

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Programs:

Active management of gas vs. oil as boiler fuel and oil supply

Greenville Utilities (GUC) negotiated a new agreement with intrastate natural gas provider, Piedmont Natural Gas (PNG), effective November 1, 2005. The new purchasing agreement with PNG requires changes in the monthly customer rate negotiation process for interruptible customers, such as ECU. The new purchasing agreement requires GUC to purchase natural gas on the open market every month and enables GUC to determine when to curtail interruptible customers. As such, the pricing for natural gas is driven by open market pricing that can fluctuate daily unless long-term pricing on projected volumes is negotiated. Campus Operations monitors fuel oil pricing weekly and tracks fuel oil pricing compared to natural gas pricing quoted by GUC. Campus Operations notifies Main Campus and Health Sciences Campus Steam Plant operations when to change types of fuel usage based on price when appropriate. Campus Operations also directs Main Campus and Health Sciences Campus Steam Plant operations when to consume fuel oil inventory and when to purchase fuel oil based on projected fuel oil pricing trends. Campus Operations tracks usage based on actual pricing and future prices to project annual expense based on usage. (*ECU 2007 Strategic Energy and Water Plan; 2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Peak Alert Notices

Campus Operations alerts the University community of utility peak situations and recommends extra efforts to conserve electricity. Campus Operations directs members of the University community to a web site for answers to frequently asked questions. Campus Operations discusses the University efforts to conserve energy by explaining the importance of peak alerts to the Deans to share with faculty members during annual meetings conducted at the beginning of the school year. Housekeeping Services continues to instruct Housekeepers to turn off lights during peak periods. (*ECU 2007 Strategic Energy and Water Plan; 2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Summer Unoccupied Setback Program

In May 2002, Campus Operations obtained support from Chancellor and his staff to achieve energy savings during the summer months by reducing load and controlling building temperature through a summer unoccupied setback program. Challenges facing the implementation of a campus-wide unoccupied setback program include buildings that are not practical candidates for an aggressive setback program and other buildings that require more effort to adjust the program to meet occupants' needs. For example, the museum quality exhibits in Fletcher Music limit the feasibility of aggressive setbacks. Problems with humidity and mildew in Old Cafeteria require close monitoring of setback efforts. In addition, incomplete information from the registrar has required fine-tuning of the program in buildings with classes not scheduled through the registrar in the evening, late Friday afternoon, and on Saturdays. Facilities Services attributes the overall positive response from the University community to the support and buy-in from the Chancellor and his staff. With this support and continued refinement of the system, Facilities Services anticipates that the future of the setback program will not be limited to the summer months. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Energy Operating Plans

Facilities Services has developed and implemented energy operating plans for University facilities and has documented plans in Facilities Services Standard Practices. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

ECU Maintenance Program rated Excellent in Operational Assessment requested by the Office of the President

In 2003, the Office of the President of the University of North Carolina requested an operational assessment on the maintenance programs and conditions of the sixteen campuses in the University system. From October through December 2003, on-site reviews were performed. The objective at each site was to determine if a formal maintenance program is in place, if the program is adequate, if there are sufficient human resources in

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

place to execute the program, and if actual conditions indicate the required maintenance is being performed. The maintenance program at each campus was assigned a rating of excellent, good, marginal, or failing. It was reported to the Board of Governors that only three campuses were rated excellent: East Carolina University, UNC-Charlotte, and UNC-Wilmington. (*2006 Strategic Energy and Water Plan; 2005 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Best Practice Meeting

As a result of the excellent rating that ECU received in Operational Assessment requested by the Office of the President, ECU hosted a Best Practice Meeting in August 2004. Topics discussed included the organization and operations of ECU Facilities Services and various aspects of the ECU preventive maintenance work order system including life safety, control systems, and CMMS. The guest speaker, Terrance Feravich, Associate Vice President for Finance & University Property Officer, spoke about the UNC budget. Other individuals involved in the program included Assistant Director, Maintenance Engineering; Executive Director, Facilities Services; Assistant Director, Utility Services; University PM Engineer; Supervisor of Controls for HSC; University Reliability Engineer; Facilities Technology Manager; Director HSC Facilities; and Senior Associate Vice Chancellor for Campus Operations. Twenty-nine people attended representing six other State institutions. (*Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

State Facilities Utility Savings Initiative

In response to recommendations by the Capital Management Subcommittee of the Governor's Efficiency Study Commission, the State Facilities Utility Savings Initiative (USI) was created by the State Energy Office (SEO) in FY02-03 to assist State agencies with lowering their utility costs and to ensure that State agencies have implemented operation and maintenance conservation measures. Rebecca Bizzell, Director, Resource Management – Campus Operations, serves as the USI Liaison. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Strategic Energy Plans

ECU Campus Operations continues to submit Strategic Energy Plans on behalf of the University annually to State Energy Office (SEO) as required per statute G.S. 143-64.12 that reads as rewritten (Senate Bill 668 ratified August 2007) “Each State agency and State institution of higher learning shall develop and implement a management plan that is consistent with the State's comprehensive program under this subsection to manage energy, water, and other utility use. The energy consumption per gross square foot for all State buildings in total shall be reduced by twenty percent (20%) by 2010 and thirty percent (30%) by 2015 based on energy consumption for the 2003-2004 fiscal year. Each State agency and State institution of higher learning shall update its management plan annually and include strategies for supporting the energy consumption reduction requirements under this subsection.”

ECU Campus Operations submitted Strategic Energy Plans on behalf of the University annually to State Energy Office (SEO) as required per statute GS 143-64.12, “each State Agency shall develop and implement an energy management plan that is consistent with the State's comprehensive energy management program.” In addition, Campus Operations developed the required Energy Mandate to serve as a Memorandum of Agreement between SEO and the State “to ensure continued support for your utility manager to reduce energy and water consumption and cost for state facilities.” In conjunction with the submission of the Strategic Energy Plan, Campus Operations continues to provide required utility cost and usage data to the SEO. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Long-Term Water Efficiency Plan

ECU Campus Operations submitted the University's Long-Term Water Efficiency Plan to Division of Pollution Prevention and Environmental Assistance and State Energy Office in July 2004 per Governor Easley's August 2002 Executive Order No. 26, Water System Protection, directed all State agencies to develop and implement long term financially feasible conservation measures. Upon completion of a long-term water efficiency plan, the University was released from the ban on non-essential water use per Executive Order #26 issued during

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

the 2002 drought. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Construction Standards

Campus Operations has developed Construction Standards to express the University's requirements in different construction areas and are intended as a guide for the Design Professional in developing project designs. The Construction Standards outline initiatives in energy management such as sustainable building designs that effect lower operation costs and good stewardship of state funds and natural resources. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Utility Conservation & Awareness Committee

Meeting from March 2000 to April 2006, the University Utility Conservation & Awareness Committee (UC&AC) supported the University's utility conservation, water conservation, resource management, and sustainability efforts. The UC&AC included representatives from Academic Library Services - Joyner Library, the Faculty Senate representing the academic community, a member of the Division of Research, Economic Development & Community Engagement representing the research community, and a member of Student Government Association. The UC&AC also included representatives from various auxiliary or revenue-supported departments including Mendenhall Student Center, Student Recreation Center, Dining Services, and Athletics. The UC&AC included representatives from various support departments including Business Services, University Police, and Environmental Health and Safety. The Energy Services Supervisor with Greenville Utilities Commission was an active member of the UC&AC. Campus Operations was also represented on the UC&AC by several positions. The focus of this effort included the promotion of recognition programs developed by the UC&AC to recognize efforts by individuals and departments to reduce energy consumption, conserve natural resources, and protect the environment. (*2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; 2005 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005; 2003 Strategic Energy Plan*)

Conservation Awareness Team

In November 2002, the State Energy Office established the USI Education Committee to design an outreach and education program as part of utilities conservation. The State Energy Office (SEO) requested that each USI Liaison establish a Conservation Awareness Team (CAT) to implement the education program. The SEO requested the University Conservation and Awareness Committee include a diverse team to "facilitate our understanding of the ways we waste and ways we can conserve resources." The USI Education Committee supported the University Conservation Awareness Team by developing guidelines and providing educational materials, training, and assistance. In January 2003, the University Utility Conservation & Awareness Committee agreed to serve as the University Conservation Awareness Team. (*Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Efforts to turn off lights in unoccupied rooms

Members of the University community are routinely reminded to turn off lights in unoccupied rooms. Utility Conservation & Awareness Committee (UC&AC) emailed reminders to turn off lights in the evening to occupants of buildings where Housekeeping Services was provided during the day. Housekeeping Services continues to instruct Housekeepers to turn lights on only in areas where they are working and turn lights off when they complete their work. In July 2002, at the request of the UC&AC, University Police incorporated turning off lights into Officers' routine security checks. The UC&AC requested that the University Police report any lights left on during routine security checks for the UC&AC to follow-up with building occupants. At the request of the UC&AC, over 6000 "instructional labels" reminding occupants to turn off lights were ordered and installed on the light switch plates in administrative and academic buildings on both campuses. (*2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Efforts to turn off lights

The Facilities Services work order system includes the following preventive maintenance work orders initiated by the Utility Conservation & Awareness Committee (UC&AC):

- preventive maintenance work order established to set and check the timers across campus when the time shifts to and from daylight savings time.
- preventive maintenance work order to survey all exterior lights on campus on a monthly basis.

(*2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Efforts to turn off computers

In January 2002, the Utility Conservation & Awareness Committee (UC&AC) recommended that Information Technology and Computing Services (ITCS) reconsider their 2001 policy recommending enabling the "power management" feature on University computers and shutting down systems, including monitors and peripherals, completely over weekends, vacations, or holidays. ITCS agreed with the recommendation and updated information on the web to reflect the change in policy that computers, including monitors and peripherals, should be shutdown every night in addition to enabling the "power management" feature. (*2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Drink Vending Machine Energy Conservation Devices

In July 2001, the Utility Conservation & Awareness Committee (UC&AC) requested the Greenville Utility Commission Energy Services Supervisor evaluate the electric consumption of refrigerated drink vending machines. Upon investigation, the UC&AC supported the use of a drink machine energy conservation device that monitors activity around a vending machine and regulates its cooling schedule to optimize energy. UC&AC requested University's Vending Services to advise the University's contract drink vendor of the use of a drink machine energy conservation device and pursue the installation of such devices on drink vending machines going forward. (*Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005; 2003 Strategic Energy Plan*)

O&M Efforts:

Occupancy Sensors

Facilities Services plans to install occupancy sensors in 42 classrooms in Bate building for lighting/energy savings. (*ECU 2007 Strategic Energy and Water Plan*)

Insulated roof systems

New insulated roof systems installed are energy savers. The Modified Bitumen cap sheet is light gray in most cases replaces a black EPDM which in turn reduces temperature at the roof surface. Eliminating old roof systems with wet insulation restores the R factor in insulation systems and requires less building conditioning costs. (*ECU 2007 Strategic Energy and Water Plan*)

Roof Works

The university roof assets are maintained by Building Services. This department has three roofers whose responsibility is to perform preventative maintenance inspections and small scale repairs. The inspection process identifies roof conditions that need repair or replacement. The data that results from the inspections is entered into Roof Works, a roof management software program. This program contains a roof rating and expected roof replacement date, also drawings, details, pictures and notes on all campus roof systems are included. This information enables department heads to make informed decisions when advising roof work to proceed on a certain building. This program has the ability to project out ten or more years of roof construction project priorities and budget estimates needed which in turn helps forecast long term budget needs in the roofing area. Roof Works data results in saved time when prioritizing the order of roof construction and repair projects. (*2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006*)

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Light weight concrete insulation system

East Carolina University has elected to use a light weight insulated concrete with torch down membrane roof system on recent projects. This system is beneficial to the environment due to the fact that the tapered light weight concrete insulation system remains in place when the next roof replacement occurs. This system eliminates the traditional built-up systems debris from being disposed in the landfill. Also the use of a light weight concrete product as a taper insulation system reduces the use of petroleum bituminous products required by the traditional BUR system. (*ECU 2007 Strategic Energy and Water Plan*)

Exterior building envelope

Exterior building envelope projects have been completed at Fletcher Music and Erwin buildings. Project involved sealing mortar joints and replacing caulk joints to reduce the impact of external forces on the heating and cooling of these buildings. Brewster exterior envelope repair is under design. (*ECU 2007 Strategic Energy and Water Plan*)

Insulated window systems

New insulated window systems have been installed in Spilman, Whichard, Wright, Graham, and Infirmary buildings. New windows replace old wood windows that were loose fitting with deteriorated glazing. Also these projects reduce maintenance time and labor costs as the windows are practically maintenance free. (*ECU 2007 Strategic Energy and Water Plan*)

Planting trees

Facilities Services - Grounds Services plants numerous trees each year on campus. Trees are extremely beneficial to the environment especially when they reach their mature size. Some examples of the benefits include reduction of cooling in buildings that they shade. Trees are planted with these energy savings in mind. (*ECU 2007 Strategic Energy and Water Plan*)

E10 Fuel

University continues to provide E10 rather than unleaded gasoline from both University fueling locations. (*ECU 2007 Strategic Energy and Water Plan*)

Truck Stock program

In order to work productively, craftsmen must have needed parts and materials on hand. To that end, Facilities Maintenance, Main Campus installation and repair vehicles are stocked with a fixed stock called "Truck Stock" which is a combination of "Consumables" and "Chargeable Items". The "Truck Stock" program reduces trips to warehouse for regularly used items resulting in less fuel usage. (*ECU 2007 Strategic Energy and Water Plan*)

Motor Oil consumption

Facilities Services - Automotive Services switched to re-refined motor oil in August, 2006. (*ECU 2007 Strategic Energy and Water Plan*)

Doubling in vehicles

Facilities Services - Building Services attempts to reduce gas consumption by allowing employees to ride in the same vehicle when the project requires more than one craftsman. (*ECU 2007 Strategic Energy and Water Plan*)

Grounds storage units

Creation of Grounds storage units on Main campus. Two such enclosures have been developed over the last few years (Austin grounds storage and Ward Sports grounds storage units) from old cooling tower enclosures. The old cooling tower enclosures that have become obsolete are up-fitted with roofs, garage doors, lights and ventilation to create a storage area for Gators, mowers and miscellaneous grounds equipment. This allows Grounds Services personnel to car-pool from the Grounds Services offices (that are off Main campus) to their areas on campus. Not only does this save fuel and wear and tear on the equipment, it also is safer for the employees tasked with the transportation. (*ECU 2007 Strategic Energy and Water Plan*)

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Air Filter

Facilities Services - Utility Services East Carolina University competitively bid a contract to supply air filters for the HVAC systems on Main Campus in lieu of using the State term contract. Significant savings (\$12,000 annually) will be realized on the previous \$80,000+ contract to provide over 6300 air filters (13 different types) which are changed quarterly. Using this new contract has resulted in improved services (e.g., packaging, delivery time from ordering, etc.) along with improved air filters which are expected to save energy and improve indoor air quality. We were able to utilize the supplier's warehouse to stock air filters we normally use and to implement just in time (JIT) inventory saving the University warehouse space and carrying costs. (*ECU 2007 Strategic Energy and Water Plan*)

Computerized Building Automation Systems

Facilities Services - Utilities Services centrally monitors and controls HVAC systems in most Main Campus buildings through computerized Building Automation Systems (BAS). There are two separate BAS on the Main Campus. Both systems were upgraded in FY04-05 to improve the ability to remotely access the systems. One system now alerts on-call personnel of alarm conditions instantly by pager and generates a follow-up email to the shop supervisor. Significant training at a cost of approximately \$10,000 was provided for HVAC technicians. These upgrades and training have enhanced Facilities Services' ability to respond quickly and effectively to HVAC problems. (*2006 Strategic Energy and Water Plan; FY04-05 Mgmt Flex*)

Instantaneous Water Heaters at Health Sciences Campus

Plumbing Shop, Facilities Services - Health Sciences Campus replaced tank type steam heaters with Flow Rite instantaneous water heaters in Brody Building, Biotechnology Building, and Leo Jenkins Cancer Center. The tank type steam heaters were over twenty years old and were leaking. The dual instantaneous water heaters cost approximately \$29,000 but required no additional piping to install. The instantaneous water heaters are more efficient using 2 pounds of steam compared to the 15 pounds of steam required to operate the tank type steam heaters. Based on 50 gallons per minute use of hot water, estimated savings is \$9.03 per hour. (*ECU 2007 Strategic Energy and Water Plan*)

University doubling generator capacity

Greenville Utility Commission (GUC) has installed power generation equipment having nominal nameplate rating capacity of 3,200 kW on Main Campus and 2,020 kW on Health Sciences Campus operating as peak shaving generator for load management. The cost of installation, maintenance, and operation of the generators is the responsibility of GUC. ECU receives a monthly credit of \$20,371 (\$11,917 for Main Campus location and \$8,454 for Health Sciences Campus location) for participating in the load side generation program. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Installation of energy efficient chillers

Over the past 10 – 12 years, Facilities Services has made a concerted effort to replace older chillers with more energy efficient ones. The most recent efforts have involved central plants. Construction of the Murphy Center included expansion of the Minges chiller plant rather than a new unitary chiller just for Murphy. This allowed more efficient cooling of both buildings. When the old Ward Sports Medicine chiller failed, Facilities Services performed an emergency project to add it to that central plant. The Science & Technology project included a new central chiller plant with very efficient chillers. Bate, Howell, and Rivers were added to that loop and the older chillers removed. The Fletcher Music Addition will do the same with Fletcher Music as will a maintenance project for Austin. The number 3 chiller at the Health Sciences Campus was replaced with a new chiller last year. The existing machine was 25 years old and had an efficiency of .78 kw/ton. The new machine is rated at .52 kw/ton. This results in the same amount of cooling being produced using 20 % less electricity. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Efficient purges for chillers

Facilities Maintenance – Health Sciences Campus purchased more efficient purges for chillers at a cost of \$16,050 to more effectively control emissions into the atmosphere. In addition, upgraded chiller control panels were purchased at a cost of \$32,100 to improve the operating efficiency of the system. (*2006 Strategic Energy and Water Plan; FY03-04 Mgmt Flex*)

Replacement of BSOM central plant chiller

Replaced 1980 chiller required .78 kw to produce one ton of cooling. The replacement chiller requires .52 kw to produce one ton of cooling. In terms of electricity, the replacement chiller requires 2/3 of the amount of electricity to create the same amount of cooling. Campus Operations anticipates that the cost of \$318,271 will be recouped over the next 6 years. (*2006 Strategic Energy and Water Plan; FY02-03 Mgmt Flex*)

Improvement to University's Boiler Operations

The Main Campus Steam Plant consists of 3 older boilers (1975 or older) and 1 boiler added with the Science & Technology building. In 2003, the State Energy Office Utility Savings Initiative inspected and evaluated all boilers in State operated facilities including 29 central plants. The Main Campus Steam Plant was one of only 3 where no recommendations to improve energy efficiency were made. The Health Sciences Campus Utility Plant was one of the other two. In the past 10 years, state-of-the-art controls, including oxygen trimming, were added to the older boilers; an economizer was added to the boiler without one; and variable frequency drives for the forced draft fans were added to the 2 boilers where that made economic sense. An excellent preventive maintenance program is implemented including calibration of controls twice a year. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Evaluation of University's Boiler Operations

In September 2003, Dr. Herbert M. Eckerlin and Eric W. Soderberg published a report summarizing the findings and recommendations of an evaluation of boilers in state operated facilities prepared for the State Energy Office (SEO). An inspection of the state's boiler operations in FY03-04 under the purview of the Governor's Utility Savings Initiative found the University's boiler operations to be two of the most efficient in the state system with no recommendations for cost savings measures. (*2005 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Operation of Heat Recovery Incinerator

The Health Sciences Campus has installed a heat recovery boiler for use with the medical waste incinerator. This boiler produces about 8,000 lbs/hr of steam using the heat produced by burning medical waste, which is essentially the entire campus steam requirement during the summer, and about 40% of the requirement during the winter. In fact, we must sometimes reduce the throughput of the incinerator slightly during hot weather because more steam is produced than is required. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Implemented efforts to conserve utilities and reduce utility costs

In September 2002, Director, Resource Management-Campus Operations forwarded State Energy Office (SEO) the following list of "ways" ECU conserves utilities and reduces utility costs compiled by the Executive Director, Facilities Services-Main Campus. The SEO subsequently distributed the ECU list as recommended practices to other agencies and incorporated ECU list into Utility Savings Initiative O&M Conservation Opportunities list for recommended no and low cost conservation measures.

- T8 bulbs and electronic ballasts
- Occupancy sensors and time clocks for active interior lighting control
- Installation of energy efficient chillers
- Low E glass windows
- KW peak shaving by chilled water supply temperature setback
- Unoccupied building temperature setback
- HDPE central chilled water piping (long term savings on pumping energy)
- LED exit signs

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

- Aggressive steam trap maintenance program
- Computerized irrigation system reduces water consumption
- Use of cooling tower controls to reduce blowdown using high cycles of concentration, monitor leaks and overflow conditions.
- Operation of AC economizer cycles
- Use of Variable Speed Drives for AHU's, CW & HW pumps, well pumps, exhaust and fume hood fans, etc.
- Low Face Velocity AHU coils for lower Fan HP usage
- Installation of Central Chilled Water plants
- Active building pressure control systems to limit infiltration
- Heating water loop reset based upon outdoor air temps
- Use of boiler exhaust gas economizer for feed water pre-heat
- Campus wide email notification during potential high electric demands periods to shut down non-essential services, computers, lights, etc.
- Variable Volume Pumping for Chilled Water Distribution Systems
- Variable Air Volume systems (VFD Conversions)
- Premium Efficiency Motors
- Increased Roof Insulation greater than the Energy Code (Increase from min R15 to R20)
- Campus Education Campaign through Housings TV network as well as stickers and other programs
- Installation of vending machine energy savings controllers.
- Installation of ground water wells for cooling tower water supplies
- University wide summer operating hours
- Installation of adjacent building chilled water piping based on excess chiller capacity to reduce stand-alone chiller units
- Elevating steam lines above flood levels
- Installation of removable insulation blankets to reduce thermal losses
- Reduced steam pressure during summer season
- Close remote, underutilized parking lot during summer (turn off lighting)
- Campus-wide Utilities Conservation Committee. Includes Academics, Operations, Residence, Student Government, Local Utility
- Active management of gas vs. oil as boiler fuel and oil supply

(2006 Strategic Energy and Water Plan; Summary of Efficiency & Effectiveness Ideas compiled June 2006; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005)

Energy Use in Facilities The University incorporated the O&M energy and water conservation measures initiated in response to the few recommendations following the Building Surveys conducted as part of the O&M Conservation Program of the Governor's Utility Savings Initiative into routine maintenance procedures and operating practices. The University continues to address energy and water conservation measures in energy operating plans and construction standards. *(2006 Strategic Energy and Water Plan; 2005 Strategic Energy Plan)*

Retention ponds

Installation of two retention ponds at the North Recreation Complex. These ponds will supply the water for the irrigation system. In phase I of construction (anticipated completion date of March 2008), the irrigation system will water approximately 50 acres of turf, 358 trees, and over a thousand shrubs. The ponds were designed to supply water to the phase I as well as all future phases of the 130 acre site. The site uses existing ground water, a sub-surface storm water system, and surface run off to replenish the ponds. There are also wells installed that can be used to fill the ponds in times of drought. *(ECU 2007 Strategic Energy and Water Plan)*

Retrofitting Low Consumption Fixtures in Restrooms

Facilities Services - Utilities Services East Carolina University plans to replace existing fixtures (66) in restrooms with low consumption models in 3 buildings on Main Campus which is expected to result in significant water savings (over 4,685,553 gallons annually) when completed. These low consumption models are being installed in any new construction. *(ECU 2007 Strategic Energy and Water Plan)*

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

Retrofitting Automatic Flush Units in Restrooms

Facilities Services - Utilities Services East Carolina University plans to replace existing fixtures (52) in restrooms with automatic flush units in 3 buildings on Main Campus which is expected to result in significant reduction in maintenance man-hours (about 1/3 the time to rebuild than current auto flush devices), fewer breakdowns, and improved customer satisfaction. These units are being installed in any new construction. (ECU 2007 Strategic Energy and Water Plan)

Domestic Hot Water Heaters

Facilities Services - Utilities Services East Carolina University plans to complete replacement of existing water heaters (10) with more energy efficient models in 10 buildings on Main Campus which is expected to result in significant energy savings (590,625 KWH annually). 8 hot water heaters have already been replaced. (ECU 2007 Strategic Energy and Water Plan)

Water Conservation Measures in Boiler Operations

Main Campus: Boiler surface blow-off is on an automatic system using conductivity in lieu of continuous blow-off. Main Campus and Health Sciences Campus: All main header steam traps are on an annual replacement schedule to prevent excessive steam use. All secondary systems are on a 5-year replacement schedule and are tested periodically to verify proper operation. Steam Plant bearing water is recovered as make-up water for the Steam Plant's boilers. (2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005)

Innovative Water Treatment System

Facilities Services - Utilities Services East Carolina University Facilities Services has installed innovative water treatment system like no other campus in North Carolina resulting in large monetary and energy savings for the University. System utilizes electrical current through a brine solution to manufacture oxidizing solution on-site. It eliminates the need for biocide purchases and is more effective than conventional biocides. This saves on purchasing time, purchasing contracts, man hours spent moving liquid biocides, energy spent on moving liquid or solid biocide, eye wash and shower requirements that cost tens of thousands of dollars per chemical treatment site. Environmental considerations are the savings to the environment due to 90% reduction in trucking required for material to make the system operational. Innovative water treatment system only cost \$182.00 per year (cost of salt) to operate versus over \$20,000 for a standard system. System only requires salt to create the brine solution. System saved \$20,000 in chemical cost, 400 man hours, environmental resources, and created safer working conditions; based on these savings, the estimated pay back of the system is 1 1/2 to 2 years. (2006 Strategic Energy and Water Plan; 2006 North Carolina Leadership in Sustainable Energy Award nomination)

Installation of water wells

East Carolina University Facilities Services has been unsuccessful in negotiating sewer credit with Greenville Utility Commission (GUC) for evaporating potable water in the University's cooling towers. Realizing that potable water from GUC is not the only viable option, the University investigated water well capacity necessary to support the University's main chiller plants on both campuses.

As such, the University has installed three water wells on each campus, one in each of the major aquifers in this area. These wells are controlled with variable speed drives to maintain a set pressure in the distribution system. They are connected to our building automation system to provide flow and pressure information and to sequence the operation to avoid withdrawing more than 100,000 gallons of water from either the Black Creek or Cape Fear aquifers. This would trigger permitting requiring a 75 % phased reduction of allowable extraction (25% in 2008, 25% in 2013, and 25% in 2018). Water chemistry variations in the various aquifers were evaluated as a design criteria to minimize system problems. The water from this system is used for cooling tower make-up, boiler make-up, and irrigation as well as for cooling and scrubbing in the University's medical waste incinerator system. As these wells are not designed permitted to be used for potable water, the system is completely separated from the GUC's supply of potable water. Utilization of this water helps reduce peak demand loads on the GUC system, and current and projected use of this resource is seasonal, which facilitates recovery of the ground water system during low use periods. The conjunctive use of surface and

EAST CAROLINA UNIVERSITY – 2008 Sustainability Report

ground water promotes sustainability of the University's vital water resources. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Water Conservation Measures in Main Campus HVAC Operations

During 2003-2004, Facilities Services implemented the campus-wide aqua-track system that allows monitoring water usage, chemical doses, bleed rates, and make-up water at all cooling towers in real time 24 hours a day. All information is charted and reviewed by HVAC personnel at the end of each week to insure that water is being used appropriately. When inappropriate uses of water are reported, a technician is sent to inspect the system. As a result of the real time monitoring, two stuck valves were discovered within days of the problem occurring. A stuck valve would allow water to over flow out of the tower into a drain. A problem such as a stuck valve could result in a cooling tower using in excess of one million gallons of water that was not required in just one month. If the HVAC shop had not been monitoring water usage, the technician would not have found the problems until the water bill had arrived and revealed the large usage. According to the ECU Supervisor, Facilities Services – Utilities Services HVAC, ECU is the only campus in the UNC system that monitors water usage in real time. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Computerized irrigation system reduces water consumption

Grounds Services central control irrigation system, Maxicom, provides irrigation in the most water conscious manner. By using a weather station, Maxicom determines how much water is lost daily and only puts back that much water through irrigation. This system also detects leaks, maximizes run times, and compresses the amount of time it takes to irrigate, making shorter water windows. This system is currently used in various areas surrounding properties on Charles Boulevard including Allied Health complex and Carol Belk building, Blount intramural fields, Grounds Services Complex, ECU Athletic complex, 14th Street properties including Facilities Services warehouse and the Moving Services/Recycling building, and College Hill properties including Jones Residence Hall and Galley dining facility and Todd Dining Hall. Additional areas are being considered for future expansion of the system. Grounds Services utilizes the "Cycle+Soak" option on the irrigation controllers allowing the water to infiltrate at the soil's own pace. In addition, "Rain Cans" are used to stop irrigation systems from running when it is raining on all controllers that are equipped for the device, approximately 75% of the irrigation controllers. FSSP 34-0007, Facilities Services Irrigation Schedule, details Grounds Services irrigation schedule. Grounds Services conducts 95% of required watering in the early morning hours and minimizes the number of days vegetation is irrigated. Grounds Services does not use public water for irrigation on the Health Sciences Campus. The water used for ornamentals and turf irrigation is taken from Laupus Lake, a storm water retention pond located on the Health Sciences Campus grounds. This pond is recharged with each rainfall and does not impact surface or ground water recharge. The other source of water at the Health Science Campus is wells installed in 2006. This source irrigates the landscape around the new Allied Health Building. This water source is shared with the Utilities Department which in turn uses the water in Cooling Towers to feed the building. This restricts irrigation to only run in the early morning hours when the demand is not present for cooling. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Replacement of hot water circulation system with a point of use system

Hot water was supplied to 13 buildings near the center of campus through an underground distribution system from a steam converter at the Steam Distribution Center in the basement of Bate. This system was abandoned and replaced by energy efficient building water heaters. (*2006 Strategic Energy and Water Plan; Summary of Efforts to Reduce Utility Consumption and Costs compiled May 2005*)

Central Control Irrigation System

Facilities Services - Grounds Services purchased a \$21,892 upgrade to the central control irrigation system, Maxicom, to expand the system. Maxicom provides irrigation in the most water conscious manner. By using a weather station, Maxicom determines how much water is lost daily and only puts back that much water through irrigation. This system also detects leaks, maximizes run times, and compresses the amount of time it takes to irrigate, making shorter water windows. (*2006 Strategic Energy and Water Plan; FY03-04 Mgmt Flex*)