burt’s Bees, and a market assessment for a public/private partnership for the Corporate Council on Africa. With a very active chapter of Net Impact, the Center sponsored 32 MBA students to attend the annual Net Impact Conference in Palo Alto in November 2005 and 34 students to attend the Conference in Chicago in November 2006.

## Carolina Entrepreneurial Initiative

The three-year-old Carolina Entrepreneurial Initiative (CEI) is designed to instill an entrepreneurial mindset among the students, faculty, and staff of the University. The \$11 million program, funded in part by the Ewing Marion Kauffman Foundation, offers competitive grants of \$5,000 to \$50,000 to develop new programs that infuse entrepreneurship education throughout campus and its disciplines. An entrepreneurship minor for non-business students, semester leaves for faculty fellows, and first year seminars are already in place. In 2007, funds were awarded to start a graduate certificate in entrepreneurship, a scientific track for the minor, a Social Justice Entrepreneurship Incubator created by the Campus Y,

and a project to explore the creation of an artistic entrepreneurship track and develop a pilot course.

The Launch Program helps faculty and staff develop a business plan and the skills needed to launch a new venture. More than 42 ventures have resulted to date. The program is jointly offered by the Center for Entrepreneurial Studies and the Office of Technology Development. Faculty, staff, and student teams also compete each year for \$50,000 in Carolina Challenge prize money to help start their business and social ventures. Zebra Crossings, one of the 2006 winners, is an online retailer of “fair trade” gifts and accessories created by economically disadvantaged artisans in Cape Town, South Africa.

## Institute for the Environment

Responding to a request from Student Government, the Institute for the Environment developed a minor in Sustainability that was approved in 2007. Students study a range of sustainability-related topics, including environmental science, business, public policy, and planning. The minor is available to virtually all undergraduates who are not environmental science or studies majors. The cross-cutting themes of the minor align well with the new general education curriculum.

The senior capstone course for environmental majors provides hands-on experience with pressing environmental issues. In 2006, one group of students assessed the implementation of sustainable policies and practices at UNC’s peer institutions. By benchmarking Carolina’s performance relative to its peers, students identified the many areas where UNC leads – education & community, land use, transportation, waste & materials, and water management – and the few areas where UNC lags – built environment and energy management.

One capstone worked with a local restaurant group to understand the design and materials changes required to bring a new restaurant up to LEED Silver standards. Another capstone studied the health effects of septic systems on minority populations in Alamance County.

A major focus for both capstones and summer internships is climate change. UNC and the Town of Chapel Hill are the first town-gown partners anywhere to commit to a 60 percent reduction in greenhouse gas emissions by 2050. Students working with the University and the Town inventoried greenhouse gas emissions and helped to develop action plans to reduce

emissions. During the summer, the International Environmental Assessment and Energy Policy internship in Cambridge, UK, works with the town and University of Cambridge to inventory, track, and devise strategies for reducing their greenhouse gas emissions.

A new, spring 2006 course on *Environmental Policy Instruments* introduced students to the regulations, economic incentives, markets for emissions and ecosystem services (i.e., cap and trade policies), and information disclosure requirements that can promote particular environmental management outcomes.

In fall 2007, a new three credit-course *Green Architecture and Planning* was taught by staff in the Facilities Planning Department. Lecturers included an architect, planner, landscape architect, historic preservation manager, and engineer.

In 2006, Greg Gangi, an assistant research professor, director of the educational program, and undergraduate student advisor at the Institute, won the Student Undergraduate Teaching Award. Dr. Gangi teaches *Environment and Society* and *Coral Reef Ecology and Management*. He also leads field experiences in Siberia, the Sierra Nevadas, and St. John in the US Virgin Islands. In 2007, Gangi received a certificate of merit from the National Academic Advising Association.

Other undergraduate majors that provide perspectives on the environment include Earth Systems, Environmental Geology, Environmental Health Science, Geography, Public Policy, and International and Area Studies. Minors that explore the environment are Marine Sciences and Urban Studies and Planning.

# Research

**Research funding at UNC has doubled over the past decade, increasing to \$610 million in 2007. The goal is to reach \$1 billion in annual research funding by 2015.**

During FY 2006 & 2007, UNC started five new companies, received 52 patents, licensed 102 inventions, and earned \$4 million from licensed technology. In fall 2005, Carolina received eight of 21 National Institutes of Health (NIH) “Roadmap for Medical Research” awards, the greatest number received by any one institution. These awards confirm that collaboration among faculty – across many schools, departments, and disciplines – is one of Carolina’s greatest strengths. Seventy-two percent of UNC’s research funding comes from the federal government. Only 4 percent of research dollars originate from private industry, a much lower percentage than at most research campuses. Attracting more private funding is one of the goals for the new Carolina North campus.

**In fall 2005, Carolina received eight of 21 National Institutes of Health Roadmap for Medical Research awards, the greatest number received by any one institution.**

## Institute for the Environment

Recognizing the growing need for environmental expertise to help guide North Carolina and the country through a myriad of environmental challenges – and this University’s unique potential to lead the way in addressing these challenges – Carolina established the Institute for the Environment in 2006. The institute will coordinate and strengthen environmental research, education, and public engagement activities throughout the campus. The Institute is composed of four research centers.

- The **Center for Sustainable Energy, Environment, and Economic Development** helps North Carolina and the nation transition energy systems to reduce

carbon dioxide emissions and other environmental impacts. Faculty Fellows: Doug Crawford-Brown, Director of the Institute for the Environment, and Pete Andrews, Chair of the Public Policy Department

- The **Center for Environmental Modeling for Policy Development** creates the advanced models needed for municipalities, the state, and the nation to predict the impact of different policies on a range of environmental and public health measures. Director: Adel Hanna, Research Professor
- The **Center for Sustainable Community Design** explores how communities throughout North Carolina and the nation can redesign their buildings, transportation systems, and other infrastructure in order to reduce their ecological footprints. Director: Phil Berke, Professor of City and Regional Planning
- The **Center for Landscape Change and Human Health** looks at the ways in which major landscape changes influence both human and ecosystem health. Director: Martin Doyle, Associate Professor of Geography

The public engagement arm of the Institute is run by the **Environmental Resource Program**, directed by Kathleen Gray.

## Institute for Advanced Materials, Nanoscience & Technology

Researchers at this Institute focus on a range of “green chemistry” initiatives that advance the development of renewable energy technologies, materials, and new manufacturing processes. Many patented inventions have resulted from discoveries at the Institute. Supercritical carbon dioxide, for example, is now a commercial substitute for the toxic tetrachloroethene widely used to dry-clean clothes. New fluoropolymers developed in these labs start as liquids at room temperature and are cured into solids. They are employed in the latest generation of photovoltaic cells that convert sunlight into electricity. These new materials promise even more efficient photovoltaic cells in the future.

New proton exchange membranes made from liquid precursors are revolutionizing fuel cells that directly produce power by converting chemical energy into electrical



Scott Taylor Photography



## Institute for Marine Sciences

Researchers quantified baseline conditions and the magnitude and causes of ecological change in 12 estuaries and coastal seas in Europe, North America, and Australia from the onset of human settlement until present day. Paleontological, archaeological, historical, and ecological records were used to trace changes in important species, habitats, water quality parameters, and species invasions. Degradation occurred in all 12 systems. Human impacts have depleted more than 90 percent of formerly important species, destroyed more than 65 percent of sea grass and wetland habitat, degraded water quality, and accelerated species invasions worldwide. Habitat destruction and exploitation are the dominant causes of these ecological changes. The baseline data provides ecosystem targets for restoration. In North Carolina, Rachel Noble's lab is quantitatively tracking bacterial and pathogen fate and transport in estuarine environments.

energy. Fueled by hydrogen or methanol, fuel cells can be used anywhere batteries are used. UNC's fuel cell research focuses on portable uses, including laptops, cellular phones, and homeland security applications.

Medical devices covered in the drug-eluting coatings discovered in these labs improve treatment efficacy and reduce side effects by delivering drugs only where they are needed. A new Carolina Center of Cancer Nanotechnology Excellence, in partnership with the School of Medicine, is one of seven centers of excellence funded by the National Institutes of Health and the National Cancer Institute.

## Carolina Environmental Bioinformatics Research Center

Using computer models to study how chemicals adversely affect health and the environment is the role of the Carolina Environmental Bioinformatics Research Center. The EPA's computational toxicology program awarded UNC \$4.5 million over five years to establish the Center. The results of this research may improve both human health and ecological risk assessments. Improving predictive models to screen and test chemicals also has the potential to reduce the use of animals in toxicological testing. The Center brings together expertise in biostatistics, computational biology, chemistry, and computer science to advance the field of computational toxicology.

## Center for Sustainable Enterprise

In fall 2005, the Center for Sustainable Enterprise (CSE), in partnership with UNC's Center for International Business Education and Research, created the CSE Faculty Grants program to support leading-edge academic research on topics of sustainable business practice. The Center awarded first round, \$5,000 grants to faculty at UC-Berkeley's Haas School of Business, University of Vermont's School of Business Administration, Georgia Tech's College of Management, and UNC's Kenan-Flagler Business School.

In 2007, the CSE Knowledge Bank was launched to provide an online searchable database of sustainable business articles, cases, and white papers from Kenan-Flagler Business School faculty and students. Within a month, more than 350 people registered to access the Knowledge Bank. An expanded and enhanced newsletter, *Sustainable Enterprise Quarterly*, covers research at UNC and highlights events and developments locally and around the world.

In 2006, the Center for Sustainable Enterprise and the Institute for the Environment collaborated on a \$125,000 grant-funded project with Bank of America. This Environmental Footprint Assessment involved creating a robust model to measure the impacts of the Bank's U.S. operations and conduct cost-benefit analyses of potential new environmental initiatives.

## Highway Safety Research Center

Reducing deaths, injuries, and related societal costs of roadway crashes in North Carolina and the nation involves more than cars. In Hendersonville, NC, the Highway Safety Research Center is implementing a model program to create safer and more inviting walking environments for older adults. A newly funded program to establish and operate the National Center for Safe Routes to School will help prevent injury from motor vehicle accidents, increase children's physical activity, and cut down on traffic. Efforts to encourage and enable more children to safely walk and bike to school will be tracked as part of a national information clearinghouse. The Center also runs the National Bicycle and Pedestrian Clearinghouse, a leading source of pedestrian and bicycle information and technical assistance worldwide.



## Environmental Sciences and Engineering

Faculty members in the Environmental Sciences and Engineering Department (ESE) focus on the interplay between humankind, other species, and the physical, chemical, and biological processes that regulate the function of both natural and engineered environments. ESE is one of the few degree-granting units at a research university that integrates environmental science with health, engineering, and public policy analysis.

Ranked among the best in the nation in water research, UNC faculty examine water flows, quality, and health impacts around the world. Applying this knowledge at UNC's new campus at Carolina North is a rare opportunity currently under investigation. In May 2007, a *One Hydrosphere* workshop organized by ESE brought together faculty, staff, administrators, and the local water utility to discuss the potential of a range of innovative water strategies. Potential applied research projects relate to potable, waste, storm, and reclaimed water at the site.

## Geography

Understanding how rare and endangered species move from one habitat patch to another is the focus of the Landscape Ecology and Biogeography Group in the Geography Department.

Researchers study some of the best-preserved longleaf pine forests anywhere at the Fort Bragg Army base near Fayetteville. North Carolina houses more military personnel than any other state on the east coast and the lands bordering these bases are buffers compatible with wildlife conservation. Study leader Aaron Moody focuses on four species: the St. Francis' satyr butterfly, the red-cockaded woodpecker, the Carolina gopher frog, and the eastern tiger salamander. The butterfly is found nowhere else in the world. Applying modern remote sensing technology and field data to understand how landscapes guide and influence the movement of rare and endangered species may help guide decisions about how to best manage landscape corridors in a rapidly growing state.

## Global Health

Improving access to quality health care around the world is the mission of the School of Public Health. After a \$50 million gift this year from a former faculty member, even

the school's new name will reflect its global theme: The Dennis and Joan Gillings School of Global Public Health.

The Office of Global Health within the School focuses on many of today's borderless health challenges. These include HIV/AIDS, malaria, SARS, tuberculosis, cancer, and obesity. By working with a broad range of local and international partners, UNC aspires to develop better intervention programs to combat these threats.

African sleeping sickness, or trypanosomiasis, is a deadly parasitic disease transmitted by tsetse flies. More than 300,000 people in sub-Saharan Africa are infected with the disease, and an estimated 60 million people are at risk. An effective and inexpensive oral drug to treat the disease, the first new treatment in 50 years, is being tested

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in clinical trials thanks to the work of an international consortium led by UNC's Dr. Richard Tidwell. The Bill & Melinda Gates Foundation has awarded two grants to Tidwell and the consortium, worth \$44 million. The funding also supports development of an inexpensive drug for visceral leishmaniasis, a potentially fatal disease affecting 12 million people in 88 countries.

## Climate Change Across Disciplines

UNC seismologist Jose Rial camps out on glaciers to measure the multiple earthquakes that occur each year as Greenland moves about 150 cubic miles of ice to the ocean. Marine scientist Tony Rodriguez is quantifying the amount of ocean- and estuarine-shoreline erosion that occurs as sea levels rise and the ocean advances landward. Tony Bruno's team has developed a Coral Reef Temperature Anomaly Database whose 20 years of data shows that ocean temperature is positively related to disease prevalence at regional scales in the Indo-Pacific. Rick Luettich's storm surge/inundation modeling work is in high demand after his model accurately forecast levee overtopping around New Orleans several days in advance of Hurricane Katrina's landfall. Astrophysicist Gerald Cecil switched fields to focus on energy and *peak oil* – the moment when oil extraction can no longer increase.

Decision scientist Douglas Crawford-Brown helps communities and institutions on both sides of the Atlantic to measure and reduce their carbon emissions in tandem with economic development. Graduate students and faculty in the School of Government are developing decision support tools to assist local governments make the low-carbon choice. Graduate business students assess the ecological footprint of major corporations and conduct feasibility studies on energy efficiency and renewable fuels.

Climate change is starting to drive research across many different disciplines. Sharing the knowledge gained will help organizations around the world, including UNC, make smart choices to reduce greenhouse gas emissions.



Scott Taylor Photography



# Public Service and Engagement

**The Carnegie Foundation for the Advancement of Teaching has classified UNC as a “community-engaged university” in recognition of continual collaborations with the community and a commitment to fostering community service among students, faculty, and staff.**

In 2006, the Carnegie Foundation classified institutions into one of three categories: “curricular engagement,” which entails engaging students and faculty with the community; “outreach and partnership,” which combines the application and provision of institutional resources to mutually benefit the campus and the community; and a category that combines both. Carolina was one of 62 institutions in the country that met the requirements for both categories.

Mike Smith, appointed as Carolina’s first vice chancellor for public service and engagement in 2006, is also dean of the School of Government. The School hosts the largest university-based local and state government training and consulting research organization in the country.

To familiarize new faculty and administrators with the people, concerns, and economy of North Carolina, a five-day Tar Heel Bus Tour takes to the roads every May. More than 360 newcomers have participated in this privately-funded tour since its launch 10 years ago.

In 2006, more than 100 local leaders traveled to Madison, Wisconsin to learn about that city’s town-gown relations. UNC administrators, local politicians, and members of the Chapel Hill-Carrboro Chamber of Commerce visited Madison’s thriving research park and learned about many town-gown collaborations, including the Sustain Dane initiative. The findings influenced planning for the Carolina North research campus in Chapel Hill.

A Chancellor’s Task Force on Engagement with North Carolina explored ways the University could strengthen

and expand its service to the state. In its final report, the task force focused on new steps the University can take to serve the state in K-12 education, health care, and economic development. The new Faculty Engaged Scholars Program, an initiative of the Carolina Center for Public Service, offers an advanced curriculum on community engagement through scholarly endeavor. Faculty participants will be awarded \$4,000 stipends to participate and then develop scholarly products on engagement.

## Active Living by Design

Increasing physical activity through community design, public policies, and innovative communication strategies is the goal of Active Living by Design, part of UNC’s School of Public Health. Chapel Hill is both the national headquarters of the Active Living by Design program and home to one of the 25 nationwide partnerships funded by the Robert Wood Johnson Foundation. Go! Chapel Hill works with parents and children to identify and create safe walking routes to school. Active Neighborhoods has assessed the pedestrian infrastructure in several mixed-use neighborhoods and recommended capital improvements. A new downtown walking map developed by Active Businesses encourages employees to engage in physical activity during work breaks.

## Campus Y

As the center for social justice and pluralism, the 1,500-member Campus Y is the largest student organization on campus. Members catalyze positive social change

## Epsilon Eta Environmental Honors Fraternity

Formed in 2006, Epsilon Eta is America’s first environmental honors fraternity. The name comes from the Greek words for science and morality and the organization’s goal is to promote a sustainable society. The first awareness raising event organized by the fraternity focused on solutions to climate change. Panelists included UNC faculty and administrators, local government staff, and leaders of Triangle area businesses and non-profit organizations that advance energy efficiency and renewable energy technologies. The local chapter intends to take the fraternity national so chapters will be created around the country.



The recently renovated Campus Y is the home of social justice and pluralism on campus.

through conferences, leadership training, projects, and events. Working with faculty of the Social and Economic Justice minor, the Campus Y launched a Social Justice Entrepreneurs Incubator Program in 2005. Expanded experiential learning opportunities for students are funded through the Carolina Entrepreneurial Initiative.

Students Working in the Environment for Active Transformation (SWEAT) started as an independent group and is now an official committee of the Campus Y. SWEAT members sold compact fluorescent light bulbs (CFLs) in 2006-2007 and used the profits to purchase and donate CFLs to low-income households.

## Carolina Environmental Student Alliance (CESA)

CESA students share their knowledge and concern about environmental issues by making engaging presentations to grade school students and organizing campus Earth Day activities. On Saturday mornings, the students remove invasive species from the Bolin Creek greenway and on Fridays, they turn their attentions to Battle Park, next to the Forest Theater. Students monitor benthic macro invertebrate populations in Bolin Creek and conduct river watches as part of weekend excursions. They also visit organic farms, build trails, and glean the fallen harvest on farm fields to share with the less fortunate.

## Carolina for Kibera

Kibera in Nairobi, Kenya, is believed to be East Africa's largest urban slum, home to some 700,000 people living in an area about the size of New York's Central Park. When Rye Barcott went there as a UNC student in 2001, he teamed up with a widowed nurse and a local sports association to create a youth soccer league. The sports program now serves 5,000 youth in exchange for community services and promotes leadership, community development, and ethnic and religious cooperation. The five-year-old, international nonprofit, Carolina for Kibera, has branched out to include a medical clinic that serves 30,000 patients annually. Housed at the Center for Global Initiatives at UNC, the nonprofit also created Binti Pamoja (Daughters United Center) to provide safe spaces for girls and to conduct HIV/AIDS peer education. Over 20 percent of Kibera's population is estimated to be HIV positive. An innovative waste management program supports more than 100 youth in Kibera who have created sustainable, environmentally friendly businesses.

People are taking note of this community led development program. Musician Sarah McLachlan is helping to fund a new building for the medical clinic. Cornell University's Johnson School of Management is facilitating a business development process for the group. The federal Centers for Disease Control and Prevention is expanding its partnership. And sales of a recently published book, *LightBox: Expressions of Hope from Young Women in the Kibera Slum of Nairobi*, will provide scholarships for the girls working on women's rights and reproductive health. This innovative development model was recently honored by *Time* magazine and the Gates Foundation as a "Hero of Global Health."

## Center for Public Service

Participation in the Public Service Scholars program, started in 2003, has risen to 1,700 students. The 96 students who graduated as Public Service Scholars in 2007 averaged 450 hours of service. To earn this distinction, participants must complete 300 service hours, take a service-learning course, and attend skills-training workshops developed by the Carolina Center for Public Service. Public-service scholars receive training in four skill

areas, including financial management, ethics, advocacy, and cultural awareness. Students in the *Environment and Society* service learning course contribute their time to local non-profit organizations, government offices, and University departments working on environmental issues. Service learning interns receive \$1,200 stipends for working 10-15 hours per week. An intern in fall 2006 helped develop the sustainability theme housing curriculum for the Morrison Residence Hall.

The Center for Public Service provides \$8,000 Ueltschi Grants to faculty interested in developing a service learning course that successfully connects community service with course concepts. *Environment and Society in the United States*, developed by Greg Gangi, and *Environmental Advocacy*, developed by Cindy Spurlock, are both

## A Chancellor's Task Force on Engagement with North Carolina explored ways the University could strengthen and expand its service to the state.

popular service learning courses. 2007 grant recipients include Flora Lu for developing Anthropology 539 *Environmental Justice* and Doug Crawford-Brown and Kathleen Gray for developing Environmental Studies 207 *Internship in Sustainability*.

## Geography Department

**I**nvasive plants and animals on the Galapagos Islands are eroding fragile landscapes and threatening species that have been aiding scientific discovery since Charles Darwin's first voyage in 1835. At the request of Ecuador's

Ministry of the Environment, geographer Steve Walsh led a team of students to the islands in 2006. The team mapped the spatial patterns of selected invasive plants and used satellite data to build three-dimensional maps of landforms and landscapes. The maps show how changes introduced by humans are altering the environment. Grasslands, for example, are turning into forests due to the importation of guava trees. A long-term research partnership will help Ecuador study and protect ecological systems under stress.

## Institute for the Environment

**T**he Environmental Resource Program is the outreach and public service unit of the Institute for the Environment. Its mission is to promote environmental stewardship and public health through education, research, and community service. The Program provides technical assistance to community groups, offers K-12 teacher professional development, conducts policy research for non-profits and government agencies, and sponsors undergraduate environmental internships. A recent addition is the Project to Assist North Carolina Health Care Providers Respond to Climate Change.

At three residential North Carolina field sites run by UNC's Institute for the Environment, faculty and students work with local organizations to study issues of interest to the state. At Morehead City, for example, marine sciences faculty focus on beach and shellfish water closures due to contamination by bacteria and other agents that cause disease. At the Albermarle Ecological Field Site in Manteo, students study the natural and cultural forces at work in the coastal environment. In fall 2005, the entire group conducted an interdisciplinary assessment of the state's blue crab fishery. They documented changes and evaluated the effectiveness of strategies to protect the spawning

## Millenium Village Project

**E**radicating extreme poverty around the world, one impoverished village at a time, is the goal of the Millenium Village Project, developed by the Earth Institute at Columbia University and the United Nations. Students at UNC, Duke, and Bennett College, a historically black women's college in Greensboro, have joined forces to create the first and only Millenium Village Project that is completely student led. The group invited Jeffrey Sachs, the economist who directs the Project, to speak on campus in November 2006. More than 1,400 students turned out to see him.

The students raised \$1.5 million to sponsor Marenyo, a village in western Kenya. The eight Millenium Development Goals for this and every project are:

- Eradicate extreme hunger and poverty
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria, and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development.



stock. At the Highlands Field Site in the southern Appalachian Mountains, students conduct biodiversity and conservation projects. In 2006, for instance, students designed and implemented an ecological study of one of the most significant remaining stands of old growth hemlock that is threatened by the invasive woolly adelgid.

## Kenan- Flagler Business School

For two years in a row, the Kenan-Flagler Business School sponsored a Habitat for Humanity house. The design for the house completed in 2007 won a NC Sustainable Building Design Competition and is the first green Habitat House in Orange County. Nearly 300 students, alumni, faculty, and staff participated in the building project.

Net Impact is the global organization of graduate business students and professionals interested in “using the power of business to make a positive net social, environmental, and economic impact.” Formed in 1993, the organization has more than 15,000 members and one of the largest chapters in the country is based at UNC. Graduates from UNC, NC State, and Duke launched the professional chapter of Triangle Net Impact in fall 2005. Through networking, education, community service, professional development, and business outreach, the group hopes to foster a new generation of leaders who use the power of business to create a better world.

## Morehead Planetarium and Science Center

Long a popular destination for school children and their families, the Morehead Planetarium and Science Center is reaching beyond the stars. A \$570,000 grant



This Habitat for Humanity house, sponsored by the Business School, won a sustainable design competition.

from the National Science Foundation supports the production of a series of *Science 360* shows. These multi-media science news shows are presented in a theater setting, including sound and video clips, animations, projections, and audience participation. Created by teams of faculty, staff, students, and instructional designers, the topics highlight University research and practice that is relevant to the public. One of the first shows, *Tomorrow's Buildings Today*, demonstrates how design and construction choices can advance sustainability. UNC buildings, and samples of innovative materials, will serve as examples of highlighted strategies.

Each fall “citizen scientists” join scientists and natural historians from the Planetarium and the NC Botanical Garden to conduct day-long inventories of biological diversity at the Mason Farm Biological Reserve.

## North Carolina Botanical Garden

Conserving native plants and ecosystems and educating the public about their importance and how to care for them is the mission of the North Carolina Botanical Garden. The Garden’s staff teaches horticultural therapy classes, publishes scientific papers, and maintains a welcoming oasis in Chapel Hill. Painting exhibitions, the annual Sculpture in the Garden show, and courses – including a certificate program on botanical illustration – focus on the beauty of the natural world. A storyteller’s garden and children’s camps inspire curiosity about na-





State and University officials honor the ground where the new Visitor Education Center will be built at the North Carolina Botanical Garden.

ture. Home gardeners can ask advice from the Master Gardeners who volunteer on site. A demonstration garden at a showcase “green house” in Raleigh provides homeowners with ideas about what they can try at home. Many lectures, events, guided walks, and celebrations cater to a range of ages and interests.

On main campus, the Botanical Garden maintains the arboretum and the trails and plantings in Battle Park across from Paul Green Theater.

## Roosevelt Institution

The Roosevelt Institution is the nation’s first student think-tank, with more than 75 chapters at universi-

ties across the country. UNC’s chapter, launched in 2005, contains six centers, each focused on a different area of public policy and advocacy.

The Center on Environmental and Energy Policy explores renewable energy, energy efficiency, nuclear waste, urban sprawl, and wetlands issues. In spring 2007, center members lobbied NC legislators on renewable energy bills, asking for more domestic forms of energy that would mitigate global warming. Members spent a day shadowing an experienced environmental lobbyist as he made his case for the Renewable Energy and Efficiency Portfolio Standard, which ultimately passed. The Center has published policy editorials in several major papers, including the *Charlotte Observer* and the *Hartford Courant* (CT).

## School of Journalism and Mass Communication

Nine students in Dr. Tom Linden’s *Science Documentary Television* course produced a three-part series on environmental issues affecting North Carolina estuaries. The series was a collaboration with North Carolina Public Television and aired statewide over three nights on *North Carolina Now*. The first segment focused on the bal-

## Student Environmental Action Coalition

The ICARE (I Called About Renewable Energy) campaign encouraged students to call their legislators about supporting the Renewable Energy and Efficiency Portfolio Standard, which passed in 2007. Students sat in the Pit and wandered through campus with signs, cell phones, and petitions encouraging their peers to register concern about reducing greenhouse gas emissions.

Encouraging more local food consumption included hosting a farmer’s market each semester with Dining Services and showing films about sustainable agricultural practices. The group is working with Dining Services to expand local food options at the dining halls.





ance between coastal development, tourism, and environmental conservation in Beaufort. Students interviewed land developers, a commercial menhaden fisherman, environmental scientists, and environmental advocates. The second part profiled three estuarine restoration projects in Carteret County. The last segment investigated causes of the recent decline in commercial blue crab catches in North Carolina. Blue crab is the state's most lucrative commercial fishery. The series is now shown to visitors at the N.C. Estuarium.

## Teacher Training in Environmental Science

UNC provides training to environmental science teachers across the state in several ways. The Destiny traveling

science learning program is managed by the Morehead Planetarium and Science Center. Destiny develops and delivers a standards-based, hands-on curriculum, and teacher professional development, with a team of educators and a fleet of vehicles that travel throughout the state. The Center for Mathematics and Science Education applies the resources of the University to improve K-12 education. Hands-on workshops for middle and high school teachers cover a range of environmental science topics from climate change to water quality. The Center for Environmental Health and Susceptibility translates Center research into knowledge that can be used to improve public health. The Community Outreach and Education Core of the Center educates teachers and the public about how individual and group susceptibilities interact with environmental and occupational factors to cause disease.

# CSE Consulting Program

CSE Consulting, launched by the Center for Sustainable Enterprise in the Kenan-Flagler Business School, employs MBA students to provide real-world sustainability consulting services to companies and nonprofit organizations. Designed to enhance the education of MBA students through experiential learning and to support the implementation of sustainable business practices – both globally and locally – the program is the only one of its kind at a business school worldwide.

Recognized in 2006 with a North Carolina Sustainability Award for innovation, CSE Consulting delivers world-class sustainability consulting services to partner organizations such as Progress Energy, Bank of America, Johnson & Johnson, and smaller private and nonprofit organizations in North Carolina. Two-thirds of past projects have been conducted for NC-based organizations. By its third summer in 2007, 29 MBA students applied for five positions. These internships are so competitive because the students are able to integrate a broad range of disciplines, including finance, marketing, operations, and corporate strategy, together with an understanding of the environmental and social considerations that affect business. The summer consulting season begins with an intensive training course in project and risk management, sustainability and innovation, and team building.

Example projects completed by CSE Consulting include:

- Designing a sustainability metrics program for Progress Energy;
- Evaluating social enterprise business models for the Orange County Partnership for Young Children;
- Assessing the financial feasibility of a startup waste-to-energy business venture for Bilboa Energy;
- Evaluating sustainability trends, issues and opportunities in specific industries for the North Carolina Department of Commerce.



# Globalization

Understanding how crucial it is for students to learn about and experience the world beyond America's shores, UNC sees global education as a leading University priority.

From the new general education curriculum, to expanded international learning opportunities and scholarships, to a new Global Education Center, students are finding it easier than ever to expand their horizons. Carolina undergraduates are still required to develop excellence in oral and written communication, a foreign language, critical thinking and analysis, and ethics. In addition, they are now expected to study global issues, engage in experiential education (such as study abroad, service learning, or a departmental honors thesis) and to make connections between and across the courses they take.

To facilitate global learning opportunities, a new, joint undergraduate degree program with the National University of Singapore (NUS) was launched in 2007. Students can take two to four semesters of classes at NUS and earn diplomas from both universities. The program is designed to serve students who major in economics, English literature, geography, history, and political science. NUS is ranked among Asia's top three universities and 19<sup>th</sup> worldwide by *The Times*, a London-based newspaper.

The first in a series of joint projects with Peking University, a co-sponsored conference on health care reform, occurred in December 2006. More than 120 UNC faculty and staff are working on China-related topics. Collaborations include AIDS research and treatment, and Business School training associated with logistical preparations for the 2008 Olympics.

UNC opened the European Study Center in London in 2007. Winston House, an all-purpose, compact, satellite campus in the academic heart of London is home to the UNC honors program abroad and is available for use by all members of the University community. Located around the corner from the British Museum and within walking distance of the University of London, the London School of Economics, and other study abroad programs,



The New FedEx Global Education Center provides many gathering spaces for sharing international knowledge.

the facility provides a robust learning environment. Video conferencing technology will create connections for students at UNC's home campus.

The new FedEx Global Education Center on the Chapel Hill campus provides a central hub for student and faculty services, academic instruction and programs, and research. The Study Abroad Office, the Center for Global Initiatives, International Student and Scholar Services, all area studies offices, and the associate provost for international affairs are all housed in this unique facility.

## Green Passport

To assist students in trimming the environmental impact of their study abroad experience, UNC launched the Green Passport in 2007. To obtain a green passport, students make a seven part pledge. Their commitments include calculating, and working to reduce, their carbon footprint. Recommended strategies include:

- purchasing carbon offsets for any air travel,
- adopting the energy and material consumption habits of the host country,
- walking, biking, and/or taking public transportation,
- purchasing local food and goods,
- making use of recycling programs,
- returning to Chapel Hill with a changed attitude about what constitutes a satisfying and sustainable life.

A range of gathering spaces encourages interaction and knowledge sharing. These include a globally-themed coffee shop, flexible and clustered open office spaces, video conferencing capability, and an outdoor fourth floor patio. Larger gatherings take place in a day-lit, three-story atrium and an auditorium with windows.

With more than 320 study abroad programs to choose from, approximately 37 percent of Carolina's undergraduates study outside the United States. The number of students studying abroad has more than doubled over the past decade. For the third consecutive year, Carolina

posted a higher rate of students going abroad than any other U.S. public research university. Scholarships for international study are supported by 10 donor-established endowment funds that have increased in value during the Carolina First fundraising campaign. Funds for summer programs, for example, have increased nearly four-fold over the past year.

This passion for global learning and service continues after students graduate. Seventy-seven UNC alumni currently serve in the Peace Corps. UNC ranked 8<sup>th</sup> nationally in the number of alumni volunteers in 2006.

## Affordability

**Committed to the principle that a college education should be affordable to all, UNC established the Carolina Covenant in 2004.**

To date, more than 1,400 students from families earning less than 200 percent of the federal poverty level have received sufficient grants and scholarships to graduate debt-free. By agreeing to work on campus 10 hours per week, these students graduate without loans to repay. Faculty mentors for Carolina Covenant Scholars help to ensure that students succeed in their studies and obtain a degree. This model program has been replicated at more than two dozen institutions across the country and by the entire state of Wisconsin. Partly due to this initiative, UNC ranks as the number one best value among the nation's top 100 public universities, according to *Kiplinger's Personal Finance* magazine, and has since 1999. In 2006, Carolina hosted a national conference to stimulate actions that will enhance access to higher education. At present, only 9 percent of low-income students in the United States earn a bachelor's degree by age 24.

Funding for the Carolina Covenant and other scholarships comes from many sources. Since 1999, 35 percent of campus-based tuition increases have been allocated to financial aid for needy students. These funds are supplemented by private donations as well as \$1 million a year from Student Stores' profits. Trademark licensing royalties in fiscal 2006 yielded \$3.6 million for merit and need-based scholarships, the largest amount earned to date.

To assist underserved and low-income high school students in their efforts to attend college, the Jack Kent Cooke Foundation created the \$10 million National College Advising Corps in 2007. UNC will house the national headquarters and coordinate the activities of 10 campuses from coast to coast. Recent UNC graduates will work full-time with 11<sup>th</sup> and 12<sup>th</sup> graders in 18 low-income high schools across the state, serving as advisors about the admissions process, entry exams, and financial aid. Another \$27 million partnership with the Jack Kent Cooke Foundation and eight colleges and universities will enable more community college students to earn bachelor's degrees from selective four-year institutions. The program will assist low- to moderate-income students to transfer to and graduate from Carolina. UNC's efforts will focus

**To date, more than 1,400 students from families earning less than 200 percent of the federal poverty level have received sufficient grants and scholarships to graduate debt-free.**

on students while they are still in high school or early in their community college careers at Durham Technical Community College, Alamance Community College, and Wake Technical Community College in Raleigh. By the end of the four-year pilot, at least 225 students will be participating at UNC and the three partner colleges; receiving the transition and support service that will help them graduate on time.

# Diversity

At UNC, efforts to expand diversity and an inclusive campus community include experiences and perspectives of students, staff, and faculty as they relate to race, gender, age, class, sexuality, culture, nationality, disability, religion, and region.

A critical mass is sought of many types of people in order to avoid the situation of somebody being “the only one” of a given identity or background in a learning environment. Following the report of the Chancellor’s Task Force on Diversity, an institutional diversity plan was developed to establish a common set of goals for university leaders and members of the campus community and to encourage accountability across the campus for addressing these goals. Objectives of the plan are to: 1) Define and publicize the University’s commitment to diversity; 2) Gain support of under-represented populations to ensure educational benefits to the entire campus community; 3) Offer diversity education, orientation, and training to all members of the University community; 4) Encourage and sustain open and respectful discussions about diversity and create opportunities for interaction and cross-group learning; 5) Support further research to advance UNC’s commitment to diversity. An annual report will highlight achievements.



In 2006, 470 students in the first-year class, or 12.3 percent, were black. UNC has led its peers in six out of the last eight years with the highest percentage of black students in its freshman class. Archie Ervin, associate provost for diversity and multicultural affairs, reports that the black student population is increasing, both as a result of enrollment and retention. UNC improved its black student graduation rates from 2005 to 2006, climbing from 69 percent to 72 percent. To bolster success, Summer Bridge, a program hosted by Academic Services, allows students

UNC has led its peers in six out of the last eight years with the highest percentage of black students in its freshman class.

to take introductory classes during the summer before their freshman year. Mentoring programs also are in place to assist black students.

The free-standing Sonya Haynes Stone Center for Black Culture and History opened in 2004. In 2007, a campus residence hall was named in honor of a former slave, George Moses Horton. Horton, a poet from Chatham County, became the first black person to publish a book in the South, *The Hope of Liberty*, in 1828.

Multicultural theme housing is an option for all students. Masala, UNC’s multicultural organization, and the Black Student Movement both dispatch student ambassadors to participate in meetings with other groups on campus. About 30 percent of the freshman class in 2006 was non-white. International students comprise only one percent of the student population and will be actively recruited in the future.

In 2007, UNC launched a new American Indian Center, the first of its kind in the South. North Carolina boasts the largest American Indian population east of the Mississippi River, with eight tribes throughout the state.

The LGBTQ (lesbian, gay, bisexual, transgender, and queer) Center expanded in 2006 to serve faculty and staff as well as students. The number of Safe Zone allies – community members trained to create spaces for LGBTQ students – increased to 723.



# CLIMATE CHANGE

**Arguably the greatest threat to our future, climate change is occurring far more rapidly than predicted. As a leading public university, Carolina is not just observing climate change: It is adopting strategies to reduce greenhouse gas emissions.**

In June 2006, UNC and the Town of Chapel Hill became the first town-gown partners in the country to commit to reducing greenhouse gas emissions 60 percent by 2050. This Community Carbon Reduction (CRed) pledge resulted from the work of Dr. Douglas Crawford-Brown, his students, the Vice Chancellor's Sustainability Advisory Committee, and Crawford-Brown's colleagues throughout eastern England.

In its pledge, the University cited the compilation of a carbon dioxide inventory for all emissions sources originating with campus operations. The inventory showed that the University produces between 335,000 and 345,000 metric tons of carbon dioxide annually, excluding air travel. About half of the total comes from electricity and steam generated at the campus cogeneration facility, which has pioneered the use of combined heat and power technology and is one of the cleanest coal-burning plants in the nation.

Another 36 percent of the University's carbon dioxide emissions come from electricity purchased from Duke Power. The remainder comes from transportation, stationary sources, and miscellaneous operations. The inventory found the per capita emissions rate to be approximately nine metric tons per person per year.

**UNC has conducted a comprehensive greenhouse gas emissions inventory and is working to develop an action plan to reduce emissions.**



Following the CRed commitment, Chancellor Moeser became an early signatory of the College and University Presidents Climate Commitment in January 2007. This national initiative calls on campuses to exercise leadership by modeling ways to achieve climate neutrality as soon as possible and reducing greenhouse gas emissions at least 80 percent by 2050. As specified in the commitment, UNC has conducted a comprehensive greenhouse gas emissions inventory and is working to develop an action plan to

Chancellor Moeser became an early signatory of the College and University Presidents Climate Commitment in January 2007.

reduce emissions. Carolina has already adopted most of the tangible actions specified in the commitment by

- establishing a policy that all new campus construction be built to at least the US Green Building Council's LEED silver standard or equivalent;
- adopting an energy efficient purchasing policy that requires purchase of Energy Star certified products in all areas for which Energy Star ratings exist; and
- encouraging the use of, and providing access to, public transportation for all faculty, staff, students, and visitors.

The comprehensive guidelines for Carolina North development also include high-performance building guidelines and sustainable energy strategies.

Exploring emissions reduction options – and feasible interim goals and deadlines – is the work of a campus-wide climate task force. The initial working group is composed of representatives from Facilities Services, Facilities Planning & Construction, Energy Services, Transportation, Dining, and Environment, Health & Safety. Additional members will be added later. Although few institutions anywhere in the world have well-defined strategies and target dates in place for achieving climate neutrality, uncertainty is no longer blocking action to address the problem.

Educating students about the science of climate change, its widespread impacts, and the markets and policies that influence decisions will equip them well for the future. Providing students with the knowledge and skills needed to address systemic challenges will enable them to benefit from the economic opportunities that will arise from developing and adopting new approaches. From first-year seminars, to science and public policy courses, to internships, a new sustainability minor, and a pan-university emphasis on entrepreneurship, Carolina is taking this challenge seriously.



Andy Ives, wearing the Earth Day 2007 t-shirt, examines the eco-footprints of fictional members of the UNC community.

## Focus the Nation

Focusing the nation on solutions to global climate change is the intent of a nationwide teach-in on January 31, 2008. UNC students are working with faculty and staff to reach as large a segment of the campus community as possible. If all goes according to plan, the subject will be brought up in classes throughout the disciplines. Speakers and musicians will attract crowds and tours of innovative energy initiatives on campus will demonstrate firsthand how the university is reducing greenhouse gas emissions.



# CAROLINA NORTH

Carolina North, a 970-acre parcel of University-owned land two miles north of main campus, provides needed room to grow. Carolina North is envisioned as an extension of the main campus that will advance teaching, research, and public service.

Public and private research conducted at Carolina North will spur economic development not only in the Research Triangle but across North Carolina. Careful planning and implementation aim to make Carolina North a new model of sustainable community.

A multi-stakeholder Leadership Advisory Committee was launched in March 2006 and was charged by Chancellor Moeser to issue guiding principles for the development. The group, which met regularly for 10 months, included representatives of the University and its Board of Trustees, the towns of Chapel Hill and Carrboro, Orange County, the State, the Chamber of Commerce, the School Board, and OWASA, the local water utility. A summary of the principles put forward by the committee in January 2007 follows.

*Carolina North will create a campus for living and learning that is a model of ecological, social, and economic sustainability. A sustainable community achieves fiscal equity and incorporates environmental consciousness, open space, natural areas, parks and recreation, diversified housing, schools, commercial areas, and offices supported by multi-modal transportation, master planned infrastructure, and advanced technology. Carolina North will create healthy living environments; protect, restore, and maintain ecological integrity; conserve energy and natural resources, and use them efficiently; balance social, economic, and environmental concerns in decision-making; promote equity, human dignity, and social justice. The planning and execution of Carolina North shall be a model of cooperation for the mutual benefit of all stakeholders.*

*Over the next 50 years, the University will limit its eight million square feet of buildings to 250 acres of the site. Building height will be minimized where the height of buildings may have an adverse effect on existing neighborhoods and taller in other sections so as to reduce the*

*developed footprint and increase open space. The development will designate and protect areas that serve as low impact recreation opportunities, as wildlife habitat, and as buffers along Bolin Creek and Crow Branch. Undisturbed natural systems have an inherent value that is recognized and respected. An inventory of natural resources will be conducted, maintained, and used as a guide for planning and development. The University commits to never building in environmentally sensitive areas as identified in the University's ecological assessment (conducted by Biohabitats) or by other studies by mutual agreement.*

**Carolina North will create a campus for living and learning that is a model of ecological, social, and economic sustainability.**

*Amenities at Carolina North, such as parks, performance space, trails, and greenways will be open and welcoming to the general public. The retail and service components of Carolina North will be privately owned to the extent feasible and accessible to the entire community.*

*Carolina North will be designed and built as a pedestrian, bicycle, and transit-oriented development from the outset. Connections will link to existing and planned transportation grids, including greenways. Retail, recreation, civic facilities, and housing will be incorporated in each phase of development in such a way as to minimize disruption and adverse impacts to surrounding neighborhoods and communities. Carolina North will create a livable community of University-related compatible uses that integrate living, working, recreation, and shopping areas, both horizontally around the site and vertically within buildings. Housing at Carolina*



*North will comply with the Schools Adequate Public Facilities Ordinance, as adopted by all local government entities, in order to pace growth with the construction of schools. The University will reserve a school site. The University will also make good faith efforts to make a positive contribution to the availability of affordable housing in the community.*

*Carolina North will assume a leadership position in sustainable water management, wastewater treatment, and reuse by seeking innovative solutions to minimize water demand and ensure adequate supply for the greater community as well as Carolina North. Development of Carolina North will result in no net increase in stormwater discharge and no net increase in loading of sediment and nutrients into local streams.*

*The University commits to adopting energy and resource conservation in all aspects of Carolina North development, including building standards and choice of technologies. The University commits that any industrial use, including power generation, will address health, safety, and welfare impacts on the community. Any commercial or industrial entity at Carolina North will adhere to the same environmental principles committed to by the University.*

In August 2006, Jack Evans, a long-time University administrator and a professor in the Business School, was appointed as full-time executive director for Carolina North. His leadership propelled the planning process forward at an accelerated pace. Technical workshops with University staff and consultant teams simultaneously formulated strategies for developing Carolina North. Streets and buildings, for example, will be oriented to maximize the use of daylight and solar energy in buildings. Utility generation will focus on energy efficiency and renewable fuels. “Working landscapes” will capture and clean rainwater and runoff. And most development will occur within 1,000 feet of a transit stop.

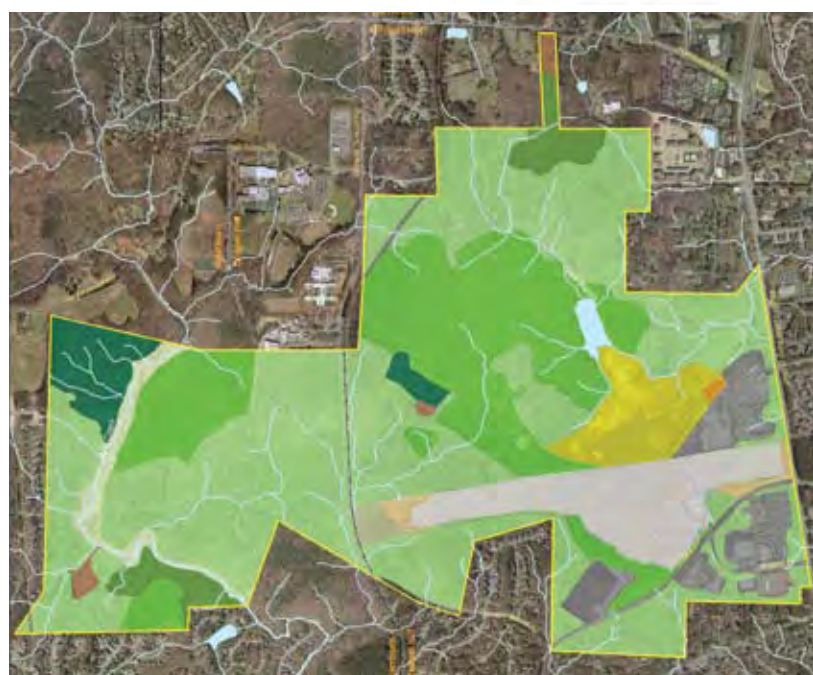
A series of public sessions sought the input of the broader local and university community. Multiple scenarios for development were presented and attendees provided input on comment cards. A frequently updated website included most of the presentations made at technical and public workshops and provided an additional means for evaluation and feedback.

The first phase of Carolina North development will occur primarily on areas of the site previously disturbed by the airport and the Town of Chapel Hill Public Works complex. Over the next 15 years, up to 2.5 million square feet of mixed-use space, including housing and services, will be developed on this southeastern section of the site. The

Innovation Center, an incubator for new startup businesses based on faculty research, is in the planning stage and will likely become the first project built at Carolina North. The Innovation Center will exemplify Carolina North’s potential to strengthen public-private partnerships that will benefit the long-term economy of the region, the state, and beyond. UNC currently lags in this area, ranking 90<sup>th</sup> nationally in terms of industry support for research and development. Only 4 percent of the research dollars flowing into UNC come from private industry. Stronger industry partnerships are essential as UNC strives to increase its research funding to \$1 billion annually by 2015.

Active management of the overall Carolina North property commenced in July 2007 when a forester was hired by the Grounds Department. An initial staff of two full-time employees and seasonal, temporary staff will identify and map service roads, biking trails, and hiking/jogging trails. A local nonprofit group, with extensive history throughout the Triangle, will design a network of bike trails that is safer and less erosive than the current paths. An advisory committee, with many community stakeholders, will create a management plan for low-impact recreational use of the property.

#### Legend



# ENERGY

## Supply

The addition and comprehensive renovation of 2.4 million square feet of space on campus since 2005 has required concurrently expanding Carolina's energy infrastructure.

The capacity of the combined heat and power plant on Cameron Avenue expanded from 28 to 32 megawatts. Two new chilled water plants, with a total capacity of 16,000 tons, were constructed to cool the 143 buildings on the chilled water loop. The new Northeast Chiller Plant is integrated into the new Cobb parking deck. A new steam plant is also under construction. To service these utilities, the first 11-foot tall, walkable utility tunnel was constructed.

In conjunction with other construction projects, almost 10 miles of new steam and condensate piping has been installed over the past 10 years. Yet by consolidating older, smaller networks, the overall length of pipe has remained relatively constant. This improved network has increased the amount of steam reaching customers by 7 percent since 2000. Today, approximately 91 percent of the steam leaving the central plant reaches its destination before it condenses and is returned to the plant to be re-boiled.

Nine thousand feet of aging hot water pipes and 7,000 feet of steam lines have been replaced since 2000. Because the new lines are better insulated and larger in diameter, more net energy is delivered to campus buildings. This increased thermal efficiency is equivalent to saving approximately 10,000 pounds per hour in steam production, enough to heat 1,600 average homes.

Five chilled water plants serve the campus. By using only the newest, most efficient electric chillers during the November to March period, and using lower temperature (65° F) condensate from the cooling towers, the electricity



The 32-megawatt combined heat and power plant at UNC is among the most energy-efficient, coal-fired power plants in the United States.

consumption per “ton-hour delivered” fell by 10 percent in 2007.

In addition, the amount of cooling provided by each ton of chilled water delivered has increased. This is due to more efficient use of the chilled water within campus buildings. The measure of this efficiency is called the “Delta T,” the difference between supply and return chilled water temperatures. Delta T has increased 13 percent since 2004. By removing more building heat with each ton of chilled water delivered, fewer gallons of chilled water need to be pumped around campus. This reduces the amount of energy and water consumed at the chiller plants.

Producing and storing chilled water at night when the electric rates are lower, and then using that chilled water during hot summer days when electric rates are highest, saves the University money. The 5-million-gallon, 40,000-ton-hour, Tomkins Thermal Energy Storage System entered service in 2006. During the first full year of operation, the Univer-



sity shaved 12 megawatts off its peak electric demand and trimmed \$230,000 off its electric costs.

Tracking energy use in campus buildings is now automated through the use of networked steam and chilled water meters. Monthly energy bills are now based on meter readings

**Larger, better insulated steam and hot water lines deliver more net energy to campus buildings. This increased thermal efficiency is equivalent to saving approximately 10,000 pounds per hour in steam production — enough to heat 1,600 average homes.**

rather than allocation formulas, as was done previously. Electric Distribution should complete installation of new, automated electric meters by 2009. Energy Services has also upgraded their billing system to provide more detail on consumption. Online billing is in the works. With these improvements, the campus community will have the tools and resources needed to more effectively monitor energy consumption down to the building and department level.

## Renewable Energy

Students at UNC have raised their fees by \$4 per semester to invest in renewable energy infrastructure directly on campus. The Renewable Energy Special Projects Committee is a student-run organization established to allocate these fees, with advice from campus administrators. The first \$185,000 funded a solar hot water system on top of the renovated Morrison Residence Hall. One hundred seventy-two evacuated-tube collectors heat water to provide showers for 860 residents. A 6-thousand-gallon tank stores water heated during the day for later use. Students leveraged their funds by successfully applying for a \$137,455 grant from the NC Energy Policy Council. The solar system is part of a \$22 million renovation project funded by Housing and Residential Education.

In the 2005-2006 school year, the green energy fee paid for the incremental cost of using 20 percent biodiesel fuel in the small Point-2-Point bus fleet. In subsequent years, the small, incremental cost of biodiesel was absorbed in the transit fee.

Interested in diversifying the technology types supported by the fee, the students next allocated \$210,000 for the geo-

thermal wells at the Visitor Education Center at the North Carolina Botanical Garden. The geothermal system, coupled with other energy-saving technologies, is expected to reduce total energy consumption at the facility by 48 percent, relative to a similar building of standard construction. In its efforts to obtain LEED Platinum certification from the US Green Building Council, the Garden is employing a wide range of innovative strategies and technologies. The ground honoring for this project occurred in April 2007 at a ceremony that included talks by the Chancellor and the Lieutenant Governor. Students were thanked repeatedly for their contribution to the project.

Several new solar hot water projects are currently being evaluated for potential future funding by the Renewable Energy Special Projects Committee. These include solar hot water systems on the roof of the Fetzer Gymnasium and/or the addition to the Woollen Gymnasium. Campus departments interested in suggesting future renewable energy projects are encouraged to forward their proposals.

The Energy Services Department is actively pursuing alternative energy sources for its central plants. Landfill gas, animal waste methane, and wood biomass appear to be the most promising fuel sources on both main campus and at Carolina North. A study to examine the technical feasibility and cost effectiveness of these options started in fall 2007.

Chancellor Moeser and Vice-Chancellor Jablonski learn about the solar hot water system on top of the Morrison Residence Hall from a student.





# Demand

A 20 percent increase in the physical size of campus since 2003 (2.75 million square feet) and the addition of several new energy-intensive facilities is driving the growth in energy use on campus.

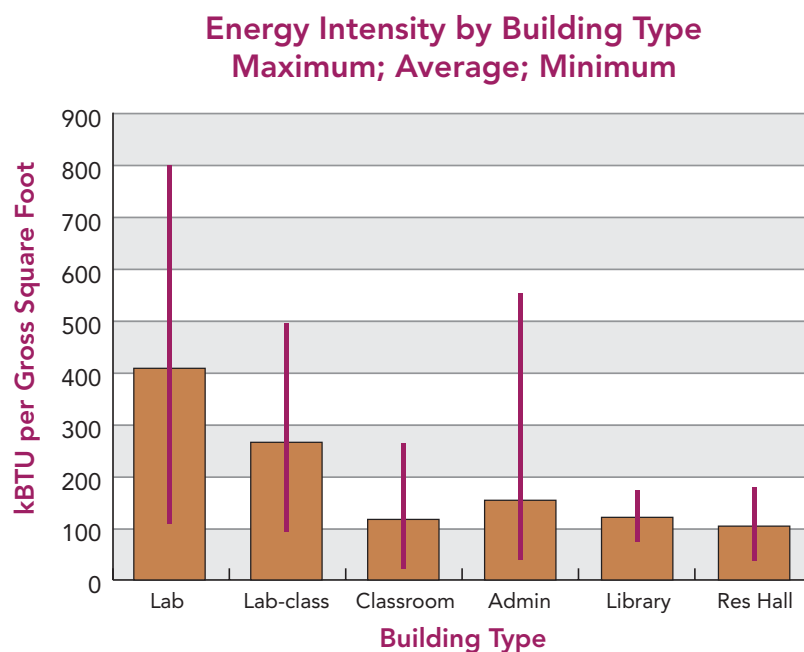
Opportunities to reduce energy consumption within the approximately 16.5 million square feet of buildings on campus are many. Infrastructure improvements, new operations and maintenance practices, and occupant behavior can all trim energy use and help reduce UNC's annual energy bill of \$64 million.

Since 2003, energy consumption per square foot in campus buildings has fallen by 8 percent. However, the energy intensity of new buildings is increasing. Seventy percent of the 811,000 square feet of new buildings added in fiscal 2007 contains laboratories and high performance computing centers. Although the University has invested in new high performance technologies for these facilities, they will still consume several times more energy per square foot than classroom, office, and residential buildings. Legislation passed in 2007 requires all public facilities to reduce energy consumption 20 percent per square foot by 2010 and 30 percent by 2015, compared to the 2003 base year. In addition, energy consumption in new buildings must be 30 percent less than required under the North Carolina Building Code, which is based on ASHRAE Standard 90.1-2004.

Although there is no recurrent funding stream for energy efficiency improvements, internal campus allocations for this purpose total almost \$3 million since 2003. Lighting replacement projects, retro-commissioning of existing buildings so they work as designed (or better), and improvements to HVAC equipment constitute the bulk of the expenditures. By investing \$1 million in 2006, the campus now saves \$263,799 annually. This 3.7-year payback is for energy savings only and does not include the reduced maintenance, longer equipment life, and improved work environment that also result. This return on investment is higher than the stellar returns achieved on UNC's endowment.

## Lighting

As energy-efficient lighting technologies become ever more cost effective, the campus is working to phase out old fluorescent light tubes and magnetic ballasts. Many of these T-12 systems have already been replaced with more efficient T-8 and T-5 light tubes with electronic ballasts. A comprehensive inventory is underway to identify the areas



Since 2003, energy consumption in campus buildings has fallen by 8 percent per square foot.

that still require upgrades. Over the past two years, the lighting systems have been replaced in Battle-Vance-Pettigrew, Bingham, Fetzer, Gardner, Kenan Labs, Lineberger, Manning, Morehead Labs, Peabody, the Student Recreation Center, Taylor, Thurston Bowles, and Woollen.

To determine where occupancy sensors would be most cost effective, light loggers have been deployed in a range of campus locations. These monitoring devices track when the lights are on and off in a space. While some buildings are occupied 24/7, this is the exception rather than the rule. In most locations, the lights can – and should – be turned off at night and over the weekend.

Students that were concerned about lights left on in campus buildings overnight inventoried classrooms where lights were left on unnecessarily. After this information was shared with Academic Technology Networks, all “smart classrooms” were reprogrammed to turn the lights off overnight. Students also identified the number and location of bathrooms suitable for occupancy sensors. Mechanical rooms and “chases” are another location where lights often remain on, so light timers are being installed in these areas. To date, more than a dozen buildings have been completed.

## Goodbye to Incandescent Light Bulbs

Incandescent light bulbs will be phased out of campus buildings by January 31, 2008. This new policy, approved by the Chancellor’s cabinet, eliminates a very inefficient use of electricity. The compact fluorescent bulbs that replace incandescent bulbs use only one-quarter as much electricity to create the same amount of light, produce less heat, and last many times longer. The Sustainability Office is working with Build-



ing Services and Design and Construction Services on a list of substitute lamps that provide the desired color and lighting effect. Some dimming systems and specialty applications will require more time to replace.



Davis Library is one of many buildings at UNC that has been retrofitted with energy-efficient lighting.

In addition to installing energy-efficient infrastructure, it is important that people turn off the lights when leaving an unoccupied area. In some buildings, like Jackson Hall, the staff rotates responsibility for turning off bathroom and shared office lights at the end of the day. Over the past two years, the Sustainability Office has printed and distributed 20,000 *Please Turn Off the Lights!* stickers to remind people to save electricity. This is especially important in common areas, such as classrooms, open offices, and restrooms, where no individual feels ownership for the space and where it may not be possible to install an electronic occupancy sensor.

Incorporating new lighting technologies is also being explored. A visit to Cree, a LED manufacturing company in Durham, was followed by several on campus presentations and an inventory of potential applications. Light emitting diodes (LEDs) are more efficient than both incandescent and fluorescent lights, last longer, incorporate redundancy, and in specialty applications can be programmed to select and change color. LEDs are currently incorporated in exit signs and traffic signals on campus.

To encourage the use of compact fluorescent lights, the Sustainability Office distributed bulbs to any faculty, staff, or student who signed EPA’s Change-A-Light Change-the-World pledge at both Campus Sustainability Day and Employee Appreciation Day. These bulbs were also distributed as door prizes at screenings of *An Inconvenient Truth*.

## Heating, Ventilation, and Air Conditioning (HVAC)

About 60 percent of the energy used on campus is for heating, cooling, and ventilating buildings. Laboratory fume hoods and the controls that govern building automation systems play the largest role in determining energy use.

Conditioning outside air to keep laboratories safe for student and faculty researchers is a necessity. The number of air changes required every hour to keep those researchers safe is a topic of national debate.

At UNC, 24 percent of the gross square footage houses laboratories. These buildings account for 52 percent of campus energy use. Reducing the number of air changes per hour, especially during unoccupied periods, and transferring the thermal energy of the air leaving the building to the outside air entering the building are key to curtailing energy consumption.

Several initiatives are underway to address these issues. A pilot Lab Energy Assessment Program (LEAP), launched by the Sustainability Office in 2006, is working in an academic lab to identify potential savings and incorporate the input of many stakeholders. Key individuals include the principal investigators working in the labs, the HVAC technicians servicing the building, various facilities engineers, including the energy conservation manager, and staff from Environment, Health & Safety, who establish indoor air quality standards. A survey of occupants, multiple strategy sessions, and on-site work to assess the potential for safely reducing air flows have been completed. Staff experts at EPA's Labs for the 21<sup>st</sup> Century program are serving as technical consultants.

The primary finding of this group is that it is imperative to replace the older, pneumatic controls in this building with new digital controls. Digital controls provide the key to safely balancing the health and safety of occupants with the campus' energy conservation goals by improving the ability to automate building operations. While all new buildings are being brought online with digital controls, UNC still has more than 3 million square feet of older, energy-intensive buildings that are in need of modernization.

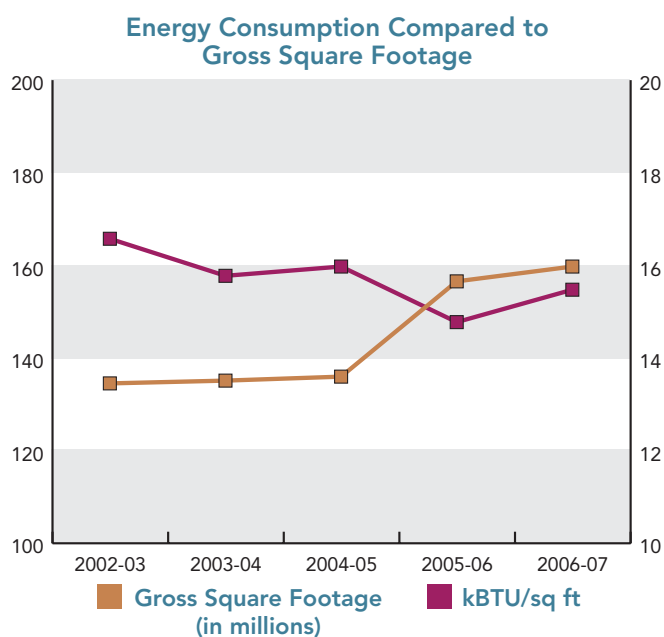
Operating and maintaining the range of complex buildings at UNC becomes more challenging each year. To date, state procurement guidelines have prohibited a single, standardized approach to building automation system controls. As a result, there are nine different proprietary

systems, and multiple generations of each, that control technicians must learn to operate. Each system has its own software tools and graphical user interface, making training and maintenance increasingly difficult.

**In laboratories, reducing the number of air changes per hour and transferring the thermal energy of the air leaving the building to the outside air entering the building are key to curtailing energy consumption.**

To address this controls challenge, UNC recently hired several high-level engineers with controls experience, including the new director of Building Services and the director of HVAC Systems. An independent consultant has documented the operation of existing control systems and worked with staff to set standards for new building designs and retro-commissioning efforts. A new team within HVAC is being created to program direct digital control systems, perform preventive maintenance, tune up existing systems, and assist the commissioning coordinator. A more rigorous training program is also under development. The goal is for UNC technicians to troubleshoot and maintain controls, analyze building level data from the building management system, and actively participate in building design reviews, acceptance testing, and retro-commissioning.

Improving the functioning of existing buildings by enabling them to perform as designed is the objective of





**The EBMS will be like the gas gauge of the University, allowing operators to measure how efficiently a building is operating.**

the retro-commissioning program. Thusfar, eight buildings have been assessed for potential improvements. At three of these buildings – Bioinformatics, Carroll, and the Medical Biomolecular Research Building – the suggested improvements have already been made. Anticipated annual energy savings are \$156,871.

At the Lineberger Cancer Center, the HVAC staff replaced and rebalanced variable air volume terminal units and electricians upgraded the lighting systems. Energy consumption in the building fell 28 percent over a four-year period.

All across campus, energy is being saved by installing premium efficiency motors to power equipment. About a dozen motors a year are replaced with premium efficiency motors with a quick payback. At the relatively few buildings on campus that rely on boilers, upgraded software is reducing the frequency of boiler firing without compromising occupant comfort. Reduced firing saves energy and money.

In many campus buildings, the rooms are empty after 10 p.m. Since heating and cooling unoccupied spaces is wasteful, the air handlers in 24 buildings are shut down between 10 p.m. and 6 a.m. when the weather is mild, saving approximately \$100,000 per year.

## **Enterprise Building Management System (EBMS)**

A new enterprise building management system will standardize and centralize access to operational information about campus buildings. This new software system will remotely monitor energy consumption and heating, ventilating, and air conditioning (HVAC) performance, enabling technicians to make informed decisions about improving building efficiency. About 60 percent of the energy used at UNC is for HVAC systems. Operating these systems more efficiently could significantly reduce fuel use, costs, and greenhouse gas emissions.

The new software will also ensure that there will be “no data left behind.” Five years worth of data will be archived onsite for easy access. This data will be used to analyze trends for laboratory certification, to resolve building me-

chanical issues, assess indoor air quality, and evaluate energy usage. Data can be paused, as well as played back and reviewed, either in real time or at an accelerated rate, a capability that no other system possesses. The EBMS will be like the gas gauge of the University, allowing operators to measure how efficiently energy is being used and how efficiently a building is operating.

The alarm features of this new system will provide additional protection for the physical infrastructure of campus by monitoring the status of building equipment. If a motor, pump, fan, valve, or other item is not operating correctly, the computer monitors at the EBMS will light up with flashing red lights and an audible alarm will sound that cannot be turned off until the problem is solved. The stream of data flowing into the EBMS will allow problems to be detected sooner, diagnosed easier, and responded to faster. And because the software is web-based, HVAC technicians will be able to use laptop computers to access information and be notified of important events, such as alarm messages, from anywhere, and at anytime day or night.

The system will monitor and control more than 100 buildings using 33,000 sensor points. Integrating the multiple generations of nine different sets of vendor-specific building automation systems into one unified system will significantly reduce the amount of training time technicians require to manage today’s complex building systems. The almost \$4 million cost was covered under the 2000 Higher Education Bond program. Components of this state-of-the-art control center include:

- Development of a first-of-a-kind Enterprise Building Management System (EBMS) software program that integrates all campus building controls under one front-end interface;
- Installation of “gateways” in more than 100 campus buildings that translate the “languages” that each building uses to communicate building information into one common language for the EBMS software;
- A new Building Operations Center consisting of an operations and control hub from which operators can manage campus buildings, an automation lab for testing components, and a server room to store the data received from each building;
- A new set of UNC-specific building automation system standards that will bring consistency to the technical requirements for new buildings and the procurement process.

# BUILDINGS

**With \$1.8 billion of capital projects underway during the peak of the development plan in 2006, UNC is improving existing facilities and adding innovative, new spaces.**

From sophisticated laboratories to renovated historical gems to apartment-style residence halls, the physical infrastructure of the campus is catching up with the increasingly complex demands of campus programs. Large classrooms no longer just hold chairs. They include laptop ports in each seat, “smart” technology to dim lights and power computer presentations, and carbon dioxide sensors to bring in fresh air before students get drowsy.

At the new Science Complex, the largest project ever undertaken at UNC, there are laboratories for chemistry, marine science, physics, and astronomy. Scientists in these labs no longer need to worry that the vibrations of a passing bus will compromise their research or that new graduate students will get lost in the maze. In Caudill Hall alone, there are 108 fume hoods to maintain good air quality and keep scientists safe while conducting their experiments. These hoods are among the first on campus to vary the air volume

in the ventilation system, reducing it when the hoods are not in use. Each fume hood uses as much energy each year as several homes. Training researchers to “close the sash” when they leave will be important in reducing the University’s energy costs and greenhouse gas emissions.

The process of designing and constructing buildings at Carolina has evolved over the past several years to focus on site protection; energy, water, and materials efficiency; and improved indoor air quality and occupant comfort. One of the tools informing this change is the Leadership in Energy and Environmental Design (LEED) Guidelines, developed by the US Green Building Council (USGBC). Achieving the USGBC’s voluntary performance standards requires an integrated design process involving the collaboration of many professionals.

The School of Nursing addition, completed in 2005, is the first building in the UNC system to be certified under LEED. Signage in the building informs occupants about the green roof, innovative materials, water-conserving fixtures, and energy-saving devices employed in the design. There are now five LEED buildings under design or construction at UNC. Three design teams – at the North Carolina Botanical Garden Visitor Education Center, the School of Information and Library Sciences building, and the Robertson Scholars building – aspire to obtain the US Green Building Council’s highest platinum level of certification.

To standardize the adoption of high performance building principles across campus, the Sustainability Office provided LEED training to the architects and engineers in Facilities Planning and Construction. Biweekly classes, coupled with a day-long seminar by outside experts on integrated design and energy modeling, were followed by independent study. Twelve project managers subsequently passed the test to become LEED Accredited Professionals, bringing the campus total to 15. While not all capital projects apply for LEED certification, all projects strive to achieve a minimum LEED silver performance standard.

The green roof on the fourth floor of the Nursing School addition manages stormwater and provides a pleasant space to relax or study.







The new FedEx Global Education Center is the first building on campus to use rainwater for flushing toilets.

At two buildings on campus – the Global Education Center and the Morrison Residence Hall – a different set of design guidelines were employed. These High Performance Guidelines for Triangle Region Public Facilities were promulgated the same time as the LEED Guidelines and employ many of the same principles. They do not, however, include third party certification. At the request of the State, the University followed these guidelines on one new and one renovated building.

The Global Education Center's three-story atrium and surrounding work spaces are infused with daylight. Vertical fins on the building exterior help keep out unwanted afternoon glare and heat. The western courtyard surrounds an existing post oak grove and two levels of underground parking are tucked into the eastern slope. An underground cistern captures rainwater from this building and its neighbor. The stored water is used to flush toilets and to irrigate the courtyard. Two green roofs, a ground floor coffee shop,

flexible work areas, and multiple indoor and outdoor gathering spaces encourage interaction.

At the 10-story Morrison Residence Hall, built in the 1960s, a comprehensive renovation introduced central air conditioning and fire protection, replaced windows, and added more common areas. On the top three floors, the suites include a living room as well as three bedrooms. The first solar hot water system on campus is on the roof. Sensors monitor the energy consumed in each wing of each floor of the building and students will be able to view how much energy they are consuming in real time via a website and a kiosk in the lobby.

On all projects, outside architectural and engineering teams are expected to bring green building experience and expertise and to facilitate an integrated design process. The University clarifies which LEED performance standards must be met on all projects, which are project specific, and which are not relevant. Improved design and construction guidelines, new energy modeling standards, and specifications for building control systems are all part of this improvement process.

One practice that has improved considerably over the past two years is that of building commissioning, or ensuring that a building operates as designed. Although a simple concept, the complexity of modern buildings means that the devil is in the details. The first campus project to be commissioned by a third party professional, starting in the design phase, was the Science Complex. With widespread recognition of the value of this service, all capital project budgets now include a line item for commissioning. In addition, a full-time in-house commissioning coordinator facilitates the process on all capital projects.

## Historically Underutilized Businesses

To ensure that minority and women-owned businesses benefit from the recent construction boom, the State set a goal of 10 percent participation by historically underutilized businesses (HUB) in the design and construction of State-funded projects. At UNC-Chapel Hill, the participation on capital projects ranges from 16 to 23 percent of the construction funds awarded to date, depending on the contract delivery method. In April 2002, the University established a HUB Resource Center to assist firms in pursuing campus design and construction projects. The director of the HUB program



conducts training and project reviews to bolster the competitiveness of interested firms. To date, businesses owned by minorities and women have performed more than \$200 million of campus improvements.



# HISTORIC PRESERVATION

Renovating historic buildings and landmarks instead of erecting new structures saves materials and energy while preserving cultural legacies and architectural character. As the bumper sticker says, “Historic Preservation: The Ultimate Recycling.” As the nation’s oldest public university, UNC has a rich heritage to protect.

A Historic Preservation Manager hired in 2002 has already managed 11 comprehensive renovation projects. Seven have received preservation awards from the Preservation Society of Chapel Hill. Renovated buildings include the Campus Y, Memorial Hall, Murphey, New East, New West, Person, Saunders, and the Love House. Historic buildings currently under renovation include Hanes, Playmakers, Steele, and Gerrard, the one-room performance space that is only now introducing indoor plumbing.

Adapting old buildings to modern uses is a challenge. Providing heating, ventilation, cooling, and information technology without ducts, chases, and large mechanical rooms requires new approaches and user education. Murphey introduced vertical chases and expanded the dirt floor mechanical room under the building. Saunders employed a valence heating and cooling system to avoid ducts altogether. At the Love House, a highly reflective copper roof was added to reduce heat gain, and ceiling fans were installed to keep people cool under the high ceilings. Heat pumps provide cooling.

Selecting materials and colors consistent with the buildings’ origins necessitates a trained eye and skilled craftsmen. Fortunately, an appreciation of these historical jewels developed prior to the construction boom that started in 2001. Wherever possible, original materials were salvaged for reuse. At New West, this included the 1920’s red oak floor and almost all the doors and trim. At the Campus Y, the original heart pine flooring now graces the entry hall, and much of the trim was reused. At Murphey and Saunders, the original

maple floors were refinished. At the Love House, almost all the original trim, doors, windows, and flooring were reused, and high performance storm windows were added for energy conservation. Most of the backyard was saved from becoming a parking lot: Building users ride bicycles or take a bus to the facility.

In addition to the comprehensive renovation projects, 12 historic buildings have either undergone or are about to start a partial renovation. This typically consists of a new roof, window replacements, exterior waterproofing, and/or masonry restoration. Examples include Alumni, Bynum, New East, and Phillips. Where feasible and appropriate, highly reflective cooper roofs are installed to reduce heat gain. At the Morehead Planetarium, new insulation was added under the copper roof.



Historic Gerrard Hall

# TRANSPORTATION

As part of the 2001 Master Plan, 20 acres of surface parking will be removed from campus. Ten acres will be replaced by new buildings, including parking decks, and 10 acres will become new green space.

After the new decks are completed, there will be a net decrease in parking available per employee. There will be one parking space for every two employees and one for every 10 students. More on-campus student housing, however, will reduce the need to commute. Since 2003, university housing has expanded by 50 percent to more than 3 million square feet. High housing costs in Chapel Hill and Carrboro have contributed to an opposite trend for employees. More than 70 percent of University and UNC Hospitals employees now live outside the Chapel Hill Transit service area.

This year 48 percent of all students and employees commuted via alternatives to the single-occupancy vehicle. Per capita bus ridership on the fare-free Chapel Hill Transit system is among the highest in the country, with more than 6 million rides offered during 2006. Average ridership is about 50 people per hour per route. All employees, and students living more than two miles from campus, are eligible for free annual passes on the regional Triangle Transit Authority buses, worth \$1,000 annually. For

vanpool riders, UNC offers a \$20 per month subsidy per person. Although expenditures on commuter alternatives exceed \$6 million annually, this cost is significantly less than constructing new parking capacity on campus.

Per capita bus ridership on the fare-free Chapel Hill Transit system is among the highest in the country. Average ridership is about 50 people per hour per route.

The *Smart Moves Apartment Finders* brochure, published by the Transportation Demand Manager in 2007, maps local apartment complexes served by the Chapel Hill Transit network. Students can use this brochure to ensure that their prospective residence is well served by one or more free bus lines.

Kiosks have been added to town and campus bus shelters showing the schedule and map for each route served. To reduce waiting times for bus riders, a GPS tracking system now displays when the next bus will arrive. Fourteen of the most heavily used bus stops host electronic signs indicating when the next bus on each route will arrive. This information can also be accessed via the internet and therefore many cell phones. So students studying late at the library, for example, don't need to head outside until they know their bus is almost there. The campus-run Safe Ride and Point-2-Point fleets also operate at night, from 7 p.m. to 3 a.m., and serve 20,000 riders per month.

The extensive network of park-and-ride lots, with more than 3,800 spaces, is served by the fare-free bus system and recently expanded in several directions long viewed as critical to the program's success. On the northern

Vanpool riders receive \$20 per person per month.







entry from Durham, a University park-and-ride lot for 241 cars is now based at the Chapel Hill Bible Church. Parishioners use the lot on weekends and UNC employees during the week. An express bus route serves the lot and operates at 20-minute intervals along US 15-501. On the southern entry to campus, a new 550-space park-and-ride lot in Chatham County serves that area's rapidly growing population. Initially managed by a private transportation company, the route was absorbed into the Chapel Hill Transit system when three new hybrid buses entered into service in August 2007. Three 60-foot articulated buses also entered the fleet. Along the northwest approach from Martin Luther King Boulevard, the frequency of bus service to the Eubanks lot has increased, and 40 new spaces have been added at the Sheps Center on Umstead Road.

New members of the no-charge Commuter Alternatives Program (CAP) may now test its suitability by enrolling in a 30-day trial membership before relinquishing their

parking permit. CAP members receive discounts at the Rams Head Parking Deck, on their Zipcar memberships, and from many area merchants who display a CAP decal in their front window. Members also receive a free ride to their car or home if there is a qualifying family emergency and a once-a-month parking pass. With parking permits starting at about \$500 annually, some 5,600 university and hospital employees are saving money by participating in the CAP program.

Previously restricted to students and employees 21 years of age or over, the campus Zipcar program – that rents vehicles for \$5 an hour, including fuel – is now available to members 18 and over. This four-vehicle fleet includes a range of cars stationed at central campus locations. For first-year students, who are ineligible to bring cars, these vehicles expand possible destinations beyond those served by the transit systems.

Information Technology Services employees ride electric scooters to service calls and meetings.



## Commuter Alternatives Program Annual Savings

<b>Employer Name</b>	<b>The University of North Carolina at Chapel Hill</b>	
<b>Number of Employees</b>	<b>16,000 (UNC and UNC Hospitals)</b>	
<b>Gas Price</b>	<b>\$2.92 (May 2006; Energy Information Administration)</b>	

<b>Environmental Benefits</b>	<b>Reduction</b>	<b>Units</b>
CO2	7,336	Metric Tons Per Year
Gasoline	833,609	Gallons Per Year
Gas Money	\$2,434,138	Per Year
Miles	17,406,429	Per Year
Vehicle Trips	416,223	Round Trips (to and from work) Per Year
Cars	1,451	"Off The Road" Per Year





Three new hybrid buses serve the route to Chatham County.

## Alternative Fuels

The small Point-2-Point bus fleet, that serves campus primarily during the evening and late night hours, runs on biodiesel fuel. The incremental cost for the first year of using this B20 (20 percent biodiesel) fuel in 2005-2006 was absorbed by the student-funded Green Energy Fee. In subsequent years, the cost has been included in student transit fees. The Robertson Scholars bus, that runs every half hour without charge to Duke University, also runs on biodiesel fuel. All diesel vehicles operated by the University are eligible to fill up at the Town of Chapel Hill's biodiesel pump. A million-gallon-per-year biodiesel refinery operated by Piedmont Biofuels in Chatham County assures a steady local supply of this increasingly popular fuel source.

In an effort to reduce petroleum consumption, an ethanol fuel pump will be constructed at the Facilities Services' garage in fall 2007. This 8,000-gallon tank will service the more than 200 flexible-fuel vehicles already in the University fleet. At present, these flex-fuel vehicles run solely on gasoline, but are capable of running on fuel that is 85 percent ethanol. Of the 42 vehicles purchased in 2007, 69

percent are able to run on B20 or E85 fuel. The two main gasoline tanks on campus have been converted to E10 fuel, which can be used in all current fleet vehicles. Roughly 90 percent of the fleet vehicles have switched to synthetic oil, reducing the consumption of petroleum-based oil by 3,300 quarts per year.

Electric vehicles, and on-campus maintenance "zone shops," are also reducing the need for liquid fuels. Grounds, Building Services, and Housekeeping each own small, pilot fleets of electric vehicles. Zone maintenance shops in strategic campus locations will further reduce the need for gasoline-powered trucks and service vans.

The University maintains a small fleet of rental vehicles in the Carolina Motor Pool for the use of departments that do not need a permanently assigned vehicle or that need to occasionally supplement their fleet. Three of these vehicles are hybrid gasoline-electric models.

Free blue bicycles are available for use in downtown Chapel Hill.



## Pedestrian Safety

Every campus construction project is charged a fee of one percent of total project costs to support pedestrian improvements. Pedestrian bridges will be added over South Road as part of the Genomics project and over Manning Drive as part of the Dental School project. At the renovated Daniels Student Store, a new entrance off South Road is coupled with improved pedestrian circulation and plantings. Pedestrian buffers and planting zones will also be added along an improved South Columbia Street. The new road connection between Hibbard and Skipper Bowles will also add pedestrian safety zones and plantings.

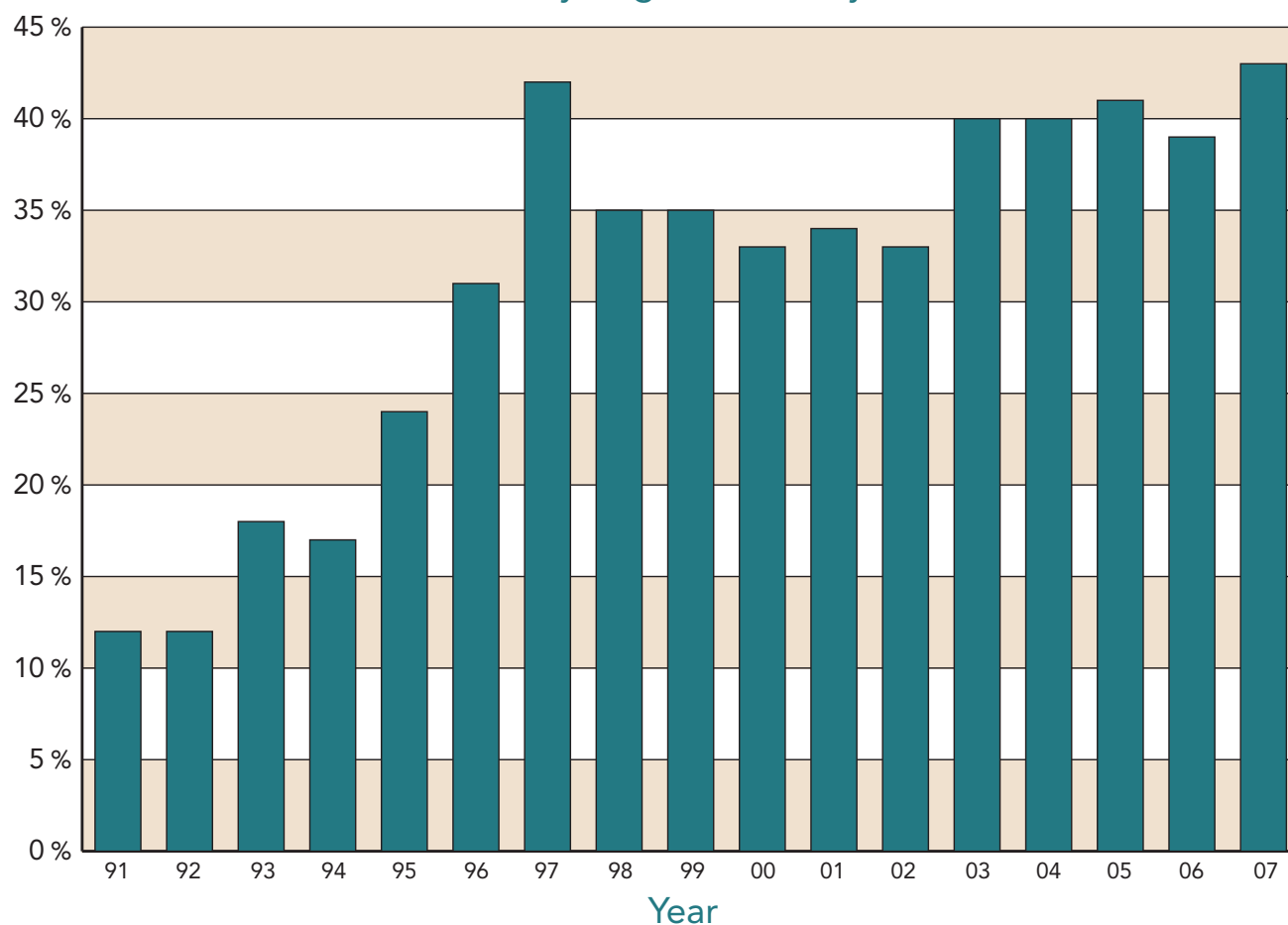
# WASTE REDUCTION & RECYCLING

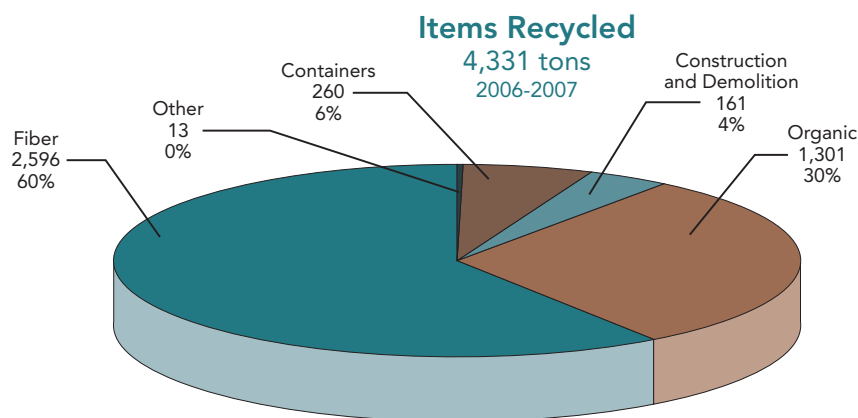
At Carolina, the amount landfilled per person has decreased by 44 percent since the base year ending in June 1991. Over the past 16 years, the amount each person recycles has increased five-fold. During fiscal year 2007, the total amount of waste managed on campus reached 10,116 tons (5,785 tons landfilled and 4,331 tons recycled) with a full-time campus population of 39,000.

Campus recycling reached an all-time high of 43 percent in 2007. The next-highest recycling rate and tonnage for Carolina were 42 percent and 4,301 tons in fiscal 1997 when Hurricane Fran hit the region. The storm

left 1,750 tons of wood and organic debris to be processed by Grounds for use as mulch or sold to the community as firewood. This compares to 387 tons of yard waste and tree trimmings recycled during fiscal 2007.

Recycling Rate History





The campus indoor recycling program has added collection bins and adjusted pickup schedules to accommodate recent growth. Carolina has indoor recycling in virtually every building on campus, including computer labs in many residential communities. There are 2,600 indoor recycling bins at 1,263 sites in 225 buildings. Since fiscal 2006, the indoor recycling of office paper has increased 20 percent for newspapers and 23 percent for magazines. This may be due in part to the large number of office moves related to construction and renovation projects. Twenty-one percent more bottles and cans were also recycled in fiscal 2007.

By recycling almost 2,600 tons of fiber, the largest share of the waste stream, Carolina saved 44,130 trees, 18 million gallons of water, and 1.2 million gallons of oil. It avoided 1.5 million pounds of air pollution and almost 8,000 cubic yards of landfill space. Office paper is the largest fiber category, accounting for 40 percent of the total. Corrugated cardboard is next at 33 percent, followed by newspapers and magazines at 22 percent. To reduce paper consumption, many campus departments are shifting to electronic forms and email notifications. Facilities Services, for example, stopped sending monthly paper invoices in May

**By recycling almost 2,600 tons of fiber, the largest share of the waste stream, Carolina saved 44,130 trees, 18 million gallons of water, and 1.2 million gallons of oil.**

2006. E-mail notifications of account activity and on-line searchable data displaced 12,000 invoices annually.

Organics are the next largest waste category. Carolina composts 482 tons of animal bedding, 428 tons of food

waste, and 387 tons of yard waste annually. Food waste is collected from the Lenoir and Rams Head Dining Centers, the Friday Center conference and catering facility, and, as of 2006, the Beach Café at Brinkhous-Bullitt in the Medical School. Employees at Lenoir, the first location on campus to collect food waste for composting, now boast a 64 percent recycling rate for food and cardboard. At Rams Head,

a food pulper, dehydrator, and chute send chopped food waste directly down to the loading dock for daily pickup. Removing water from the food waste reduces its weight and volume. Employees at Rams Head recycle 55 percent of the cardboard and food waste generated in the building. Waste grease is also collected and powers the machines that handle the compost.

To reduce the amount of food waste produced, Carolina Dining Services switched to smaller plates at many food stations in the all-you-can-eat dining halls. In 2006-2007, 44 fewer tons of food waste were discarded than during the previous school year. An information program on food waste, created in partnership with the Student Dining Board, started in 2007. Plans are underway to begin food waste collection at Café McColl in the Kenan-Flagler Business School and at the Tar Heel Café in the Thurston Bowles building.

Legislation passed in 2007 expands the list of materials banned from disposal in North Carolina landfills to include plastic bottles, oyster shells, wood pallets, and used motor oil filters. Aluminum cans had already been banned from state landfills. Beverage containers account for 6 percent, by weight, of the materials recycled on campus.

Locally, the Regulated Recyclable Materials Ordinance prevents pallets, clean wood waste, scrap metal, and cardboard from disposal in Orange County landfills. These materials must either be source separated at the jobsite or taken to a processing center where marketable materials are separated out for recycling.

During fiscal 2007, operations and small renovations on campus generated 763 tons of construction waste. Of this, 602 tons were landfilled – 10 percent of the total amount landfilled from the campus. A significant portion of the waste landfilled – 202 tons – was collected from



the “convenience center” at the Surplus Property Warehouse. The convenience center was created to serve as a drop-off point for the construction shops, as the primary collection point for scrap metal, and to handle waste from Surplus Property operations, such as broken furniture.

Of the 161 tons of construction waste recycled from operations and small renovations, 87 percent was source separated by campus employees. Materials recovered included pallets, clean wood waste, scrap metal, concrete, and brick. The masonry shop initiated a collection program to recycle their broken brick and concrete debris. Twenty-five tons were hauled to a local recycler to be crushed and used for aggregate in road beds and other paving jobs. Approximately 48 tons of construction and demolition waste were transported to a material recovery facility in Apex. Based on the recovery rates reported for the facility, approximately 20 tons of recyclables were recovered from these mixed loads.

After football games, both plastic and cardboard are collected for recycling. Throughout the seven-game home season in 2006, 44 percent of the trash was recycled. The majority came from post-game clean up efforts by Athletics and from cardboard recycling by the concession stand vendors.

Before students arrive on campus in August, they receive information about the Orange County ban on cardboard at the landfill and are asked to pack in non-disposable containers. Dedicated dumpsters, eye-catching signs, and extra staff remind them of the need to recycle boxes once they arrive. In 2006, 18 tons of cardboard, brought by 8,000 residential students, were recycled.

Before students move out of the residence halls at the end of spring semester, donation stations are placed in residence hall lobbies. Students are encouraged to contribute any office supplies, unopened food products, and apparel they don't plan to take with them. Donations have tripled since 2003. Of the 80 cubic yards of items collected in

**With the proliferation of electronics on campus, recycling programs now include cell phones, batteries, computer equipment, printer cartridges, and DVDs.**

May 2006, 70 percent consisted of clothing and shoes, which were donated to the local PTA Thrift Shops. Eighteen percent was office supplies, which were given away to students during the first week of classes. Twelve percent was food that benefited the Interfaith Council homeless shelter and food bank.

With the proliferation of electronics on campus, recycling programs now include cell phones, batteries, computer equipment, printer cartridges, and DVDs.

In the science labs, mercury is not only recycled: The goal is to be “Mercury-free at UNC.” The Environment, Health & Safety Department replaces old mercury-containing thermometers for free. The School of Pharmacy has already switched to digital and alcohol thermometers, as have many in the Chemistry Department. Other equipment that contains mercury includes barometers, sphygmomanometers, dental amalgams, batteries, fluorescent lights, and electrical switches.

## Green Games

The Residential Green Games program is an environmental competition among residence halls, started by students in 1993. The goal is to stimulate energy and water conservation, reduce the amount of trash generated while increasing recycling, and promote student awareness of campus sustainability initiatives. Each year the student-generated educational programs become more creative. They include energy fairs, building tours, and Captain Planet pancake breakfasts. Posters, t-shirts, and a variety of activities spread the word and garner points. The Office of Waste Reduction and Recycling and the Department of Housing and Residential Education fund



## Student Printing Cap

Concerned about profligate printing in student computer labs, Student Government instituted a printing cap in fall 2006. Pages printed fell from a budget-busting 17 million pages in fall 2005 to seven million pages in fall 2006. Students wishing to exceed the 500 page cap during the fall semester could swipe their One Cards for a fee of five cents per page. After graduate teaching assistants and some undergrads reported exceeding the quota, the limit was raised to 800 pages per person during spring 2007.

the program and offer cash prizes. In 2007, the Sustainability Office instituted an Energy Award, which went to the Olde Campus Upper Quad community.

The first annual Faculty and Staff Green Games were launched in 2007. Award categories and winners are listed below:

- **Alternative Commuter of the Year:** *Sue Tolleson-Rinehart, Ph.D., Research Assistant Professor, School of Public Health Leadership Program*
- **Energy Saver of the Year:** *Housing and Residential Education*
- **Enviro-Maniac of the Year (All-Around Award):** *Sandra Hancock, Department of Otolaryngology*
- **Environmental Motivator of the Year:** *Elizabeth Matteson, AIDS Clinical Trials Unit*
- **Green Department of the Year:** *N.C. Botanical Garden*
- **Recycler of the Year:** *Jodi Flick, School of Social Work*
- **Waste Reducer of the Year:** *John Beres, Chemistry Department*
- **Water Conservationist of the Year:** *Chilled Water Systems*

UNC also participates in RecycleMania, a national recycling competition that included 178 schools in 2007. UNC ranked fourth in highest gross tonnage of recyclables, regardless of campus population.

## Construction and Demolition Waste Management in Capital Projects

Each contractor working on a new building or renovation project at UNC must submit a Solid Waste Management Plan and monthly report. Items salvaged, recycled, and landfilled are tracked. In Orange County, cardboard, scrap metal, clean wood, pallets, and crates are banned from the landfill, and haulers of construction and demolition waste require special permits.

University construction projects completed in 2006 and 2007 diverted more than 12,000 cumulative tons of construction and demolition waste from the landfill. This amount includes all waste generated over the life of these capital projects. During fiscal 2007 alone, 74 percent of the 3,544 tons of construction waste reported were diverted from the landfill through salvage or recycling. UNC is one of only a few universities nationwide that comprehensively tracks construction waste.

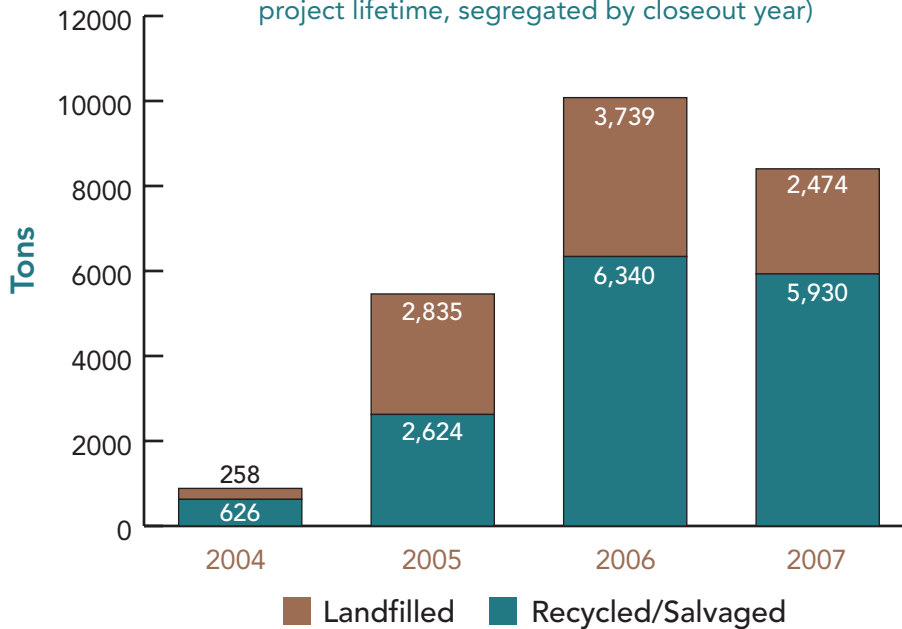
The first preference is to reuse materials from campus buildings whenever possible. In several recent renovations, wood flooring that had been covered up was exposed and refinished. The campus construction waste specialist works with maintenance shops to identify materials that can be salvaged for use elsewhere. Marble bathroom partitions, light fixtures, building automation system computers, and doors can often find a second life on campus. Brick pavers have been stored for reuse on several projects. Part of a fire alarm system salvaged at Odum Village was reused in a university building on Finley Golf

Slate roofing tiles from Phillips Hall were removed for reuse in the Science Complex.



## Construction & Demolition Waste Management

(total tons of waste generated during capital project lifetime, segregated by closeout year)



Course Road. The slate roof removed from West House was salvaged for use on a future campus project, as were the entry columns and mantel. Twelve tons of clay roofing tiles were diverted from the landfill when the Bynum and Caldwell roofs were replaced. When the sidewalk is taken up as part of the Nash Hall demolition, the pieces will be taken to the Botanical Garden to be used in a retaining wall at the new Visitor Education Center.

If materials cannot be reused on campus, they are sold through UNC Surplus, made available to local non-profits, or recycled by the contractor. Contractors often find that it pays to be creative: They save money by not sending materials to the landfill.

After nearly three years of planning, the decommissioning and demolition of the Venable chemistry building, built in 1925, is underway. Some materials were contaminated and could not be reused, but much was salvaged. The chemistry and marine sciences departments are re-using furniture and equipment elsewhere on campus. One truckload was sent to UNC's Institute for Marine Sciences in Morehead City. Various maintenance shops salvaged pumps and electrical panels. The roofing shop will store the slate tiles and concrete roofing pavers for future campus projects. Twenty, two-ton truckloads of furniture and equipment were shipped to UNC's Surplus

Property retail store for sale to the public. New Venable, the building that will rise in its place, will incorporate the old building's granite steps and door surrounds. Once campus reuse opportunities were exhausted, a consultant facilitated sending 11 tons of furnishings and equipment to Haiti.

In an effort to divert at least 70 percent of Venable's materials from the landfill, contractors will separate and store demolition materials to be recycled directly on the project site. This approach results in higher quality materials for the secondary market.

In order to expand reuse and recycling opportunities on construction jobs of all sizes, maintenance and recycling personnel are working together on new strategies. To enable smaller projects to recycle their ceiling tiles, for example, the Office of Waste Reduction and Recycling set aside space in their warehouse. Now projects generating small quantities of tiles can store them until 30,000 square feet of tiles are collected. Then Armstrong Industries loads them onto a truck, hauls them to one of its factories, and grinds them into new ceiling tiles.

**University construction projects completed in 2006 and 2007 diverted more than 12,000 cumulative tons of construction and demolition waste from the landfill.**

A centralized storage and inventory system for salvaged materials is planned in conjunction with the new maintenance, repair, and operating supplies storeroom. Identifying reusable materials early, communicating their availability and potential use, finding storage space, and tracking the disposition of recovered items are ongoing challenges.



# GROUNDS

With \$1.8 billion of capital projects underway across campus, the Grounds Department faces challenges on many fronts. Protecting canopy trees; installing appropriate, new landscapes; converting plantings to enhance stormwater retention; maintaining new stormwater management projects; and being displaced from its physical home are but some of the issues grappled with by the department. In a testament to their tenacity, foresight, and good management, the Grounds Department has not just survived, but thrived during this period.

Areas of campus disturbed by the erection of new buildings, the renovation of old, and a range of utility infrastructure projects are being knit back together. Restoring the landscape around a cluster of historic north campus buildings will be preceded by an in-depth study of the planting traditions on our historic quadrangles. Then the loop from Playmakers Theater to Memorial Hall will be linked with improved pedestrian circulation and plantings while preserving existing trees. The vision for this Historic Landscape Master Plan, as well as the quality of work done to date, is so compelling that a highly competitive, \$100,000 Getty Campus Heritage Grant was awarded to the University in 2007.

To maintain the revered tree canopy throughout campus, the University's tree protection policy was strengthened through the work of the Chancellor's Task Force on Landscape Heritage and Plant Diversity. Now, any trees removed must be replaced – inch-for-inch – elsewhere on campus. This no-net-loss policy is funded through a fee on any trees removed due to construction. This Heritage Tree Fund was first tapped by

the Grounds Department in fall 2006 to purchase a six-inch white oak that was planted on Polk Place.

Most of the trees surrounding Polk Place are about 80-year-old oaks that, with proper care, can live for more than two centuries. When these trees began declining at an accelerated pace over the past few years, a diverse task force was convened to address the issue. A tree research laboratory brought in to study the problem found severe compaction – similar to the density of brick – in the soil around these trees. As a result, new campus-use policies were instituted for the historic quads. Now, for any Polk Place events with more than 200 participants, the organizer must pay for the

New outdoor seating groups provide gathering spaces for students and employees.







installation and removal of temporary fencing around the dripline of the trees. This includes the Tar Heel Town celebrations that precede home football games. The Grounds Department has also applied more mulch around the trees to conserve moisture, treated the trees for pests and diseases, and aerated the soil.

Following the recommendations of the Intellectual Climate Study, several outdoor seating groups have been added to provide student gathering spaces. The Thomas Wolfe Memorial Garden creates outdoor seating for contemplation of the Thomas Wolfe sculpture and for use as an outdoor classroom. The Wellstone Memorial Garden beside Murphey Hall also creates a space for meetings and classes. Sometimes new seating serves multiple purposes, such as the sitting walls that surround the planters between the Student Union and the Pit. These large, circular planters reduce impervious area, and as the trees

grow in the years ahead, this exposed area of campus will be shaded from the sun.

Places for quiet contemplation have been added by intensively planting a memorial garden, in place of existing lawn, at the Lineberger Cancer Center. At the cemetery on

**To maintain the revered tree canopy throughout campus, the University's tree protection policy was strengthened through the work of the Chancellor's Task Force on Landscape Heritage and Plant Diversity. Now, any trees removed must be replaced – inch-for-inch – elsewhere on campus.**

South Road, the new Memorial Grove scatter garden preserves existing remnant forest and maintains the stormwater detention capacity of the site. The rebuilt rock walls on Raleigh Street, a major entry corridor to campus, were also carefully developed to save existing trees.

To encourage employees to maintain existing stormwater projects and to propose new planting strategies that better hold rainwater in place, Grounds Department supervisors sponsored a stormwater contest with cash prizes. The creative ideas flowed, and employees are taking even greater pride in their work.

Grounds employees are encouraged and rewarded for developing new stormwater management strategies.





# WATER

## Reclaimed Water

Energy Services, working with the University's local water utility, OWASA, is developing a reclaimed water system that will divert highly treated effluent from OWASA's Mason Farm Sewage Treatment Plant for reuse on campus. The project is planned to come on line in 2009 when it will replace approximately 180 million gallons of potable water per year used in the operation of the University's central chiller plant cooling towers.

By reducing the University's total potable water use by 22 percent, this project will greatly increase the drought tolerance of OWASA's water supply, benefitting both the University and other OWASA customers in the towns of Chapel Hill and Carrboro. The reduction on the OWASA system will initially be about 530,000 gallons per day or approximately 6 percent of the total system demand. Over time, it is anticipated that more utility applications, and possibly irrigation systems, will use this reclaimed water supply.

As of September 2007, 5,450 feet of on-campus, wastewater-reuse piping has been installed or is under contract. For its efforts, Chilled Water Systems received the *Water Conservationist of the Year* award from the faculty and staff Green Games competition, sponsored by the University's Office of Waste Reduction and Recycling.



This recently planted green roof on top of the FedEx Global Education Center will manage stormwater and provide an attractive view from the fourth floor patio.

The reclaimed water will also flush the toilets at the North Carolina Botanical Garden's new Visitor Education Center.

## Stormwater

The new FedEx Global Education Center is the first building on campus to flush toilets with rainwater. A 54,000 gallon underground cistern that stores rainwater from both Tate Turner Kuralt and the Global Education Center supplies the secondary piping system and irrigates plantings adjacent to the western oak grove.

The fourth floor of the Global Education Center is topped by two sections of green, or vegetated, roof totaling 11,000 square feet. The unirrigated roof gardens are the first of their kind on campus. The northern section is planted in

New planters in front of the Student Union reduce stormwater runoff and provide seating space. The trees will provide shade in the future.





Historic Preservation Manager Paul Kapp demonstrates how bourbon barrels collect rainwater for drip irrigation.

only four inches of a specially engineered planting media to grow evergreen succulents that are extremely drought tolerant. The section of green roof on the west side, that borders a patio area with tables, is planted in six inches of the engineered soil. Eight different types of sedum and delosperma (ice plant) were incorporated in a geometric pattern. Since most of the building site for the Global Education building was formerly a surface parking lot, the amount of impervious area actually decreased by 7 percent after project completion.

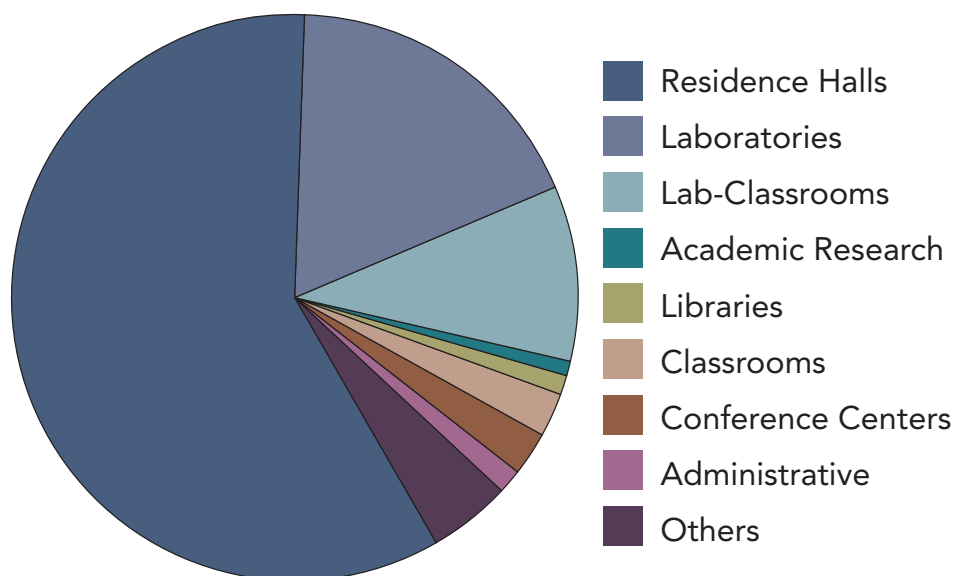
At the renovated, historic Love House, home to the Center for the Study of the American South, real bourbon barrels collect rainwater for use in the drip irrigation system. There is also a small rain garden on site. At the historic, north campus junction of the Campus Y, Hanes, and Gerrard, a 10,000-gallon, central cistern will collect rainwater for

irrigation and stormwater management. At the Visitor Education Center at the North Carolina Botanical Garden, large cisterns will store all the water needed to irrigate the display gardens.

At the \$205 million Carolina Physical Science Complex, the very limited amount of new parking is paved with porous asphalt over an infiltration bed. Now standard practice on main campus, the new 550-space park-and-ride lot in Chatham County is also paved with porous asphalt over infiltration beds. Many of the existing canopy trees at this site were saved, providing shade and stormwater uptake. A detention bed to slow the release of stormwater was added under the parking lot at the Steele Building as part of an underground piping project.

In addition to parking lots, athletic fields and intramural play fields can be used as storage/infiltration beds. These beds replenish the groundwater supply and help maintain stream flow during dry weather. To create the beds, large volumes of gravel are topped with geotextile fabric and then covered with artificial turf. Infiltration beds are found under the new football practice field (Navy Field), under Ehringhaus Field, and under Hooker Field. The infiltration bed under Hooker Field can hold up to 500,000 gallons of water that is collected from the roofs of the School of Government and the indoor track. A 7,000-gallon cistern also underlies Hooker.

### Water Consumption by Building Type (Thousands of Gallons)



When Student Stores was renovated and enlarged, planting beds were installed in front of the Union and on the south side of Lenoir to mitigate stormwater runoff. The soil in the beds is a special mix for urban planters. Rainwater is collected and taken up by plants with any excess returned to underground stormwater flow via the drainage system in the Pit. The planters are really a type of roof garden for the Pit. The trees were chosen primarily for their shade and aesthetic qualities: Vitex with blue flower spikes and Blackgum. The underplantings are a mix of shrubs, flowering perennials, and annuals that were selected for their ability to withstand dry conditions.

The Environment, Health & Safety Department hosts a stormwater website to educate members of the University community about the many innovative stormwater management practices that have been introduced on campus. UNC uses a global positioning system to map stormwater drains and stores this information in a geographic information system (GIS) database. Grounds employees rely on the GIS database to perform scheduled preventive maintenance on the many stormwater management systems.

## Potable Water

After the cooling towers at Energy Services, the largest use of water on campus is for irrigation. At new buildings, irrigation systems deliver water directly to the

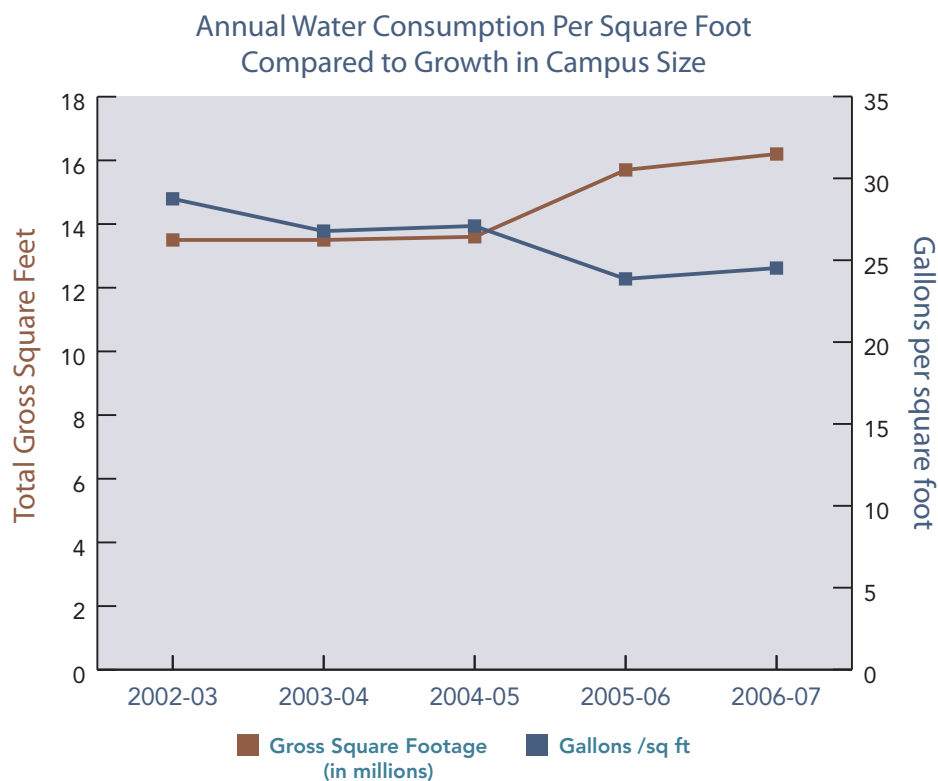
roots of plants without spraying it into the air. Plants are selected that require minimal care and watering. To further reduce water use, the Grounds Department con-

**In many buildings on campus, the toilets have been renovated with dual-flush valves that reduce the water used per flush by up to 31 percent.**

nected the irrigation system to a wireless weather station. Recent or predicted rain signals the system to stay off.

The new Facilities service station includes a vehicle wash bay that captures and processes gray water from the wash bay and reuses it to wash vehicles.

In many buildings on campus, the toilets have been renovated with dual-flush valves that reduce the water used per flush by up to 31 percent. When the lever is pulled up, only 1.1 gallons of water are used per flush. When the lever is pushed down, the standard 1.6 gallons of water are flushed. Signs on the wall behind the toilet and on the inside of the stall door alert users to the benefits of the system and contain instructions for use.



From 2003 through 2007, water use per capita dropped by 5 percent. Closed-loop cooling systems, more efficient lab equipment, and more water-saving fixtures account for most of the decline. Behavioral changes appear to ebb and flow with rainfall patterns.

The water intensity of the building types on campus varies greatly. Residence halls are an area ripe for future water savings. Reaching students early in the academic year, when this region is most likely to be suffering from drought conditions, will be important to future water saving efforts.

# PURCHASING / HOUSEKEEPING

## PURCHASING

UNC-Chapel Hill makes many purchases each year. Across the country, colleges and universities procure some \$300 billion of goods and services annually, making them a potentially large market driver.

At Carolina, the trend toward purchasing more sustainably is growing. Since 2001, a contract with our online vendor has defaulted orders for standard office paper to 30 percent, post-consumer content, recycled paper. All laser printers and new and remanufactured photocopiers must have the ability to use copy paper having at least 50 percent recycled content, of which at least 30 percent must be post-consumer. The vendor encourages the purchase of environmentally responsible office supplies on its home page by reminding purchasers to consider recycled content, energy-efficiency, and toxicity when making product selections.

In 2006, the University adopted an Energy Efficient Purchasing Policy. Purchasers of any electricity-consuming item, whose product category has been rated under EPA's Energy

**One item the University will not be purchasing in the future is incandescent light bulbs.**

Star program, must buy an Energy Star certified product. The Energy Star logo confirms that the product is among the top 25 percent of the market in terms of energy efficiency. For product categories that have not yet been rated by the EPA, such as laboratory equipment, purchasers must include energy efficiency as one of their purchasing criteria.

One item the University will not be purchasing in the future is incandescent light bulbs. These bulbs will be virtually phased out of campus buildings by January 31, 2008.

## HOUSEKEEPING

**A new housekeeping approach to cleaning University facilities, called Operating System 1 (OS1), has been found to be more efficient, effective, safer, and environmentally superior.**

Under the OS1 System, housekeepers work as teams, with each housekeeper performing one particular task, such as emptying the garbage, in a number of build-

**The cleaning products used in the new OS1 system are non-toxic. They have been certified under Green Seal Standard 37, a third-party verification system.**

ings. After a predetermined number of days, housekeepers rotate assignments. Daily tasks are more structured through the use of job cards that prioritize duties. Under the old zone system, housekeepers were assigned to fully clean a specific building, from emptying the garbage to cleaning restrooms to vacuuming and dusting. A University-wide evaluation committee found that housekeepers on the pilot team overwhelmingly favored the new work model and ergonomic equipment over the old zone cleaning system.

The cleaning products used in the new OS1 system are non-toxic. They have been certified under Green Seal Standard 37, a third-party verification system. The Green Seal certified cleaning products come in portion pacs that will be stocked in housekeeping closets. After pilot tests in two buildings, the OS1 system is currently being implemented throughout the campus.



# WELLNESS

## The Chancellor's Task Force for a Better Workplace identified worksite wellness as a priority for improving the health and well-being of University employees.

A subsequent steering committee for Worker Health, Safety, and Wellness is creating an inventory of existing campus resources then assessing health promotion needs, interests, and expectations of employees.

Reviewing practices at peer campuses, as well as environmental conditions, such as access to healthy foods and physical activity, and policies that support healthy lifestyle choices are part of the effort. The Center for Health Promotion and Disease Prevention leads this initiative.

### Food

Carolina Dining Services provides more than 8,000 meals daily and uses no trans fats in their kitchens. Dining Services actively seeks produce, meat, seafood, and dairy products from local suppliers in North Carolina and Virginia. Some 70 percent of the milk is from North Caro-

### Smoke Free Campus

On July 4, 2007, UNC Hospitals, the School of Medicine, and Campus Health became smoke free. The rest of the campus will soon become smoke free. Smoking has been banned within campus buildings for years. The new rules ban smoking within 100 feet of University buildings. This will include athletic and performance venues. Smoking cessation programs are available for employees who need help kicking the habit.

North Carolina leads the country in tobacco production. The issue of banning secondhand smoke demonstrates how good science and strong public opinion can influence change.

lina and southern Virginia, and the percentage would be higher if demand did not exceed local supply. Fresh produce purchases are increasing annually, as is the share from local growers. From January through May 2007, 11 percent of the fresh produce served was purchased from local suppliers. When looking only at the produce in season locally, 60 percent of the produce was purchased from local growers.

To make students more aware of healthy and locally grown produce, a farmers market is held each fall and spring at Rams Head Plaza, sponsored by Carolina Dining Services, Student Health, and Student Government. A marketing campaign, highlighting locally grown and produced products, will be launched in campus dining halls in fall 2007.

For students wanting to grow their own organic produce, the Carolina Garden Co-op meets each weekend at their garden on Battle Lane behind Kenan Residence Hall. The harvest is enjoyed at potluck dinners.

Shade-grown and organic coffee is sold at the Daily Grind at the bookstore, the Global Cup Café at the Global Education Center, and the Friends' Café at the Health Sciences Library. The grounds are composted offsite.



# AWARDS

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**2005 Entrepreneurial Excellence Award for Life Science Spin-out of the Year**, from the Council for Entrepreneurial Development to Joe DeSimone, Professor of Chemistry and Chemical Engineering, for the spin out of Liquidia

**2005 Grand Award**, from the Professional Grounds Management Society to the UNC Grounds Department for maintaining the historic beauty of the campus during unprecedented construction

**2006 NC Sustainability Award for Innovative Initiatives**, from Sustainable North Carolina to the Center for Sustainable Enterprise in the Kenan-Flagler Business School for the CSE Consulting program

**2020 Vision Award**, from the International District Energy Association to Ray DuBose, Director of Energy Services and member of the Higher Education Committee of the American Council on Renewable Energy

**"A in Administration": Sustainability Report Card**, from the Sustainable Endowments Institute to UNC

**Best Cleaning Program Award, Best Communications Program, and Best Safety Program**, from the Operating System 1 Users Group to the UNC Housekeeping Department, 2007

**Best Paper**, from the Academy of Management to Lisa Jones Christensen, Assistant Professor, Kenan-Flagler Business School, focus on sustainable enterprise

**Best Rookie Program and Best Communications Program**, from the Operating System 1 Users Group to the UNC Housekeeping Department, 2006

**Beyond Grey Pinstripes**, from the Aspen Institute and the World Resources Institute to the Kenan-Flagler Business School for the 8<sup>th</sup> top MBA program in the world for social and environmental stewardship, 2005

**Building Better: A Guide to America's Best New Developments**, from the Sierra Club to UNC for new development that uses innovative and environmentally sensitive methods of stormwater management

**C. Knox Massey Award**, from UNC to Kirk Pelland, Director of the UNC Grounds Department, for meritorious service

**Chapel Hill Greenways and Open Space Award**, from the Town of Chapel Hill to the North Carolina Botanical Garden for the restoration of Battle Park

**Clark Prize for Excellence in Water Research**, from the National Water Research Institute to Dr. Philip Singer

**Cool College**, from the Sierra Club to UNC

**Creative Invention**, from the American Chemical Society to Joe DeSimone, Professor of Chemistry and Chemical Engineering, Director of the Institute for Advanced Materials, Nanoscience and Technology, Director of the National Science Foundation Science and Technology Center for Environmentally Responsible Solvents and Processes

**First Place**, from the Global Citizenship Challenge to a team of five MBA students

**First Place**, from the Leeds/Net Impact Case Competition to a team of four MBA students. UNC has placed in the top three for three years in a row.

**First Place**, from the Sustainable Venture Capital Investment Competition to a team of five MBA students

**Henry F. Whalen, Jr., Award for Business Development**, from the American Chemical Society to Joe DeSimone, Professor of Chemistry and Chemical Engineering

**Hero of Global Health**, from *Time* magazine to Kimberly Chapman, director of Carolina for Kibera, that provides health care, support, and sports programs to youth in Kibera, Kenya

**Preservation Award**, from the Preservation Society of Chapel Hill to UNC for the restorations of the Morehead Sundial 2003, Murphey Hall 2004, Kenan Residence Hall and Memorial Hall 2005, New East 2006, and the Campus Y and the Love House and Hutchins Forum 2007

**Reginald Wilson Diversity Leadership Award**, from the American Council on Education to Chancellor James Moeser

**Super Achiever Award**, from Smart Commute Challenge, EPA Best Workplaces for Commuters, and Triangle Air Awareness to UNC

**Third Place**, from the national Net Impact organization for Chapter of the Year to UNC Net Impact Club

**Wall Street Journal**, ranked the Kenan-Flagler Business School seventh for corporate social responsibility, 2006

# SPEAKERS & EVENTS

**"Beyond Washington, D.C.: States as the Driving Forces in American Climate Change Policy,"** Barry Rabe, Professor, Schools of Public Policy and Natural Resources and Environment, University of Michigan

**"Changing Climate, from Chapel Hill to Capitol Hill,"** Fred Krupp, President, Environmental Defense

**"China's Environmental Challenge,"** Elizabeth C. Economy, Senior Fellow and Director of Asian Studies at the Council on Foreign Relations

**"Climate Change, Energy Policy, and National Competitiveness...Where Are We Going?"** Greg Kats, Principal of Capital E and former Director of Financing for Energy Efficiency and Renewable Energy at the US Department of Energy

**"Corporation 20/20: Designing for Social Purpose,"** Marjorie Kelly, Founder, Business Ethics Magazine and Senior Associate at the Tellus Institute

**"Creating Markets for Ecosystem Services: Notes from the Field,"** Jim Salzman, Environmental Law Professor, Duke University

**"Design for Sustainability,"** Al Segars, Director, Center for Sustainable Enterprise, UNC Kenan Center for Private Enterprise and Kenan-Flagler Business School

**"Ecological Economics: Creating a Sustainable and Desirable Future,"** Robert Constanza, Director of the Gund Institute of Ecological Economics at the University of Vermont

**"Environmental Market Mechanisms,"** Anita Bahe, Principal Lynx Group International

**"Environmental Protection & International Trade,"** Tom Cors, Attorney, Lobbyist, Consultant

**"Focus the Nation on Climate Solutions,"** Eban Goodstein, Economics Professor, Lewis and Clark University

**"Food, Action, Change, Hope,"** Anna Lappé, author *Hope's Edge: The Next Diet for a Small Planet*

**"Gardens and the Endurance of African American Culture,"** Patricia Klindienst, author of *The Earth Knows My Name: Food, Culture, and Sustainability in the Gardens of Ethnic Americans*

**"Global Poverty: Reflections on Millennium Development Goals,"** Carol Bellamy, President and CEO, World Learning, President of the School for International Training, and former Executive Director of UNICEF



**"Global Warming: What Should We Do About Fossil Fuel CO2?"** Wallace Broecker, Geology Professor, Columbia University

**"Implementing Natural Capitalism,"** Hunter Lovins, Natural Capitalism, Inc.

**"Indexed Regulation,"** William Pizer, Resources for the Future

**"It's My Party Too: The Battle for the Heart of the GOP and the Future of America,"** Christine Todd Whitman, former NJ Governor and US EPA Administrator

**"Leading a Values-Based Business,"** Mark Albion, author, *Making a Life, Making a Living*, co-founder Net Impact

**"Market Dynamics & Opportunity in Green Building and Renewable Energy,"** Tim Toben, CEO, Carolina Green Energy

**"Millenium Village Project,"** Jeffrey Sachs, Economist and Humanitarian, Harvard University

**"Product Stewardship and Sustainable Growth at DuPont,"** John Lott, Global Corporate Product Stewardship Lead, DuPont

**"Public Health Transformation for the 21<sup>st</sup> Century,"** Bob Greczyn, President and CEO, Blue Cross & Blue Shield of NC

**"Reinventing Small Business for People, Community, and Place,"** John Abrams, CEO, South Mountain Company

**"Robertson Scholars Community Conversation,"** Fred Krupp, President, Environmental Defense



**"The Banking Industry & Environmental Credit Risk,"** John Ganzi, Managing Principal, Eco Inn Experiences

**"The Small-Mart Revolution,"** Michael Shuman, Business Alliance for Local Living Economies

**"Transportation and America's Oil Addiction: Is there a Fix?"** David Greene, corporate fellow at Oak Ridge National Laboratory

**"Water and Human Well-Being,"** John Briscoe, Country Director for Brazil for the World Bank

## Conferences, Workshops, and Symposia

**Backyard Pollution Prevention,** Presented by the Environmental Resource Program and the Town of Chapel Hill's Stormwater Management Program, Hosted by the Morehead Planetarium and Science Center, September 2006

**Biofuels Workshop and Reactor Demonstration,** Presented by Piedmont Biofuels, Hosted by Engineers Without Borders – UNC, April 2007

**Building Commissioning in North Carolina,** Hosted by Southeast Region Building Commissioning Association, NC Building Commissioning Committee, UNC-Chapel Hill, and the North Carolina State Energy Office, April 2006

**Careers in Sustainability Forums,** Hosted by Net Impact, October 2005 & November 2006

**Carolina Summit on Community Economic Development,** Hosted by the Office of Economic and Business Development and the Carolina Center for Public Service, February 2006

**Conference on Race & Environment,** International Scholars Conference, April 2007

**Connecting Civics and Science: Inspiring N.C. Youth to Address Global Warming,** Hosted by the Environmental Resources Program for middle and high school science and civics teachers, June 2007

**Development in Practice: A Critical Look at the Millenium Village Project,** hosted by the Campus Y, March 2007

**Does Racism Make Us Sick?,** Hosted by the School of Pubic Health's Minority Health Project and the Office of Diversity and Multicultural Affairs, June 2007

**Energy and the Environment in North Carolina,** Hosted by the Institute for the Environment in partnership with the Office of the Vice Chancellor for Research and Economic Development, the Sustainability Office, and the Center for Advanced Materials, Nanoscience, and Technology, March 2007

**Integrated Design and Energy Modeling,** Presented by Jason McLennan and Mohit Mehta, hosted by the Sustainability Office, March 2006

**Navigating the Global American South,** Hosted by the Center for Global Initiatives, Center for the Study of the American South, and Office of Global Health, March 2006

**N.C. Climate Challenge Summit,** Hosted by the Renewable Energy Special Projects Committee, Sierra Student Coalition, Southern Energy Network, Student Environmental Action Coalition, and Students United for a Responsible Global Environment, October 2006

**One Hydrosphere,** Hosted by the Department of Environmental Sciences and Engineering, May 2007

**Reinventing Today's Business for the Challenges of Tomorrow,** Hosted by the Center for Sustainable Enterprise, March 2006

**Safe Drinking Water: Where Science Meets Policy,** Hosted by the Carolina Environmental Program Symposium, March 2006

**Sustainable Ventures Capital Investment Competition,** Hosted by the Kenan-Flagler Business School, March 2006 & 2007

**The Politics of Inclusion: Higher Education at a Crossroads,** Hosted by UNC, September 2006

## Panel Discussions

**"Black, White, Brown, and Green: An In-depth Look at the Role Race Plays in Environmental Justice,"** featuring Marge Anders Limbert, Land for Tomorrow; Abdul Rasheed, CEO of NC Community Development Initiative; Monica McCann, The Conservation Fund; and Dannette Sharpley, Black Family Land Trust. Organized by the Environmental Affairs committee of Student Government, the Carolina Environmental Student Alliance, and Students for the Advancement of Race Relations

**"Carbon Reduction and the Local Community,"** featuring representatives from campus, local government, and energy-related businesses, organized by Epsilon Eta, environmental honors fraternity, April 2007





**"Interdisciplinary Global Warming Panel,"** Earth Day 2007, featuring UNC faculty, organized by Focus the Nation

**"Discussion on Energy and Global Climate Change,"** featuring speakers Paul Anderson, CEO of Duke Energy; Bill Johnson, President of Progress Energy; Doug Crawford-Brown, Director of Carolina Environmental Program; and William Schlesinger, Dean of Duke University's Nicholas School of the Environment. Organized by the Carolina Environmental Program, the Center for Sustainable Enterprise, Student Government, and the Sustainability Office

**"Katrina: Preparing for and Responding to Natural Disasters,"** General Alumni Association, September, 2005

**"Strategies to Improve Wages and Working Conditions of Low-Wage Workers,"** Center on Poverty, Work, and Opportunity, November 2005

**"What's the Big Idea: Energy and the Environment,"** organized by the Friday Center for Continuing Education, sponsored by the Carolina Environmental Program, the Vice Chancellor for Research and Economic Development, and the Sustainability Office, March 2-23, 2006

## Events

**A Week of Awareness,** organized by students, November 2005:

- Health and Hog Farming
- Mountain Top Coal Removal
- Public Health and Environment Panel
- Revelations: Documentaries on Health and the Environment

**Big Sweep Creek Clean Up,** organized by Environment Health & Safety and students, October 2005 & 2006

**Bolin Creek Festival,** organized by Friends of Bolin Creek and students, October 2005 & 2006

**Campus Sustainability Day,** organized by the Sustainability Office, October 2005 & 2006

**Captain Planet Pancake Breakfasts in Residence Halls,** organized by the Sustainability Office and residence hall assistants. Included cartoons, decoder rings, and an appearance by Captain Planet

**Car Free Day,** organized by the Village Project with campus exhibits, September 2005 & 2006

**Career Services: Careers in the Environment**

**Community Meetings to Gather Input on Carolina North Planning,** 2006-2007

**Earth Action Fest,** Carrboro NC, April 2006

**Earth Day,** organized by the Carolina Environmental Student Alliance, the Environmental Affairs Committee of Student Government, and the Sustainability Office, April 2006 & 2007

**Energy Tours of Campus Buildings,** tours of Cobb Residence Hall, the Cogeneration Facility, and Murphey Hall, organized by the Sustainability Office

**Environmental Social,** April 2007

**Environmental Cook Out,** May 2007

**Farmers Markets,** organized by Student Government, Dining Services, and Student Health, Spring 2006 & 2007 and Fall 2006

**Grand Opening of the New Energy Management Control Center,** January 2007

**Green Games Awards Ceremony,** April 2006 & 2007

**Ground Honoring,** for the LEED Platinum-registered Visitor Education Center at the NC Botanical Garden, April 2007

**Health on the Block at the Hargraves Community Center,** free screenings organized by the NC Health Careers Access Program Ambassadors, March 2006 & 2007

**Human Rights Week,** organized by students in the Campus Y, March 2006 & 2007

**Institute for the Environment Launch,** April 2007

**Invasive Species Removal Along Bolin Creek,** organized by Friends of Bolin Creek and students, monthly

**Leadership Advisory Committee for Carolina North,** monthly meetings of UNC, local and state government, and community leaders to develop principles to guide the development of the new Carolina North research campus, March 2006-January 2007

**LEED Training for Facilities Planning and Construction Staff**, biweekly classes offered by the Sustainability Office, January - May 2006

**Our Vanishing Night**, presentation and walk hosted by the Morehead Planetarium and Science Center, the Sustainability Office, and the Chapel Hill Downtown Partnership, for Earth Day, 2007

**Race Relations Week**, October 2005 & 2006

**Retro-commissioning Webinars**, hosted by the Sustainability Office, produced by Portland Energy Conservation, Inc., January 2007

**Smart Commute Challenge**, sponsored by the Triangle Transit Authority, the Triangle Air Awareness Coalition, and UNC, September 2005 & 2006

**Step it Up**, national global warming rally, April 2007

**Sustainable Enterprise Career Fair**, organized by the Center for Sustainable Enterprise, February 2006 & January 2007

**US Green Building Council**, Triangle Chapter Talk & Walk, at the Environment Health & Safety building, the first UNC building to incorporate a controlled daylighting strategy, March 2007

**Timberlyne Walkable Communities Workshop**, organized by Go! Chapel Hill, Active Living by Design Active Neighborhoods program, November 2006

## Off Campus Presentations

**ACEC/NC-PENC Environmental Conference**, Raleigh, June 2007

**Sustainable Energy Conference**, Raleigh, March 2006 & 2007

**Building Materials Reuse and Recycling: Decon '05**, Building Materials Reuse Association, Atlanta, GA, November 2005

**Climate Change, Carbon Constraints, and Creating a New Energy Future with District Energy**, IDEA Conference, Nashville, TN, June 2007

**Campus of the Future: Meeting of the Minds**, APPA/NA-CUBO/SCUP Conference, Honolulu, HI, July 2006

**Combined Heat and Power at UNC-Chapel Hill**, Legislative Committee on Energy and Energy Efficiency, Raleigh, NC, July 2007

**Combined Heat and Power at UNC-Chapel Hill**, Legislative Commission on Global Climate Change, Raleigh, NC, December 2006

**Energy Independence Days**, Raleigh, NC, September 2005

**Environmental Partnership Summit: Improving Our Air, Protecting Our Health**, Research Triangle Park, September 2006

**Green Day**, Sasaki Associates, Boston, MA, May 2007

**Greening the Campus VI**, Ball State University, Muncie, IN, September 2005

**National Low Impact Development Conference**, Wilmington, NC, March 2007

**National Recycling Coalition's 25<sup>th</sup> Annual Congress & Expo**, Atlanta, GA, October 2006

**The Role of Higher Education in Creating a Sustainable World**, Association for the Advancement of Sustainability in Higher Education, Tempe, AZ, October 2006

**Smart and Sustainable Campuses**, EPA/SCUP/University of Maryland, College Park, MD, April 2007

**Sertoma Club**, Chapel Hill, November 2005

**Strategic Leadership Conference at Ingersoll Rand**, Atlanta, GA, March 2006

**US Green Building Council – Charlotte Chapter**, Charlotte, NC, October 2006

**Wachovia's Leadership Conference**, Charlotte, NC, 2006

**Water Resources Research Conference**, Raleigh, March 2007

## Films

**Black Diamonds: Mountaintop Removal and the Fight for Coalfield Justice**, April 2007

**Kilowatt Ours: A Plan to Re-Energize America**, October 2006

**An Inconvenient Truth**, Seven campus showings in January 2007, two at the Union in November 2006, and one theater showing in July 2006

## Brown Bags

**Biotech – Sustainability and International Career Opportunities**, Rolf Hoffman, Senior Vice President, European Operations, Amgen Europe

**LED Lighting Applications in Campus Buildings**, Greg Merritt, Cree

**Market Based Approaches to Environmental Restoration**, Martin Doyle, Associate Professor, Geography

**The Potential for Solar Thermal Systems on Campus**, Tom Henkel, Sustainable Energy Consultant



# RESOURCES

## Guidelines & Policies

### Campus Sustainability Policy

<http://sustainability.unc.edu/Resources/UNC/tabid/158/default.aspx>

### Energy Efficient Lighting Policy

<http://sustainability.unc.edu/Resources/UNC/tabid/158/default.aspx>

### Energy Efficient Purchasing Policy

<http://sustainability.unc.edu/Resources/UNC/tabid/158/default.aspx>

### Greening Federal Facilities

[http://www.eere.energy.gov/femp/technologies/sustainable\\_resources.cfm](http://www.eere.energy.gov/femp/technologies/sustainable_resources.cfm)

### NC Executive Order 156

<http://www.sustainablenc.org/main/orders.htm#156>

### The Greening Curve: Lessons Learned in the Design of the New EPA Campus in North Carolina

[http://www.epa.gov/rtp/new\\_bldg/environmental/thegreeningcurve-new.pdf](http://www.epa.gov/rtp/new_bldg/environmental/thegreeningcurve-new.pdf)

### UNC Design & Construction Guidelines

<http://www.fpc.unc.edu/DesignGuidelines.aspx>

### US Green Building Council

Leadership in Energy & Environmental Design (LEED) Rating System  
<http://www.usgbc.org/>

### Whole Building Design Guide

<http://www.wbdg.org/>

## UNC-Chapel Hill

### Carolina Center for Public Service

<http://www.unc.edu/cps/>

### Carolina North

<http://cn.unc.edu/>

### Commuter Alternatives Program

<http://www.dps.unc.edu>

### Energy Services

<http://www.energy.unc.edu/>

### Environment Health & Safety

<http://ehs.unc.edu/>  
<http://ehs.unc.edu/environmental/stormwater/>

### Facilities Planning and Construction

<http://www.fpc.unc.edu>

### Facilities Services

<http://www.fac.unc.edu>

### Morehead Planetarium and Science Center

<http://www.moreheadplanetarium.org/>

### North Carolina Botanical Garden

<http://www.ncbg.unc.edu/>

### Office of Waste Reduction and Recycling

<http://www.fac.unc.edu/wastereduction>

### Our Community

<http://www.unc.edu/community/>

### Surplus Property Office

<http://www.ais.unc.edu/msd/mmd/Surplus/Surplus.htm>

### Sustainability Office

<http://sustainability.unc.edu>

## Academics at UNC

### Active Living by Design

<http://www.activelivingbydesign.org>

### APPLES Service Learning Program

<http://www.unc.edu/apples/>

### Carolina Entrepreneurial Initiative

<http://www.kenan-flagler.unc.edu/KI/cei.cfm>

### Center for Community Capitalism

<http://www.ccc.unc.edu>

### Center for Sustainable Enterprise

<http://www.cse.unc.edu>

### Center for Urban and Regional Studies

<http://www.unc.edu/depts/curs/>

### City and Regional Planning Department

<http://www.planning.unc.edu/>

### Environmental Finance Center

<http://www.efc.unc.edu/>

### Environmental Resource Program

<http://www.sph.unc.edu/erp/>

### Institute for Advanced Materials, Nanoscience and Technology

<http://www.advancedmaterials.unc.edu>

### Institute for the Environment

<http://www.ie.unc.edu/>

### Interdisciplinary Obesity Center

<http://www.cpc.unc.edu/idoc>

### Urban Investment Strategies Center

<http://www.kenan-flagler.unc.edu/KI/urbanInvestment/index.cfm>

## Student Groups at UNC

### Campus Y

<http://campus-y.unc.edu/>

### Carolina Environmental Student Alliance

<http://www.unc.edu/student/orgs/cesa/>

### Net Impact

<http://www.net-impact.org/>

### Renewable Energy Special Projects Committee

<http://respc.unc.edu/>

### Student Environmental Action Coalition

<http://www.unc.edu/student/orgs/seac/>

## North Carolina

### The Chapel Hill-Carrboro Chamber of Commerce

Foundation for a Sustainable Community  
<http://sustainablefoundation.org>

### N.C. Green Power

<http://www.ncgreenpower.org/>

### North Carolina Solar Center

<http://www.ncsc.ncsu.edu/>

### North Carolina Sustainable Energy Association

<http://www.ncsustainableenergy.org/>

### State Energy Office

<http://www.energync.net/>

### Sustainable North Carolina

<http://www.sustainnc.org/>

## Higher Education

### APPA: The Association of Higher Education Facilities Officers

<http://www.appa.org/>

### Association for the Advancement of Sustainability in Higher Education

<http://www.aashe.org/>

### Campus Consortium for Environmental Excellence

<http://c2e2.org/>

### EPA Sector Programs – Colleges and Universities

<http://www.epa.gov/sectors/colleges/>

### Higher Education Associations Sustainability Consortium

<http://www.aashe.org/heasc>

### National Association of College and University Business Officers

<http://www.nacubo.org/search/>

### National Wildlife Federation Campus Ecology Program

<http://www.nwf.org/campusecology/>

### New Jersey Higher Education Partnership for Sustainability

<http://www.njheps.org/>

### Northeast Campus Sustainability Consortium

Society for College and University Planning  
<http://www.scup.org/>

### United Nations Decade of Education for Sustainable Development

<http://www.uspartnership.org/>



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