SUSTAINABILITY

ECONOMY + ENVIRONMENT + SOCIETY =



2007 - 2008 ANNUAL SUSTAINABILITY REPORT

NC STATE UNIVERSITY

"WE CANNOT SOLVE OUR PROBLEMS WITH THE SAME

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THINKING WE USED WHEN WE CREATED THEM."

Albert Einstein

Progress

The concept of sustainability, which is meeting the needs of the present without compromising the ability of future generations to meet their own needs, poses many challenges.* It also presents many possibilities for North Carolina (NC) State University. Our students, staff and faculty are learning how to think about the many challenges facing our society in new ways. Our researchers are developing new ways to provide our communities with sustainable forms of energy. Our extension offices are reaching out to North Carolinians who are adapting to a changing environment. We are collaborating with universities around the globe and fostering an environment that is allowing our students to become global leaders. We are helping create a more sustainable world.

* Based on the concept from the 1987 Brundtland Report, "Our Common Future" from the World Commission on Environment and Development



How will our society meet the needs of the present without compromising the ability of future generations to meet their own?^{*} At NC State University, our students, staff, faculty and alumni are addressing the answer to this question, as well as others, every day. Through their dedication and innovation, we are making progress in the areas of sustainability.

As our society addresses the economic, environmental and community aspects of a changing climate, it is with great pleasure that I am sharing the 2007–2008 Annual Sustainability Report of NC State.

This document provides a snapshot of many on-campus projects and initiatives that are allowing us to progress towards a more sustainable, global community. Since our Campus Environmental Sustainability Assessment was released in 2006, each of our colleges, institutes and units have been stepping up with research and projects that are increasing efficiencies and environmental responsibility. These efforts are made visible through this annual report and through the work of the University Sustainability Office.

As part of our land-grant mission, we are a University with great responsibility to address the needs and challenges of our state. At NC State, we are working to be among the top players in the field of sustainability — in energy, technology, innovation and more. For example, we declared 2008 The Year of Energy at NC State, initiating several energy-saving programs and encouraging environmentally conscious practices for our campus community. We are proud of our accomplishments and look forward to the discoveries yet to be made and implemented.

I hope that as you read this report, you will gain a better understanding of what is means for us to be progressing toward sustainability while also finding a way to become involved in future progress.

Sincerely,

James L. Oblinger Chancellor North Carolina State University

* Based on the concept from the 1987 Brundtland Report, "Our Common Future" from the World Commission on Environment and Development

Facilities Operations is proud to provide quality support and services for the University community and dedicated to providing these services in a progressively sustainable manner. As a land grant university, we have a responsibility to educate our students; part of their basic education must include how to be environmentally responsible global citizens. Operating as a model of sustainability will provide an opportunity to enhance this aspect of their education.

As Sustainability Officer for the last four years, I have had the opportunity to take part in the evolution of sustainability at NC State University. I have seen many within our community join together with a dedication that is allowing us to progress toward campus sustainability. This year, the Energy Council was created to guide the Year of Energy, build partnerships, momentum and academic resources to create scholarships and programs focusing on energy and the environment. This year has also marked the creation of the Sustainability Office to serve as a centralized clearing house for campus sustainability.

This progress will allow us to take campus sustainability to the next level. Our administration has set the vision of being a national leader in sustainability (specifically energy and the environment). To meet this vision we all need to take part in creating our sustainable future.

Sincerely,

Jack Colby, Sustainability Officer & Assistant Vice Chancellor Facilities Operations

We are each part of the NC State University community and were drawn to this University because we want to make a difference in the world. At NC State, we demonstrate over and over again how to lead the Nation in our research, technology and innovation. We now have the opportunity to become leaders in an evolving field, which is sustainability.

Everyone has a valuable role in creating a sustainable campus that operates in a resourceefficient manner and produces students with a sense of environmental responsibility. Whether it is turning off a light, reporting a leaky faucet, generating new ideas and innovations, collaborating with others or heading up a project, individual actions will continue providing our global community with progress toward a more sustainable future. As each of us is playing our role, we must embrace a collaborative approach to finding solutions, by knowing that it takes many experts to find an appropriate solution to the many questions of sustainability. We must also remember that it's not only experts that hold the solutions. Each of us has unique skills and ideas that are integral in creating and maintaining our sustainable future.

Sincerely,

Tracy Dixon, Director University Sustainability Office





The concept of sustainability means that our environment, people in our society, and our economy matter. It is the balance of these basic needs now and for our future generations that is important. The most common sustainability definition, established by the United Nation's 1987 Bruntland Commission, states this balance: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." NC State University recognizes this balance and is emphasizing efforts on environmental sustainability and how humans and our campus have an impact on the environment.

We continuously monitor and evaluate our progress toward sustainability in our pursuit to be a more sustainable campus. The vision of NC State ensures progress toward sustainability by incorporating sustainability into our academic programs and operations. Each year as our faculty, staff and students develop new ways of thinking about the problems facing our society, our University makes progress toward the goal of sustainability.

Although the University Sustainability Office was only recently established to serve as a central clearinghouse for sustainability information and visioning, our efforts to improve the sustainability of our campus began long before the existence of this office. Our waste reduction and recycling program is more than 30 years old, our Solar Center opened nearly 20 years ago and our Energy Management and Transportation offices have been well established for some time. Our University's official focus on sustainability began in 1999 when our Board of Trustees approved the Environmental Sustainability Guiding Principles, publicly declaring our commitment to protecting and enhancing the environment through both education and management of the physical NC State campus. We have made progress toward many of our goals that were set in the 2000 Environmental Sustainability Task Force Recommendations. Our Campus Environmental Sustainability Assessment. This benchmarked where our campus is in terms of nine focus areas of academics and research, buildings, community and culture, energy, land use, materials management, transportation, waste reduction and recycling and water.

Just this year, our University has taken several large steps committing to sustainability. These steps include dedicating 2008 as the "Year of Energy," focusing on a unified agenda of energy and environment and signing the American College and University Presidents Climate Commitment dedicating us to working toward climate neutrality by evaluating and reducing our carbon footprint. We also committed that all our new construction will be LEED Silver. These are examples of how we are steadily progressing toward a more sustainable campus.

This Annual Sustainability Report is designed to provide a snapshot of the types of sustainability-focused activities that have occurred during the 2007–08 fiscal year, and a look forward at initiatives that will improve our future sustainability. The report's purpose is to provide information about our University's progress toward a more sustainable future and to encourage personal responsibility for how we impact their environment and the sustainability of our community.

CEST in partnership with the Sustainability Office wrote this report. The organization of this report provides a general framework by which we will continue to assess and monitor the sustainability of our University. The main sections reflect the nine focus areas of the CEST working groups formed from the 2006 Campus Sustainability Assessment.



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ACADEMICS

> STUDENT ENROLLMENT IS PREDICTED TO INCREASE 25% OVER THE NEXT DECADE



As part of signing the American College & University Presidents Climate Commitment, we have committed to actions that "make climate neutrality and sustainability part of the curriculum and other educational experiences for all students." This commitment becomes more crucial as our student enrollment is predicted to increase by 25% over the next decade. **ENERGY COURSE INVENTORY** The Energy Council completed an inventory of existing courses connected to the themes of energy. The inventory shows NC State offers about 155 courses in categories including energy theory (55), production (37), distribution and storage (4), use (59) and policy (1). An additional 66 courses include energy as an important, integral theme. As courses are always being added, we recognize the course inventory is not complete, and will continue to develop the list. The inventory shows current courses as well as courses that are desired, but not available. This inventory will help guide the development of new courses and curricula needed to ensure students at NC State have access to academic programs related to the critical themes of energy.

NEW COURSE – ZERO-CARBON/SOLAR DECATHLON DESIGN RESEARCH STUDIO (ARC 301) In spring 2008, the School of Architecture held a graduate architecture studio focusing on the Solar Decathlon. The primary goals of the studio were:

- To get the students started thinking rigorously in terms of the energy and environmental implications of various architectural design decisions.
- To generate a number of solid designs that can be used as a basis for a proposal to the US Department of Energy to participate in the next cycle of the Solar Decathlon.

Dr. Wayne Place taught this course and was joined by two of his PhD graduate students, Jim Grady and Traci Rider. This work will continue into the fall with an undergraduate architecture studio, ARC 301, focusing on the Solar Decathlon, taught by Dr. Wayne Place, Jim Grady and Visiting Assistant Professor, Jianxin Hu.

NEW COURSE – ENVIRONMENTAL SUSTAINABILITY (NR 491G/NR

595G) This year a new special topics course, Environmental Sustainability was approved and developed. Dr. Bill Winner will be teaching this interdisciplinary course with guest lectures from other campus experts. The course will explore environmental sustainability from a range of perspectives and will focus on five themes:

- Natural resources (agriculture, forestry, water, soil, air)
- Energy (biofuels, nuclear power, alternative sources, conservation)

- Sustainable NC State
- Policy and economics (business, politics, sociology, law)
- Issues of scale (regional-global, immediate-centuries)

UNDERGRADUATE ENERGY-RELATED RESEARCH NC State's

Office of Undergraduate Research, Division of Undergraduate Academic Programs partnered with Progress Energy to provide \$100,000 to support undergraduate student research projects dealing with energy. The projects supported activities for nearly 30 students through the 2007-08 academic year and summer. Projects ranged from research on biofuels to studies intended to yield new, energy saving electrical components. The real value, though, is commitment from NC State to stimulate creative solutions to energy issues by providing resources for the inventors and leaders of tomorrow's energy industries.

NEW LEADERSHIP IN ENVI-RONMENTAL ECONOMICS AND POLICY Dr. Laura Taylor joined the NC State faculty in 2007 and was appointed Director of the Center for Environmental and Resource

Economic Policy. Dr. Taylor brings her expertise on environmental policy analysis and on measuring the market and non-market benefits we derive from sustainable use of our environment and natural resources. The Center engages more than 20 faculty and their students in seminars, colloquia,



specialized workshops and research that connect natural and environmental resources to the systems of economics and policy that underlie natural resource management.

RESEARCH

> RECEIVED OVER \$18,882,000 FOR ENERGY-RELATED RESEARCH AS OF THE YEAR OF ENERGY MIDPOINT



Jayant Baliga, NC State electrical and computer engineering professor, responsible for eliminating over 100 gigawatts of power

As a major research university with research expenditures approaching more than \$325 million annually, we have the responsibility to advance knowledge, transfer technology and discover and develop innovations that solve some of the world's most pressing problems. Through the American College and University Presidents Climate Commitment we will take action to expand research and other efforts necessary to achieve climate neutrality.

INVENTION LEADS TO SMALLER CARBON

FOOTPRINT NC State electrical and computer engineering professor, Jayant Baliga may have the world's smallest carbon footprint. One of Baliga's inventions is responsible for eliminating the need for more than 100 gigawatts of power, which translates to a reduction in carbon dioxide emissions of about one trillion pounds per year. The insulated-gate bipolar transistor (IGBT), a semiconductor that controls the flow of power from the energy source to whatever device needs the energy, improves energy efficiency by more than 40% in an array of products, from cars and refrigerators to light bulbs and cardiac defibrillators. Now Baliga, the director of the University's Power Semiconductor Research Center, is watching as another of his inventions, a semiconductor made of silicon carbide that is significantly more efficient than the IGBT, is beginning to gain widespread acceptance in consumer products.

SOLAR HOUSE The Solar House serves as an educational tool and showcase for solar and energy-efficient technologies. Together with its research annex, the house serves as a living laboratory for solar research. Many graduate student theses and dissertations have continu-



NC Solar House serves as a living laboratory for solar research

ally focused on the Solar

House. Through such research as well as continuous metering and monitoring, we have determined how well the Solar House works. We have also determined the costs of its operations and under what weather conditions it is fully functional. The total heating bill for the winter averages less than \$70.



This year the house received a new 50-year roof made from recycled material, a new photovoltaic array and new landscaping to complement the passive solar architecture. A new 5.4-kW solar photovoltaic system was installed using Sun Power modules. stored and processed in North Carolina at its Williamsdale Farm Agricultural Extension and Research Facility in Duplin County. The College held its first Biofuels Field Day at the Williamsdale site in 2007. Work at Williamsdale focuses on switchgrass, sweet sorghum, sweet potatoes and soy-



beans. Also in 2007, the college's Center for Environmental Farming Systems held a workshop titled "Fueling the Farm: Managing Energy Risks and Reducing Energy Costs and Exploring Alternative Energy Sources." In addition to offering an overview of current and future energy use in agriculture, the workshop showed farmers how to evaluate energy saving options and how to finance and build renewable energy projects.

CONVERTING FATS TO FUEL

NC State researchers developed a way to convert vegetable oil and other oils from animal fat, even cooking grease and algae, into jet fuel to power airplanes. The technology, called Centia[™], is 100% green, as no petroleum-derived products are added to the process. There is no soot or particulate matter associated with fuel from fats. Therefore, the fuel created by the new process also burns cleaner, so it's better for the environment.

Dr. William Roberts, professor of mechanical and aerospace

HELPING FARMERS SAVE ENERGY The College of Agriculture and Life Sciences (CALS) and North Carolina Cooperative Extension are working to help North Carolina farmers use energy more efficiently and cash in on the need for alternative fuels. CALS has concentrated research and extension efforts aimed at identifying and developing alternative fuel feedstocks that can be grown, harvested, engineering and director of the Applied Energy Research Laboratory at NC State, developed the biofuels process with NC State's Dr. Henry Lamb, associate professor of chemical and biomolecular engineering; Dr. Larry Stikeleather, professor of biological and agricultural engineering; and Tim Turner of Turner Engineering in Carrboro, NC.

BUILDINGS

> BUILDING ALL NEW CONSTRUCTION TO LEED SILVER STANDARDS



Administrative Services Building III, home of the Sustainability Office, takes advantage of passive solar design by having south-facing orientation and using low-e windows, daylighting techniques and solar shades

According to the U.S. Green Building Council, buildings account for 65% of electricity consumption, 36% of energy use, 30% of greenhouse gas emissions, 30% of raw materials use, 30% of waste output (136 million tons annually) and 12% of potable water consumption in the United States. Clearly, the built environment is one of the most visible ways to promote and showcase our commitment to sustainability. **PHYSICAL MASTER PLAN** Sustainability requires a multifaceted approach in the master planning process. Our University commitment to addressing changes to our campus includes protecting, enhancing and restoring the environmental quality of flora, fauna, soil, water and air on campus and in surrounding areas. We also commit to the



highest quality of design and construction for lasting value. As part of this commitment, sustainability has been one of our Guiding Principles since the year 2000, and our Physical Master Plan states that sustainable designs set forth the guidelines depicting our commitment to efficiency and responsible development. We have gone through the process of updating our master plan over the past year. During this process, we expanded the description of sustainability at our University to include life cycle costs, the cost of externalities associated with design and construction and introduced the idea of energy generation as well as conservation. Through this plan we also strive toward the Hanover Principles, which insist on rights of humanity and nature to co-exist in a healthy, supportive, diverse and sustainable condition.

LEED SILVER CERTIFICATION Although standards such as Leadership in Energy and Environmental Design (LEED) set by the US Green Building Council have been a part of our design process for many years, we have committed to attaining LEED Silver



for all future campus buildings. LEED encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. This rating system is the nationally accepted standard for green building design, construction and operations, and it has been adopted by 11 Federal government agencies, dozens of state and local governments and private developers all over the United States. LEED is a voluntary building certification program that defines high-performance green buildings, which are more environmentally responsible, healthier and more profitable structures.

CONSTRUCTION GUIDELINES Sustainability has been integrated throughout our University's Construction Guidelines for many years. These guidelines are presented to the design community as an aid to the design and construction of facilities and renovations at NC State University. We began the process of updating these guidelines during the past year to align with our commitment to build to LEED Silver standards.



GREEK VILLAGE During 2007-08 we began Phase I of our Greek Village Development Project. Greek Village is a partnership between our University and campus' fraternities and sororities. We will develop the neighborhood and building lots, and the individual organizations will design and construct the chapter houses. This design and construction will be reviewed by the Campus Design Review Panel but it falls outside our University's general construction guidelines. Recommendations on sustainable building will be given to individual organizations

during the design phase for each house. As part of Phase I construction, the Sigma Nu house will be LEED Silver as was designated by the donor of funding for this chapter's house.

HEALTHYBUILT HOMES The NC HealthyBuilt Homes Program is focused on providing support for small- to medium- size homebuilders that may not have the resources to compete in the rapidly emerging field of green building. This fiscal year, the program certified 98 homes in 10 NC counties. These homes met a statewide set of sustainable home guidelines and created a community partnership with the Appalachian State University Energy Center, called



the Northwestern NC HealthyBuilt Homes Program. Other activities include answering a Request for Qualifications from the US Green Building Council in November of 2007, which resulted in the program being named as a LEED for Homes Provider in February of 2008. Our director of the HealthyBuilt Homes Program participated with the National Association of Home Builders (NAHB) as Task Group Chair for Remodeling during NAHB's creation of an American National Standards Institute (ANSI) standard for residential green building.

STUDENT COMPETITION A team of students from the School of Architecture won second place in the 2008 NC Sustainable Building Design Competition. This competition is designed to help colleges and universities across North Carolina integrate sustainable design into their curriculums. The students were required to design a home using the LEED for Homes and SystemVision[™] standards, create a budget for the project and consider a maximum 5-year return on investment for the home. The winning design is built every year, and teams from NC State have won the competition and had their designs built for the last two years.

COMMUNITY & CULTURE

> JOINING OVER 550 OTHER UNIVERSITIES IN A VOLUNTARY COMMITMENT TO WORK TOWARD CLIMATE NEUTRALITY



Personal Energy Day held on the brickyard during Earth Week

Our students' involvement in the campus community outside the classroom has a great influence on their future. Our campus culture at NC State University is shifting to recognize the societal aspects of the processes that are leading us toward sustainability within our programs and initiatives. Additionally, the current societal shift toward environmental responsibility around the globe is reinforcing our culture of progress toward sustainability. **CREATION OF THE SUSTAINABILITY OFFICE** One of our most notable achievements of the past year is creating the University Sustainability Office. It will function as a clearinghouse for information and projects relating to our progress toward sustainability. The office was created in April 2008 and is establishing an active role within our community. In the fall of 2007, a sustainability blog was established to highlight events and provide information to the campus community, and the Sustainability Office website was established during the summer of 2008.

CLIMATE COMMITMENT Chancellor James Oblinger signed the American College & University Presidents Climate Commitment



(ACUPCC) in February. This is a voluntary commitment that had been signed by over 550 universities and colleges as of June 2008. This commitment provides a framework and support to assist signatories in achieving climate neutrality. This formal commitment has reinforced a culture of environmental responsibility within our University. The presidents and chancellors who are joining and leading the ACUPCC believe that exerting leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding and increase the support of alumni and local communities.

GREEN MILLENNIUM SEMINAR As part of the

Millennium Seminars, North Carolina native and Emmy Award winning journalist Charlie Rose moderated a



panel discussion on sustainable design in October. The panel of experts included public health expert Dick Jackson; NC State College of Design Dean and president-elect of the American Institute of Architects, Marvin Malecha; and world renowned architect, Thom Mayne. The entire seminar was televised in January.

EARTH WEEK 2008 We celebrated Earth Day, April 22, 2008, with an expanded calendar of Earth Week events. In honor of our Year of Energy, all of the events had an energy-related theme. A dedicated group of staff, faculty and students spent many months preparing the events, which included speakers, movies, art, dinners, music, brickyard events and tours.

The week culminated in our sixth annual Earth Day event on the brickyard, which showcased various campus groups and departments as well as state agencies and local businesses. High attendance at these events exhibits increasing interest in the environment.

EARTHWISE AWARDS Our fifth annual Earthwise Awards ceremony was held on April 25, 2008, during Earth Week. These awards recognized individuals who have shown an exemplary commitment to sustainability at our University. These awards consisted of a cash prize and plaque made from 100% recycled glass. The Campus Environmental Sustainability Team (CEST) chose award recipients, and this year's winners were Rhonda Sherman-faculty, Barry Olsonstaff and Elin Arnaudin-student.

HEALTH & SAFETY We have continued to focus on the health and safety of our students, staff and faculty. Our Student Health Center continues to promote a healthy lifestyle, and the Wolf Alerts Emergency Communications system now includes over eight outlets for notifying members of our community of emergency situations. The occupational safety of our employees is monitored by our Environmental Health & Safety Division, and our Safety Officer emails notification of all recordable accidents to each member of Facilities Operations. This allows us to prevent and/or correct hazards that cause accidents within our organization. In addition, we continue to review and update our response plans to natural and other disasters through our Business Continuity and Disaster Recovery Department.

CAMPUS ORGANIZATIONS

- This year marked the reinvigoration of our Campus Environmental Sustainability Team (CEST). The group is comprised of staff, faculty and students who have been meeting voluntarily on a monthly basis to discuss campus sustainability initiatives and develop nine working groups, which are based on the nine sections of this report.
- The Wolfpack Environmental Student Association (WESA) was established early in the 2007-08 academic year and worked with CEST in development of the Contract with the Environment.
- The mission of NC State's chapter of Net Impact is "to improve the world by growing and strengthening a network of leaders who use the power of business to make a positive net social, environmental and economic impact."
- Our student government passed a new student sustainability fee during the 2007-08 academic year that would have supported sustainability initiatives on campus. There is currently a hold on the sustainability fee due to the University of North Carolina College system's moratorium on new student fees.

DINING University Dining has begun assessing the sustainability of their programs. In partnership with the Center for Environmental Farming Systems, University Dining offered two opportunities for students



CONTRACT WITH THE ENVIRONMENT

During the fall of 2007, the Campus Environmental Sustainability Team and the Wolfpack Environmental Student Association created the Contract with the Environment. This contract allows students to pledge their commitment to "Live, Learn, Engage and Sustain" as environmentally responsible global citizens. The intention of the project is to gauge the amount of campus

interest in the environment and create an ever-growing network of people who are interested in sustainability.



to experience local foods: Earth Feast, an Earth Week dinner

featuring locally produced pastured pork, eggs, beef and produce; and the All Carolinas Meal, a cultural event that showcases locally produced foods that are North Carolina favorites. 2007 marked the first year that dining took part in the NC Choices program by serving locally raised pork products. Two new programs began in the 2008; the removal of trays from the dining halls for water conservation and the collection of used cooking oil by Piedmont Biofuels for the purpose of making biodiesel. Dining has

also begun researching alternative products and educating their staff on environmentally responsible operations.



ENERGY

> SAVING 7,785 KWH DURING THE RESIDENCE HALL COMPETITION WHICH EQUATES TO PLANTING 771 TREES

For many years our university has served as a center for renewable energy research, and our Facilities Operations unit has focused on energy efficiency. Many of our



For more about the Year of Energy see page 28.

departments, centers and organizations contribute to advancements in the field of energy on a daily basis. It is only fitting that 2008 is the Year of Energy at NC State University. **2008 YEAR OF ENERGY** Chancellor James Oblinger announced 2008 as the Year of Energy, which is focusing our University's resources on energy and the environment. The kick-off event to the Year of Energy was the dedication of what was at the time of installation, North Carolina's largest grid-tied photovoltaic solar panel array, which is located on University property near the RBC Center in Raleigh. Following the ceremony was the inaugural Energy Fair, held on North Campus, which brought together concepts detailing how we create partnerships to envision solutions to complex energy issues.

"JUST SWITCH IT OFF" CAMPAIGN This is a campus wide initiative to get people to switch off unnecessary lighting. During 2007-08, building labels and mouse pads displaying the logo were distributed all across campus and in



all of the computer labs. This campaign is a practical and low-cost approach to reduce the wasted energy that goes into unnecessary lighting and computers that remain on after use. **RESIDENCE HALL COMPETITION** As part of the "Just Switch It OFF" campaign, we developed our first energy competition. It was conducted over the three-month period from November 2007 through January 2008 and the participants were residents of the Honors Quad Residence Halls, Berry Hall, Becton Hall and Bagwell Hall. While Bagwell saved the most energy with a 7.3% decrease, all residence halls saw a decrease in electricity consumption. Becton saved 6.5% and Berry saved 4.1%. Total kWh saved for the competition was 7,785 which equates to planting 771 trees.

NORTH CAROLINA SOLAR CENTER

The NC Solar Center specializes in sustainable energy technologies, green building, renewable energy, distributed generation,



clean transportation, energy policy and renewable energy economic development. Through its programs and services, it seeks to stabilize energy costs for consumers, stimulate local economies, reduce dependence on foreign fuels and mitigate the environmental impacts associated with fossil fuels. This past year the Solar Center's Economic Development group has continued to grow as the only Economic Development Administration "University Center" in the Southeast that focuses solely on sustainable energy technologies. As part of the final year of a three year Clean Fuel Advanced Technology project, the Clean Transportation group subawarded 11 projects, totaling over \$631,000, for emission reduction projects. Sucesses of the Healthy Built Home program are highlighted under the Buildings section of this report.

OFFICE OF ENERGY MANAGEMENT

The Office of Energy Management (OEM) is charged with managing and conserving the energy and water used on campus. OEM's



plan for maximizing energy and water conservation uses a five-step approach in the following focus areas: energy data management, energy supply management, energy use in facilities, equipment efficiency and campus integration. Since fiscal year 2001-02, OEM has exceeded the 10% reduction in water consumption per gross square foot goal. In 2007-08 we measured approximately a 40% reduction. We also started reclaiming condensate from our cooling towers and collecting rainwater from roof tops to use mostly in irrigation and plantings. We are also working towards the goal of reducing energy consumption per gross square foot by 4% over a 10 year period by implementing major retrofitting projects such as using LED lighting, investing in energy saving devices, lighting and computer software and evaluating alternative energy sources.

INDUSTRIAL EXTENSION SERVICE AND INDUSTRIAL ASSESSMENT CENTER These programs serve as extension agents to industrial and commercial-energy users who are seeking ways to become more energy efficient.

The Industrial Extension Service's (IES) Energy Management Program promotes energy conservation in industrial, institutional and government sectors by providing a series of workshops and technical assistance services. This past year IES completed 158 energy-efficiency and preventive maintenance surveys, 52 formal training one-day workshops for 345 managers, engineers and technicians and conducted both the energy management and facilities engineering management diploma series. This program provides significant effort to support the State Energy Office's Industries of the Future Program, the Utility Savings Initiative Program the NC State's Industrial Assessment Center and the State Energy Office's Control System Tune-up Program.



The Industrial Assessment Center (IAC), housed in the Department of Mechanical & Aerospace Engineering provides free energy conservation surveys to small and medium size North Carolina manufacturers. Students are involved in every aspect of the survey including on-site data collection, engineering analysis of the potential savings, and communication of the findings to plant management in a written technical report. Over the last four years, the IAC has provided 85 surveys with \$16 million in recommended savings.

SENATE BILL 668, SESSION LAW 2007-0546 Senate Bill 668 was groundbreaking North Carolina legislation passed in 2007. The bill mandates energy efficiency and requires that all state buildings cut energy use by 20% per gross square foot by 2010 and by 30% per gross square foot by 2015. The bill also mandates the following:

- Compact fluorescent lighting (CFL) will replace incandescent bulbs
- All incandescent exit signs be replaced with light-emitting diode (LED) signs
- Installation of 1.5 gpm faucet aerators and 1.5 gpm shower heads will occur

LAND USE

> SUSTAINABLE MANAGEMENT OF THE HOFMANN FOREST PROVIDED \$3,174,000 IN SCHOLARSHIPS, FELLOWSHIPS AND OTHER SUPPORT



Restoration of a bank along Rocky Branch Creek

Our university is constantly expanding to meet the needs of growing enrollment, and we recognize that the development of University land and facilities has an enormous impact on the environment. Over-development of our campus' interior can result in loss of green space. Therefore, we are committed to development that occurs in an increasingly balanced, planned and thoughtful manner.

Our main campus is comprised of approximately 2,240 acres located in the heart of Raleigh, NC, which is a city consistently voted among the best places to live and do business. We control over 104,000 acres of research farms, forests and facilities across North Carolina. We use these lands to foster mutually beneficial relationships between the University and surrounding communities. **NEIGHBORHOODS & PATHS** All development is guided by our Master Plan Guiding Principles such as sustainability, mixed-use activities and design harmony, as well as its vision: A Campus of Neighborhoods & Paths. This plan includes guidelines and standards for individual projects and directions on how to fit those projects into the overall campus fabric. By focusing on neighborhoods and paths, we are integrating the many parts of our large, urban campus into a coherent whole.

ROCKY BRANCH CREEK The Rocky Branch creek runs 6,100 feet through our main campus and serves as an outdoor classroom and a focus of our Stream Restoration Program. Six thousand feet of greenway paths are being installed along the stream's edge. This greenway will provide a transportation alternative while allowing people to enjoy the creek. Approximately \$900,000 was acquired for Phase III of the restoration project during the 2007-08 year. Designing for the final phase and permitting by regulatory agencies were also completed during the 2007-08 year. As of June 2008, we had \$2 million of the \$3 million needed for completion of Phase III, and the bidding process for a construction contract is in progress.

HOFMANN FOREST The Hofmann Forest consists of 80,000 contiguous acres harvested using sustainable forestry practices that provides income to fund research, fellowships and student scholarships. During the 2007-08 fiscal year, the Hofmann Forest provided \$183,000 in scholarships, \$581,000 in fellowships, and \$2,410,000 in other programmatic and departmental support.

CENTENNIAL CAMPUS Centennial Campus is a 1,120-acre site adjacent to our main campus, and it includes the first green building on NC State University land, built by the North Carolina Wildlife Resources Commission (WRC). This building houses the WRC Administrative Headquarters & Centennial Campus Wildlife Education Center.

Centennial Campus is our University's vision of the future and was recognized as 2007 Research Science Park of the Year by Association of University Research Parks. This "technopolis" consists of multi-disciplinary research and development neighborhoods, with university, corporate and government facilities intertwined. To date, there has been \$620 million invested in the facilities and infrastructure. The unique master plan for this environmentally sensitive, mixed-use, academic village responds to the professional, educational and recreational needs of our faculty, staff and student body, as well as those of corporate and government affiliates whose presence on Centennial Campus adds to its vigor and effectiveness.

LAKE RALEIGH WOODS The campus is home to Lake Raleigh and Lake Raleigh Woods. Our 90-acre lake serves as a public boating and fishing spot and is free and open to the public from sun up to sun down. Lake Raleigh is home to a variety of fish, including largemouth bass and catfish. A boat ramp allows launching of canoes, kayaks and any other watercraft not powered by gasoline. Lake Raleigh Woods is a unique ecosystem within Centennial Campus. We designated it to be preserved as an outdoor environmental teaching resource while we were updating our Master Plan in 2007.

GROUNDS MANAGEMENT Through our University's construction specification review process, **Grounds Management** requires the use of plant materials and grasses that are native, drought tolerant and low maintenance. We have also been implementing more perennial plants rather than replanting annuals each year. Bulk leaves and other yard debris are removed from our campus, ground and mixed and then used to mulch our campus. Knowing runoff from our grounds affects the surrounding river basin and the health of our campus, we have reduced our use of chemicals by nearly three-quarters and only use herbicides for specific problems. When herbicides are used, we track what we use, how much was used and where it was applied. Our integrated pest management plan is designed to ensure proper use of these herbicides, insecticides and fungicides. When chemicals are necessary, we notify, at least 24 to 48 hours prior to spraying an area, any students, faculty and staff who have identified themselves as being chemically sensitive.

STORMWATER MANAGEMENT In accordance with the requirements and conditions of the University's permit to discharge stormwater under the National Pollutant Discharge Elimination System (Permit No. NCS000376), our University is requiring all component organizations to develop and implement stormwater best management practices in an effort to minimize the adverse effects on stormwater runoff. The permit requirements that must be developed and implemented include, at a minimum, the six management measures:

- Public education and outreach to provide information about stormwater and water-quality awareness
- Public participation to provide stakeholder involvement in program development and feedback
- Illicit discharge detection and elimination to ensure detection, reporting and elimination of illicit discharges, spills and illegal dumping
- Construction site runoff control to require implementation of appropriate waste, erosion and sediment control practices
- Post-construction runoff control to ensure that best management practices are integrated into the design process and to require development and implementation of an inspection and maintenance program
- Pollution prevention and good housekeeping-technique development to prevent and/or reduce the potential for stormwater pollution from our facilities and operations



MATERIALS MANAGEMENT

> PURCHASING FACILITATED A BID FOR LOW-FLOW TOILETS AND FLUSH VALVES, SAVING UNIVERSITY HOUSING MORE THAN \$150,000



Shoppers sifting through lightly used clothing at the 2008 Pack ${\rm 'N}$ Go Sale

Our purchases encompass all types of products and services and represent the volume of purchasing acquired by a large and thriving city. During the 2007-08 fiscal year, we have been very successful in managing all of our materials. **MATERIALS SUPPORT** Materials Support manages our Surplus Property and handles the removal of unwanted items across our entire campus. Through a partnership between Materials Support and University Housing, 700 sets of furniture were put out to bid through our state surplus process, and all but approximately 200 pieces of the 3,000 items offered were either acquired through sealed bid or donated to non-profit charitable organizations. This allowed us to send only 8% of the inventory we removed from residence halls this year to the state landfill.

UNIVERSITY HOUSEKEEPING Our Housekeeping Services are focusing their efforts on green cleaning products and methods. Some of the products Housekeeping Services uses include KaiBosh, Kaio and KaiBlooey, which are all GreenSeal certified cleaning products. The new products are much safer for our environment and occupant health and provide an equally impressive end-result.

PURCHASING We conduct over \$400,000,000 worth of purchasing annually. Our Purchasing Department handles the contracts for all major state purchases and continues to support the purchase of recycled-content paper. Our largest quantity of sustainable purchasing is through paper products. We have purchased over \$816,000 in recycled paper during 2007-08. We have also purchased over \$150,000 worth of other recycled products, such as refurbished toner cartridges, office supplies and compost/mulch.

During 2007-08, we added contracts for electric vehicles and low-flow aerators and showerheads for use on campus. These agreements facilitate the best price and most reliable delivery of the products. Purchasing recently facilitated a successful bid for low-flow toilets and flush valves for University Housing, saving them more than \$150,000.

UNIVERSITY GRAPHICS AND COPY CENTER University Graphics and Copy Center uses Eco-Set Inks, which are designed and formulated with the latest renewable resource product materials available. Many of the petroleum-based solvents and



LED lighting in Wolf Village

rosins have been replaced with renewable, vegetable-based products in order to achieve a more sustainable printing ink. The ink is produced with more than 24% renewable products, minimal solvent content and is very low in Volatile Organic Compounds (VOCs).

ENERGY STAR We have adopted an energyefficient appliance purchasing policy as part of the 2008 Year of Energy. This policy requires the purchase of certified Energy Star products in all areas where such ratings exist.



REPAIR AND RENOVATION (R&R) R&R utilizes sustainable products and practices in their renovation work. For example, they use carpeting from Interface Flooring, which is made entirely of post-consumer recycled products and does not require glues to adhere the product to existing subfloors. This reduces the amount of harmful volatile organic compounds (VOCs) to zero. R&R has also required vendors to recycle all of the ceiling tiles they remove during large-scale replacements.

FIRST LED UNIVERSITY™ We have entered into an agreement with Cree, Inc. becoming the inaugural LED University™. Through Light-Emitting Diode (LED) technology, we will not only generate high-quality, comfortable lighting around our campus, but also we will see significant cost savings, with energy usage being reduced by as much as 62%. LED lighting is currently being used in parking decks on campus, as well as in the Bragaw Residence Hall. When complete, Bragaw will be the first residence hall in the nation to be lit by LEDs, and the parking deck lighting project was also the first of its kind across the nation.

2008 PACK 'N GO SALE Waste Reduction and Recycling and University Housing paired up to host the Third Annual Pack 'N Go Sale. At the end of the academic year, when students are moving out of the residence halls, WRR reduces campus waste by collecting unwanted items for re-use and recycling. Everything from clothes and room supplies to food and loft wood are collected from campus residents. Re-usable materials such as clothes, shoes, room supplies and furniture were sold to the campus community with the proceeds benefiting environmental education initiatives on campus. The event raised nearly \$1500 for campus environmental education initiatives, which is a 41% increase over the previous year.

TRANSPORTATION

4TH YEAR AS ONE OF THE "BEST WORKPLACES FOR COMMUTERS" >IN THE TRIANGLE

The mission of NC State University Transportation is to improve the quality of life for our community by providing seamless and sustainable transportation systems with excellent customer service, and the mission of our Fleet Services is to serve all of NC State University with its official transportation needs.

As required by section 19.5 of S.L. 2005-276, NC State is working toward a 20% petroleum reduction by January 1, 2010 by evaluating the types of fuel and oils we use, the types of vehicles we purchase for our fleet and the education and trainings we offer.



BEST As a University, we encourage alternatives to solo travel reliance on single occupancy vehicles. The 2007-08 year marked the fourth year

we have been recognized as one of the "Best Workplaces for Commuters" in the Triangle. This designation has been made possible by our campus community, which has chosen to bike, carpool, vanpool, walk and take the bus rather than driving single-occupancy vehicles.

WOLFTRAILS Wolftrails is a program that is providing transportation alternatives for getting to, from and around Main Campus,



Centennial Campus and the Centennial Biomedical Campus. A goal of this program is to increase the number of commuting carpoolers, vanpoolers, bikers and walkers by 20%.

EMERGENCY RIDE HOME Persons registered with the Wolftrails program are eligible for Emergency Ride Home Assistance provided by Triangle Transit (formerly TTA).

CLEANER TRANSPORTATION NC State is becoming a clean fleet campus. Approximately 70% of all permanently issued Motor Fleet Management vehicles assigned to our University run on alternative fuel. The Motor Pool offers



WOLFTRAILS PROGRAM REGISTRANTS FOR 2007-2008



daily and monthly vehicle rentals, bus shuttle services, automotive repairs, small equipment repairs and a car wash facility to the campus community. Fleet Services currently offers two types of alternative fuel, a 20% bio-diesel (B20) and a 10% ethanol blend of unleaded (E10) at their fuel site. No vehicle modifications or enhancements are required to



run either type of these fuels. During the 2007-08 fiscal year, we doubled the amount of vehicles that are capable of running on alternative fuels in preparation for an E85 filling station.

Our transit contractor acquired a new fleet of buses using Ultra Low Sulfur diesel during 2007. On board emissions reduction systems for these vehicles, combined with low-sulfur fuels, offer significant reductions in pollutants of public health concern, such as particulate matter, hydrocarbons and carbon monoxide.

VEHICLE ACQUISITION When it comes to purchasing new vehicles and equipment, Facilities Operations is making smarter choices when selecting their fleet. This includes determining the right vehicle size for the job, seeking alternative fuel or diesel engines when available, and requesting from the manufacturer

the smallest engine size that can be used in the selection process. Departments are also encouraged to order smaller utility vehicles to replace full-size vehicles when applicable.

ADVANCED TRANSPORTATION ENERGY CENTER As

part of the Year of Energy, Governor Mike Easley announced the creation of the Advanced Transportation Energy Center in February. Its purpose is to develop fundamental technologies that will enable the electric power industry to actively manage and control large amounts of plug-in hybrid vehicles (PHEV) and plug-in electric vehicles (PEV). It is also forwarding technologies to help make the automobile industry develop better and more efficient PHEVs and PEVs, hence allowing our nation to move away from gasoline-based vehicles. The center is also educating the public through its outreach program in collaboration with industry sponsors. WOLFLINE TRANSIT Our annual Wolfline transit ridership increased by 2.6% during 2007-08. As an incentive, we have a U-PASS program allowing NC State students, staff and faculty to ride the Triangle Transit and Capital Area Transit buses for free with a valid University ID. We are funding this program with assistance from the NC Department of Transportation.

BICYCLE PLANNING & AWARENESS This year, our transportation office was actively involved in developing the Raleigh Bike Plan. They also continued to conduct annual bike rack surveys and identify areas where new or permanent racks are needed. Sheltered bike racks, storage lockers and showers are currently available in Engineering Building II and, wherever feasible, similar bicycle facilities are being incorporated into designs for new buildings.

Our transportation office also publishes a periodic e-newsletter for our campus Bicycle User Group (BUG). This e-newsletter contains information and news of interest to cyclists. Promotion of safe biking on campus is being advanced by the on-pavement symbol, the share the road arrow of the Sharrows program, across campus roadways.

The Sharrows symbol is meant to inform drivers about cyclists traveling the roadway and to guide cyclists along heavily traveled routes where bike lanes and paths are unavailable.

CAR & BICYCLE SHARING Based on preliminary surveys performed during 2007-08, our campus seems eager to be a part of a bikesharing program. This program is in its initial stages of planning. Our



transportation office is also exploring options for introducing a Zipcar program that will provide self-service access to cars on campus.

WASTE REDUCTION & RECYCLING

> KEPT 6 MILLION POUNDS OF WASTE FROM ENTERING THE WASTE STREAM



Re-use effort provided unneeded residence hall desks for the public



NC State University's Waste Reduction and Recycling (WRR) office continues to effectively manage and reduce campus waste while

leading environmental initiatives for the campus community. Several programs coordinated by WRR during the past year have engaged and educated the campus about sustainability and the role of recycling. Such programs include special events, presentations and conferences both on and off campus. Ongoing program development and expansion allows for the diversion of re-usable and recyclable materials from the waste stream. NC State has successfully surpassed the 40% diversion rate that was mandated as a goal for all state agencies in NC Executive Order 156. **RECYCLING/SOLID WASTE/COMPOSTING TOTALS FOR FISCAL YEAR 2007-08** For the 2007-08 Fiscal Year, NC State has avoided \$82,118 in landfill fees, and has kept 6 million pounds of waste from entering the waste stream. As a result of recycling 2.21 million pounds of fiber, we have saved 18,785 trees in the 2007-08 fiscal year. The revenue gained from sale of recycled materials is \$54,925.

WE RECYCLE WE Recycle is a collaborative program between WRR, Athletics, Wolfpack Sports Marketing and Waste Industries. This volunteer-driven recycling effort at Carter-Finley Stadium reclaimed 45,160 pounds of beverage containers in the 2007 season, which is up 27%



from the previous year. Through this innovative program, WE Recycle has educated tailgaters to recycle while saving 167 cubic yards of space at the Wake County Landfill.

RECYCLEMANIA 2008 Recyclemania is a 10-week long recycling competition among colleges and universities across the country that is designed to raise awareness about the importance of waste reduction. NC State was ranked 17th among 400 schools in our



first year of participation. From our recycling efforts we saved the equivalent of 2,405 MwH's of electricity, 3565 tons of Carbon Dioxide, 3 tons of Nitrogen Dioxide and 11.6 tons of Sulfur Dioxide.

OUTREACH WORK WRR is heavily involved in environmental programs both on and off campus. Some of the outreach activities include presentations for University Towers, Central Campus Resident Advisors, Inter-Residence Council, Net Impact, Solar House and Bowen and Metcalfe residence halls. WRR participated in tabling events such as New Student Orientation, Cates Crawl, Energy Fair, America Recycles Day and Earth Day. Sustainability presentations were made for the Centennial Campus Lunch & Learn lecture series as well as at Pfeiffer University. WRR also chaired the Carolina Recycling Association Events Planning Committee for the 2008 conference.

RE-USE EFFORTS Though recycling is an excellent way to keep items out of the landfill, often there are re-use opportunities that can extend the life of materials. WRR utilizes a popular re-use website (craigslist.com) to make items not accepted by University Surplus available to the public for re-use. In FIGURE 1. RECYCLED 2007–2008



FIGURE 2. PERCENTAGE OF YEARLY WASTE RECYCLED



partnership with Grounds Management, plastic plant pots are collected year round and periodically given away for free to local landscapers and gardeners. University Housing replaced all of the desks in Sullivan residence hall and in collaboration with WRR, the old wooden desks were made available to the public. The response was overwhelming as a large portion of the unwanted furniture was taken by families and organizations who needed it.

DESKSIDE RECYCLING UPGRADE In collaboration with University Housekeeping, WRR updated the Deskside Recycling program allowing users to put more fiber material into deskside bins. The upgrade has involved educating all housekeepers and building occupants on campus as well as replacing all stickers on deskside recycling bins. A



successful pilot program in one zone of the campus has helped guide the planning and implementation of the campus wide program changes.

COMPOSTING WRR manages a yard waste site on Inwood Road. Grinding campus yard waste at this site provides the mulch used in landscaping the campus. Composting of over 1.5 million pounds of yard waste during the 2007-08 fiscal year has saved the University \$30,000 dollars. Additionally, all of the animal bedding from Centennial Biomedical Campus is sent to a local composting facility.

HAZARDOUS WASTE Our Environmental Health & Safety Center has completed the process of consolidating the chemical, radioactive and mixed (radioactive hazardous) waste collection programs into a single service. The goal is to ensure compliance with US Environmental Protection Agency, NC Department of Transportation and National Recycling Coalition regulations while also providing convenient and responsive service to the hundreds of laboratories, shops and storage facilities that generate waste within our University.

CONSTRUCTION WASTE WRR has developed an inhouse roll off service for the hauling and disposal of campus construction and demolition waste. New swaploader trucks can transform from a roll-off delivery vehicle to a recycling collections truck. There are now 16 yard roll off containers that are available to the campus as a billable service.

CARMICHAEL GYMNASIUM As the Carmichael Gym expanded, WRR adjusted collections to capture more recyclables. Full recycling sites are now available throughout both sections of the gym. Currently, WRR is working with Carmichael to expand the outdoor activity areas and will have recycling bins in high traffic areas.

MAIL ROOM RECYCLING WRR created a Mail Room Recycling Program in the residence halls that educates users on what sort of materials can be recycled and provides a convenient way to recycle unwanted mail. Bins are now available in all residence halls adjacent to student's mailboxes.

WATER

> SAVING NEARLY 10 MILLION GALLONS OF WATER PER YEAR THROUGH 10 PROJECTS



FIGURE 1. WATER USE BY GROSS SQUARE FOOT

NC State has reduced water consumption per square foot by 44% compared to the baseline year of 2001-02

IRRIGATION Our Irrigation Manager has signed an individual partnership with the EPA Water Sense Program. This partnership showcases efforts to maintain or decrease water usage by being more efficient and effective with irrigation. We are the first school within the University of North Carolina System to participate in this program.

We currently manage 20 of our 69 irrigation systems through the MAXICOM system. This system allows for continuous communication with weather towers, the measurement of evaporation, and recognition of vegetation-type and uses this information to create a specific prescription of water to be applied per week. MAXICOM also recognizes when and where

there is a high-flow situation, such as a broken sprinkler head, a cut hose, etc. MAXICOM then shuts down the system at the main and alerts the Irrigation Manager that there is a high-flow situation.

Our Grounds Management office measures the weather data involved in

North Carolina is experiencing the worst drought this region has seen in nearly a century. While this environmental tragedy increased efforts to conserve water across the state during 2007-08, we reinforced our water conservation policy to make our water restrictions more stringent than those imposed by the City of Raleigh.

We have committed to reducing water consumption per square foot by a minimum of 10% over the baseline year of 2001-02. We have maintained a steady decline in water usage per square foot in recent years, and increased awareness of the drought brought about increased conservation during 2007-08. To date, we are currently exceeding that goal at a 44% decrease over this baseline.

turf and ornamental watering, such as temperature, rainfall, evaporation, solar radiation and wind. We are driven to minimize the quantity of water used while maximizing the efficiency of the water that is used. By monitoring drought levels we often take actions to reduce our water usage before it is required by City of Raleigh regulations. Additionally, we collect and use rainwater and condensate runoff to irrigate fields and ornamentals.

WATER COMPETITION In November 2007, our Student Body President, Bobby Mills, challenged University of North Carolina (UNC)-Chapel Hill to a water conservation competition. In an effort to increase conservation among

> students, both schools tracked residence hall consumption for a three-month period to see which school could reduce student water usage by the highest percentage. Our students won the competition with an impressive 29% reduction in water use, while UNC-Chapel Hill students achieved a 24% reduction. Together,



FIGURE 2. EXAMPLES OF CAMPUS WATER CONSERVATION PROJECTS - FY 2007-08

Site	Project Description	Estimated Water Conserved (gallons/year)
Centennial Biomedical Campus, Main Building	Replacement of vacuum and medical air pumps	1,180,000
Campus wide	Replacement of fixtures/valves with low-flow models: 86 toilets, 38 flush valves at CVM, Harrelson, DH Hill, Holladay, Poe, COT and Carmichael	1,510,700
Campus wide	Placement of low-flow aerators on all public sinks	694,000
Fox Labs	Installation of Condensate Recovery System for Greenhouse Swamp Coolers	470,300
Monteith Research Center	Installation of Condensate Recovery System for cooling towers	845,800
Pulp & Paper	Installation of Condensate Recovery System for cooling towers	168,000
Mann Hall	Installation of Process Cold Water Loop for cooling hydraulic accumulators	1,382,400
Williams Hall	Replacement of water-cooled condenser in Growth Chamber Room	490,600
Gardner Hall	Replacement of water-cooled units with air-cooled units for microscope cooling	2,600,000
Jordan/Biltmore Halls	Installation of Rainwater Recovery System for irrigation of upper Miller Field	641,600
Thermal Plants (5)	Installation of Rainwater Recovery System for cooling towers (Yarbrough); placement of low-flow aerators on all sinks	20,000
University Housing	Placement of aerators on all faucets, low-flow shower heads	
University Dining	Placement of aerators on all faucets, limited use of trays, and service of water at catering events solely upon request	

ESTIMATED WATER CONSERVED FOR FY 2008-09 AND BEYOND THROUGH THESE FY 2007-08 PROJECTS: 10,003,400

both schools reduced water use by an estimated 11,000,000 gallons throughout the competition.

EFFICIENCY PROJECTS Our building maintenance, retrofitting and process changes that occurred during 2007-08 will result in reoccurring savings each year. Examples of these projects and their estimated savings are listed in the table above.

STORMWATER MANAGEMENT In accordance with the requirements and conditions of the University's Permit to Discharge stormwater under the National Pollutant Discharge Elimination System, the University is requiring all component organizations to develop and implement stormwater best-management practices in an effort to minimize the adverse effects on stormwater runoff. More details on our stormwater management can be found in the Land Use section of this report.

DINING HALLS In response to our region's water crisis, the dining halls stopped using trays to help reduce the amount of water used for cleaning purposes.

HOUSEKEEPING The housekeeping staff has become more conscious of how much water is used during cleaning routines. Their use of new micro-fiber floor-cleaning devices conserves water and cleaning solution, and uses 90% less water and 95% less cleaning solution.

CAR WASHING Fleet Services two car wash bays recycle approximately 75% of water used and it utilizes environmentally safe soaps.



NC State University dedicated 2008 as the Year of Energy to focus on a unified agenda of energy and environment across our campus. Below are just a few examples of the many accomplishments to date as part of this commitment. Many more programs and events are scheduled to occur throughout the remainder of the year, and a more comprehensive list of accomplishments will be published at a later date. **ENERGY COUNCIL** An energy council comprised of students, faculty, staff, alumni and industry leaders was appointed to highlight current academic, research, outreach and engagement activities related to energy. Activities such as investing in faculty and graduate support, leading energy policy discussions through the annual Emerging Issues Forum, installing a solar panel array and hosting some of the nation's top research and policy experts were all part of the Year of Energy. The Energy Council's goal is to recommend actions that ensure our academic community is knowledgeable about contemporary energy issues, the University responsibly addresses energy use and the public has information needed to address energy issues.

INSTALLED GRID-TIED SOLAR PHOTOVOLTAIC

SYSTEM The NC Solar Center and NC GreenPower coordinated, what was at the time of installation, North Carolina's largest grid-tied photovoltaic (PV) solar panel array. The 75.6 kilowatt (kW) system is located on University property near the RBC Center. The system is comprised of 432 ground-mounted solar panels and



was dedicated on Tuesday, January 15. The ceremony held at the dedication was the kick-off event for our Year of Energy. Tax incentives are currently being leveraged by Carolina Solar Energy, which is the current owner of the project, while the University owns the project at the completion of financing agreements.

ENERGY FAIR Following the PV array dedication was NC State's inaugural Energy Fair. This fair kicked off a series of events that were scheduled throughout the semester to raise awareness about the ways students, faculty and staff use energy. The event showcased many sustainable energy technologies related to transportation and lighting. A number of exhibitors gave students an up-close look at hybrid vehicles, plug-in vehicles modified to run largely on battery power for sustained distances and buses that used the same technology. The LED lighting fixtures installed in the Dan Allen parking facility were also showcased. Bagwell Hall, winner of the first Residence Hall



Energy Competition, was outfitted with 250 compact fluorescent light bulbs (CFLs), which were donated by Progress Energy & the State Energy Office.

EMERGING ISSUES FORUM Energy and environment were the topics of the annual Institute of Emerging Issues forum, which was designed to inform, engage and mobilize the state. On February 11-12, distinguished speakers including Thomas Friedman (NY Times), Amory Lovins (Rocky Mountain Institute), Jeff Immelt (GE), Bill Johnson (Progress Energy), Jim Rogers (Duke Energy), Dr. Rajendra Pachauri (Nobel Prize Winner), Senator Richard Burr, Chuck Swoboda (CREE), Thomas Nagy (Novozymes, Inc.) and other guests discussed energy security, energy opportunities, climate change and energy economic development.

Grid-tied solar panel array located on University property near the RBC Center

ENERGY STAR PARTNERSHIP NC State has become an Energy Star Partner; this commits us to measure, track and benchmark energy performance, develop and implement a plan to improve energy performance and



educate our University and the public about our partnership and achievement. The University has been doing much of this work through the Office of Energy Management. This partnership will allow us to expand our work in this area.

Descriptions of other major commitments, such as signing the American College and University Presidents Climate Commitment, building all new construction to LEED Silver standards, becoming an LED University and Earth Week, are mentioned in other sections of this document.

LOOKING FORWARD

- Complete an emissions inventory and create a plan to work toward climate neutrality as part of the American College and University Presidents Climate Commitment
- Continue Earth Week as an annual event
- Serve as a host institution for the November 2008 Association for the Advancement of Sustainability in Higher Education (AASHE) National Conference
- Continue to utilize LED technologies in University Housing
- Select Energy Performance Contractor to conduct performance contracting projects
- Establish a sustainable energy technologies economic cluster at the University, through the work of the NC Solar Center
- Grow our green cleaning efforts including employee training, re-engineering recycling collections to include all office fiber, reducing chemicals usage, reducing water consumption and improving customer service
- Use more sustainable products in future Repair and Renovation work on campus
- Establish an E85 filling station through Fleet Services

- Increase the number of carpoolers, vanpoolers, bikers and walkers in the Wolftrails Program by 20% and transit users by 10% for 2008-09
- Continue planning for the campus bike sharing program
- Explore options for introducing a Zipcar program to campus
- Reduce the amount of furniture sent to the landfill to less than 5%
- Expand We Recycle to Vaughn Towers, which houses box and club seats as well as the press box
- Continue Recyclmania as an annual event
- Complete deskside recycling upgrades
- Research and re-permit our compost facility, resulting in a more comprehensive campus composting program
- Integrate electronics recycling into Waste Reduction and Recycling programs
- Increase the recycling percentage by at least 1% during 2008-09, equivalent to 124,000 pounds
- Implement the Intra-Mail Network to reduce receiving junk mail

As we highlight the progress that has been made during our 2007-08 fiscal year, we recognize the additional challenges that are before us on our path toward sustainability. We expect to make progress on the following initiatives in the near future:

- Construct a 865-gallon rainwater collection tank to irrigate the surrounding landscape as part of the Erdahl-Cloyd patio renovation
- Finalize replacement of all toilets and flush valves in dormitories and apartments to low-flow (1.6g/flush) models
- Create and implement a campus wide Sustainability Strategic and Tactical Plan
- Expand staffing in the Office of Energy Management and Office of Sustainability
- Make climate neutrality and sustainability part of the curriculum and other educational experiences for all students as part of the American College and University Presidents Climate Commitment
- Expand research and other efforts necessary to achieve climate neutrality
- Revise University design and construction standards to include Senate Bill 668 and LEED
- Incorporate LEED standards into new building projects (Hunt Library, Sullivan III, Greek Village, etc.)
- Develop a mission and vision for the Campus Environmental Sustainability Team and goals for each working group

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PRINT AVAILABILITY The printer used vegetable-based ink on 100% post-consumer recycled paper. Printed copies are for distribution to the Board of Trustees and other University officials. Remaining copies are dispersed throughout the 12 colleges to increase student and faculty awareness.

FEEDBACK We encourage readers of this report to provide us with their own insight into how we are progressing as a model of sustainability and how we may progress in our future endeavors as a large, public University. Please provide your insight to the Sustainability Office at ncsu.edu/sustainability

EQUAL OPPORTUNITY STATEMENT NC State University is dedicated to equality of opportunity. The University does not condone discrimination against students, employees or applicants in any form. NC State commits itself to positive action to secure equal opportunity regardless of race, color, creed, national origin, religion, sex, age or disability. In addition, NC State welcomes all persons without regard to sexual orientation.

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