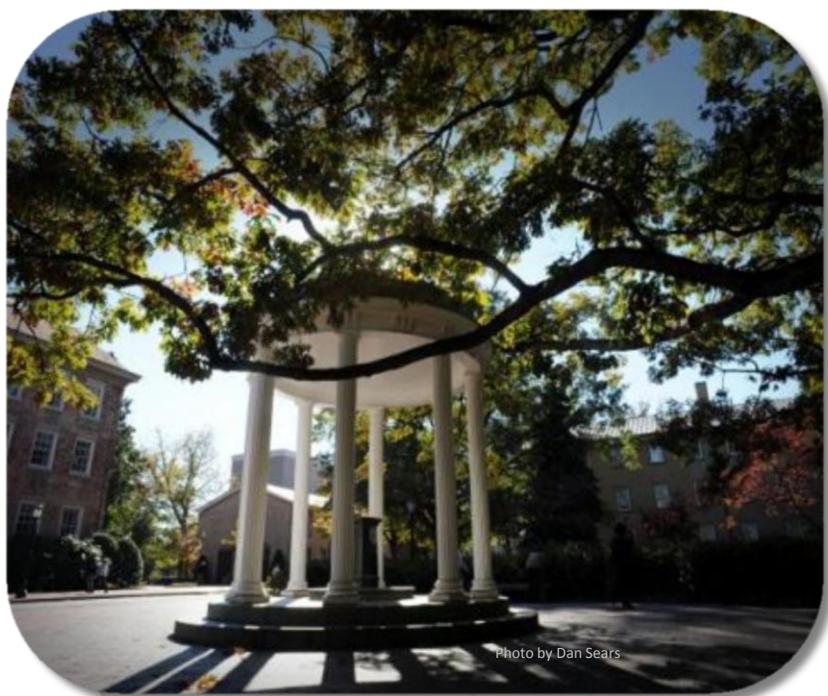


UNIVERSITY of NORTH CAROLINA at CHAPEL HILL



43%
31%



2012

STRATEGIC ENERGY AND WATER PLAN



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EXECUTIVE SUMMARY

In this reporting period, the university exceeded the mandates set by the Utility Savings Initiative (USI) as outlined in NC Session Law 2007-546 for both energy and water conservation. Energy consumption dropped again this year for an overall reduction of 31% from the base year, which exceeds the target of 30% by FY2014-15. Potable water consumption dropped 43% from the base year, exceeding the target of 20% by FY2014-15. If the energy and water usage per square foot remain unchanged since the base year then the university would have realized more than \$129M in additional energy costs and \$13.8M in additional potable water costs.

Year	Energy Cost Avoided	Energy Cost / GSF	Cost / mmBtu	Btu / GSF	Btu / GSF % Change
2002-03		\$3.53	\$18.22	193,502	
2003-04	\$2,574,607	\$3.45	\$18.83	183,400	-5%
2004-05	\$2,448,097	\$3.56	\$19.35	184,214	-5%
2005-06	\$8,516,845	\$3.62	\$21.51	168,254	-13%
2006-07	\$6,529,460	\$4.00	\$22.76	175,543	-9%
2007-08	\$13,264,000	\$4.16	\$25.52	163,095	-16%
2008-09	\$11,388,566	\$4.72	\$27.77	170,034	-12%
2009-10	\$19,652,680	\$4.84	\$30.79	157,349	-19%
2010-11	\$26,788,903	\$4.78	\$32.43	147,336	-24%
2011-12	\$38,152,581	\$4.75	\$35.37	134,144	-31%

Table 1: Energy Consumption Summary; Energy Services Buildings, Leased Buildings, and UNC Hospital Excluded

Five Key Factors

Five key factors affect the significant increase in energy savings from last year's 17% reduction. These include:

- modification of reporting methodology to include improvements from the university utility provider,
- warmer weather,
- continuation of our internal Energy Conservation Measures (ECM) program,

- difference in steam conversion rates in the portfolio manager model, and
- completion of over \$1M in lighting upgrade and HVAC projects.

In spite of substantial energy reductions thus far, opportunities for even greater savings are abundant. These are being pursued with heavy emphasis on efficiency in new construction, implementing a large Energy Savings Performance Contract (ESPC), and expansion of the ECM program.

ENERGY DEMAND

Detailed Analysis of Results

This year's report outlines a significant increase in reported energy savings. This 14% increase, from 17% in FY2010-2011 to 31% in FY 2011-2012, is due to the influence of five factors. A detailed analysis of the five contributing factors reveals the source of the substantial decrease in energy consumption.

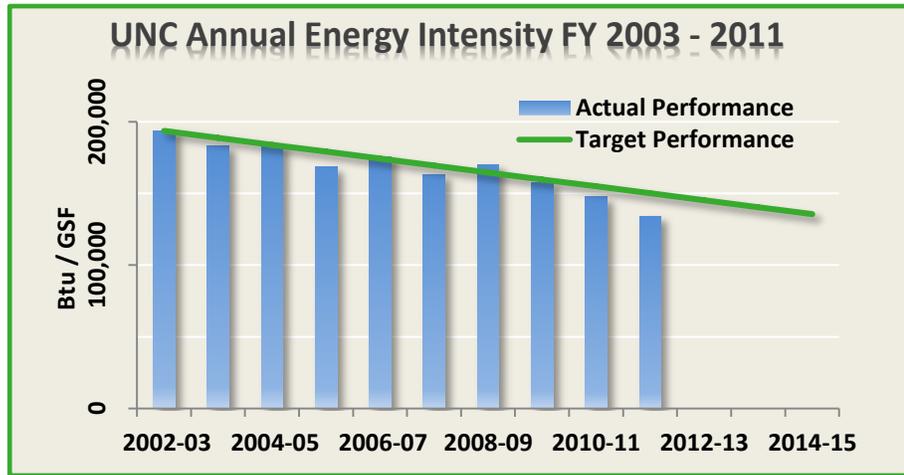


Table 2: Comparison of Current Energy Intensity to Target Consumption

- **Revised reporting to include efficiency gains from Energy Services**

- **Effect on overall savings = 6%**

- The university invested substantial capital since FY2002-03 to upgrade the steam distribution system which provides steam for heating, humidification, domestic hot water and process steam loads. These upgrades replaced piping and insulation for much of the piping network resulting in a reduction of thermal loss from the pipes from 14% to 9%, a distribution efficiency improvement of 5%.

- The university also installed a 5M gallon thermal storage system for the chilled water distribution system, upgraded chilled water plants and improved operational procedures since FY2002-03. This resulted in an improvement from requiring 1 kW of electricity to produce one ton of chilled water (kW / ton) to 0.66 kW/ton, a generation efficiency improvement of 33%.

*Don't blow it - good planets are hard to find.
-Quoted in Time*

- **Weather related effects**

- **Effect on overall savings = 2%-7%**

- An overall warmer year decreased the heating energy required and increased the cooling energy required. A simple analysis of heating degree days and cooling degree days reveals an overall decrease of 24% in heating required and an increase of 10% of cooling required. The overall effect resulted in a 13% reduction in energy required due to warmer weather. This analysis omits consideration of the significant impacts of humidity on energy consumption, however, so accurately quantifying the impacts of weather is beyond the scope of this report.

- **Energy Conservation Measure (ECM) Program**

- **Effect on overall savings = 2%-3%**

- The ECM Program, detailed in previous reports, is an in-house retro-commissioning effort utilizing in house labor, outside contractor support and minimal funding to achieve low cost energy savings. Over 10M square feet of university building space is now in the program and realizes over 26% savings since program inception. Efforts this year include improved control sequences for managing the supply air temperature of the HVAC systems, increased and improved occupancy scheduling and enlistment of more buildings in the program.

- **Revised conversion rates for steam energy**

- **Effect on overall savings = 2%**

- To improve the process of reporting energy consumption for all state agencies, a revised model is being used that normalizes energy units for steam differently than in previous years. The revised calculation uses 1194 British Thermal Units (Btu) of energy in each pound of steam consumed. The value previously used was 1000 Btu / lb of steam. This modification in reporting results in a reported increase of 2% overall savings and doesn't reflect action taken by the university for conservation.

- **Completion of lighting upgrade and HVAC improvement projects**

- **Effect on overall savings = 1.5%**

- Over \$800K of lighting upgrades and HVAC improvements resulted from an American Recovery and Reinvestment Act (ARRA) grant administered by the State Energy Office. These projects were completed mid-year so only a partial year of benefits is realized for this report.

- Over \$350K of university funded lighting upgrades completed in the previous fiscal year also contributed to the reductions reported here.

- The lighting upgrades focused on elimination of old, inefficient T12 lamps and magnetic ballasts with modern, efficient T8 lamps and electronic ballasts.

- The HVAC projects focused on reduction of excessive airflow from the heating and cooling systems, installation of variable frequency drives to reduce electrical consumption and overall system improvements.

Outlook for Building Level Conservation Efforts

Though the university has achieved the legislatively mandated target of 30% reduction, substantial opportunities remain for further reductions.

Expansion of the ECM Program entails including more facilities in the program as well as implementation of more effective processes that could net additional program savings of 5-15%. The university plans to implement a more expansive occupancy scheduling program to include weekends and university holidays. Other opportunities include expanded surveying for faulty steam traps and leaks in compressed air systems. The university will also pilot new technology to inform future projects, including occupancy sensors to control HVAC systems and thermal imaging to identify building envelope issues.

The university is currently engaged in the Investment Grade Audit (IGA) phase of an Energy Savings Performance Contract (ESPC). This will continue through FY2012-13 with construction beginning in the first half of FY2013-14. This project involves over 2M square feet of facilities. Though the scope of work and subsequent savings is yet to be finalized, additional annual cost reductions of \$1M - \$3M could result from this project.

Internally funded projects for FY2012-13 include further lighting upgrades and building automation system upgrades. Lighting opportunities include further elimination of T12 lamps/ballasts in select portions of buildings and replacement of dimmable incandescent lighting systems for classrooms.

Weather related impacts to energy consumption for the upcoming year will serve to reduce the reported savings if a more typical weather year occurs. Additionally, over 646,000 square feet of new buildings will affect the results with a majority of buildings added being high intensity laboratories.

ENERGY GENERATION AND DISTRIBUTION

Advancements and Efforts to Increase Efficiency

Cogeneration Facility

Efficiency improvements at the Cogeneration Facility (Cogen) in FY2011-12 included adjustments in coal mill air flows and particle size distribution, resulting in increased boiler efficiency. This will be completed in all mills in FY2012-13. Installation of new main steam pipes extending to campus was completed. The new, larger diameter pipes and new insulation systems increase the distribution efficiency.

Cogen's alternative energy projects include a landfill gas to energy project and a project looking at biomass fueling options for the boilers at the main Cogeneration Facility. The landfill gas project began

flaring methane at the landfill in FY2011-12. The pipe and engine portions of the project are currently in progress and will bring the Electricity Generating Engine on line in FY2012-13. This engine will be on the Carolina North campus, and will provide heat to the first buildings at the new campus, as well as generate electricity.

Cogen continues to plan test burns for woody biomass. A test burn of dried chip product is planned in FY2012-13 and completion of a test burn for torrefied biomass in FY2012-13 is anticipated as well. The study of alternatives continues to suggest that woody biomass is still the best option for helping to reduce the university's carbon footprint.

Chilled Water Department

In FY2010-11, operations staff and programmers worked to implement the use of the two new variable speed chillers. The chillers were added to the system during the renovation of the North Chiller Plant which was completed during FY2009-10. The addition of the two chillers also allows for the use of the original variable speed chiller, providing a total of 5,750 tons of chillers with drives. The chillers use 50% less power during the colder months. Also in FY2010-11, operations staff and

Electric Distribution Systems

In 2012, the university replaced thirty three 150 watt, forty two 250 watt, and thirty five 400 watt high pressure sodium area lights with LEDs. This results in a savings of \$2,196 per year in purchased electricity. The HPS lamps require replacement every five years, at an average annual cost of \$968 (materials and labor). Combined with the savings in electricity, this is an average annual savings of \$3,164. The installed cost of the LEDs was \$47,713. This provides a simple payback of 15 years. The LEDs

have a life expectancy greater than 20 years.

The proposed projects for this year total about the same number and wattage of lamps as that in FY2011-12. We do not have prices for LEDs yet, but they have been steadily declining. At the same time, it is expected that electricity costs will continue rising, so the savings should be larger going forward.

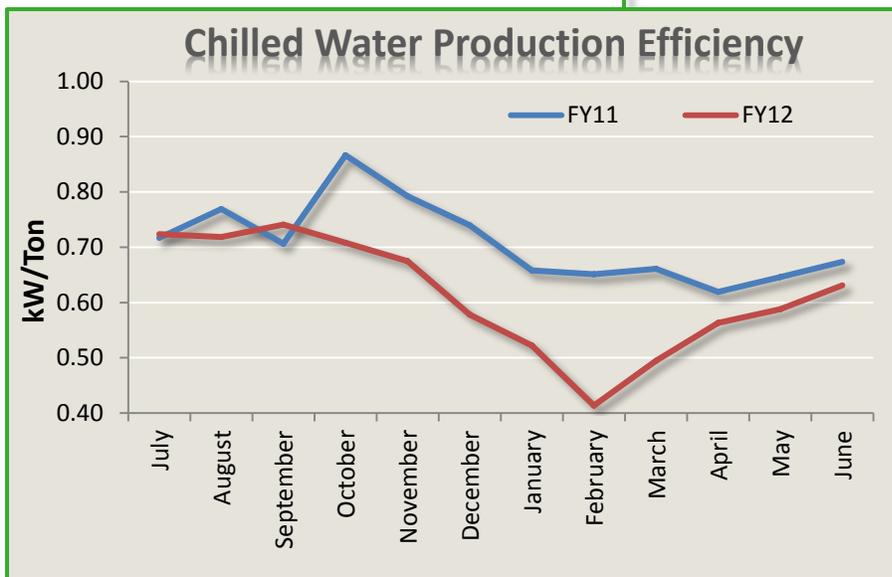


Table 3: Comparison of Chilled Water Production Efficiency

programmers modified programming to implement automation of condenser water reset for all chiller plants. Previously, operators maintained the temperature of condenser water manually.

As shown in the chart above, annual performance has decreased due to these operational changes. Further changes will be made with a goal of 0.6 kW/ton annual efficiency.

Photo by D.L. Anderson

EDUCATION AND OUTREACH

Education

Energy Related Curriculum

Approximately 40 courses are available to students interested in learning about energy, the environment, community design, and climate change. These include small First Year Seminars in environmental studies, geography, geology, marine sciences, physics, and planning. Energy is a recurrent theme in the Environmental Studies and Environmental Sciences majors and the Sustainability minor. Law students can learn about carbon trading and interagency environmental cooperation. Business students can learn about financing renewable energy and megaprojects.

The Sustainable Triangle Field Site managed by UNC's Institute for the Environment has completed its second year. Many of the students who participated in the spring 2012 semester of sustainability courses, capstones, and internships worked on energy related topics. Environmental capstone projects completed last year included an effort to "green" public housing in Chapel Hill by making it more energy efficient; an assessment of single-family rental properties and their eligibility for the town's energy audit and subsidized retrofit program; and program assistance for the Triangle Green Business Challenge launched by the Triangle Council of Governments and participating businesses.

Energy Research

Carolina faculty have a strong interest in energy finance, policy, science, and technology. Faculty in chemistry and physics are working to develop the next generation of photovoltaic cells using advanced materials and structures. Promising research on organic, bio-inspired, and liquid-based photovoltaics is being tested in the Chapel Hill Analytic and Nanofabrication Laboratory (CHANL). This unique facility enables researchers from throughout the region to test their concepts in a high tech nanofabrication instrumentation lab that is part of UNC's new \$205 million science complex. Cutting edge research and facilities helped land a \$13.6 million National Science Foundation grant to study soft materials such as foams, gels, polymers, and emulsions at four Triangle universities.

Integration

For the first time, UNC has a two-year campus theme: Water in Our World. Faculty from across the university are incorporating water themes into their teaching, writing, and assigned projects. A tour of Carolina's water infrastructure – past, present, and future—is under development. The tour will be offered first to participants at the international Water and Health conference in fall 2012.

Jamie Bartram, director of UNC's new Water Institute, and former WHO official, will address the University Day convocation on October 12.

Outreach

Conserving Carolina Recognition Program

The Energy Management energy conservation recognition program was established to recognize faculty, staff, and students for their energy conservation efforts on campus. The recognition program rewards measurable energy savings efforts for individuals or teams with money, vacation leave and an engraved brick installed on campus.

Energy Use Dashboard

The online Energy Dashboard developed by UNC's Energy Services department now includes data on more than 200 buildings. The display provides the ability to monitor interval, monthly and annual utility consumption for steam, electricity, chilled water, domestic water, and reclaimed water. Access to this data will be used for the Conserving Carolina Energy Recognition Award Program, to monitor residence halls for building competitions, and for monitoring and analyzing data.

Making the data visible to the Carolina community is the first step in occupant behavioral modification. Positive action is enabled through education and information. Real time electricity consumption data is available for a smaller subset of buildings. Current and historical data reveals trends, weather impacts, and the result of behavioral and operational changes.

In the new Dental Sciences building, large touch screen displays profile the high performance building features incorporated in the project and energy use.

Other Education and Outreach Efforts

- **X-treme Energy Teams.** A packet of energy conservation information called X-treme Energy Team Packet was created by student interns and is distributed to building managers for their use in educating and reminding occupants of their contribution to conservation.
- **EcoReps.** Student representatives are trained on energy and water conservation, recycling efforts, and sustainability initiatives at the university. The representatives, called EcoReps, will conduct training and campus tours for their peers.
- **Carolina Green Pledge.** UNC offers members of the campus community an opportunity to make an online pledge to reduce their energy, water, and waste footprint. The chancellor supported the effort in a video informing campus that energy conservation is a core value of the UNC community.

Employees from Energy Management staffed event booths throughout the year on campus and off. Some of the campus events were Sustainability Day, Employee Appreciation Day, Tarheel Bike Launch Event, and new students' orientation.



Student Involvement

RESPC

RESPC is a student-created and led committee of student government that was formed as a result of a 2003 campaign to get renewable energy on campus. Via referendum that same year, 74.5% of voting students agreed to tax themselves \$4 per student per semester—funds that amount to approximately \$200,000 a year – to fund renewable energy projects. The most recent fee renewal in 2009 resulted in an expanded mandate that includes energy efficiency, energy education, and maintenance.

FY2011-12 resulted in a majority of energy efficiency, energy education, and maintenance projects. Funding included the second

round of Developing Energy Leaders Through Action (DELTA) internships with matched funding from an ARRA grant that expired in May of 2012. A project to replace lights in Lenoir dining hall with LEDs and old appliances with Energy Star certified appliances allowed RESPC to do its first project using the Revolving Fund Agreement (RFA). The RFA grants RESPC the ability to replenish its funds by requesting that receipt supported facilities pay back 90% of the energy savings achieved by the projects. For the Lenoir project however, a payback of 50% was agreed to as a pilot program. The largest project in FY2011-12 and the second largest in RESPC history was the Student Union air louver replacement costing over \$200,000. Since this was an RFA project, RESPC expects to see a \$125,500 return to the fund by the year 2017. To continue with the theme of lighting replacements, RESPC funded several LED

replacements that included parking garages, outdoor lighting, classroom buildings, and even Ackland Art Museum. Another lighting project in the Music Department's Hill Hall is intended to not only save energy, but also to allay the safety concerns associated with bulb replacement in a high ceiling concert hall. The fiscal year ended with sponsorship of a bike share program for freshman dorms.

In total, RESPC spent approximately \$450,000 in FY2011-12 on both traditional projects and RFA projects. This coming year, RESPC expects to fund a

Internships

The Energy Management Department took part in the Student Energy Internship and Fellowship Program again this year. The (DELTA) program allowed Energy Management to host two undergraduate students from UNC. NC State hosted three engineering undergraduate students through their Student Energy Internship and Fellowship program and allowed them to work with Energy Management. The students worked approximately 1,900 hours entering data into the EPA Energy Star Portfolio Manager database, Labs21 database and building automation graphic design. They also assisted in data analysis and various energy projects.

renewable energy project in order to support meeting the mandate along with several other efficiency projects. It has never been more important to support students than now in the effort to lower the cost of attending UNC-Chapel Hill. The committee consists of seven student committee members (five undergraduates, two graduates), an open student group, and ex-officio members who provide advisory and oversight assistance.

Kenan-Flagler Energy Club

The Kenan-Flagler Energy Club provides MBA students with the skills, knowledge, and connections necessary to compete for top energy industry jobs and internships and enhance their value in the workplace. The Energy Club hosts a range of events including the Energy 101 series and career treks to industry hubs and offers opportunities to participate in global competitions.

WATER RESOURCES MANAGEMENT

Summary

UNC's water resources management includes the use of non-potable water in addition to potable water to meet the water needs of UNC.

The table below, Ten Year Record of Progress in Potable Water Usage Reduction, under "All Campus Water Usage" includes campus water consumption and the water consumption for Energy Services. Energy Services' water consumption is for the production of chilled water and cogeneration of steam and electricity serving the campus community. This table reflects the potable water usage reduction for the campus.



Fiscal Year	Water & Sewer Cost Avoided	Water & Sewer Cost / mGal	Water & Sewer Cost / mGal % Change	Water Gal / GSF	Water Gal / GSF % Change
2002-03		\$5.94		49.48	
2003-04	\$67,374	\$6.50	9%	48.71	-2%
2004-05	\$290,796	\$7.08	19%	46.46	-6%
2005-06	\$650,646	\$6.88	16%	43.45	-12%
2006-07	\$891,213	\$7.41	25%	41.95	-15%
2007-08	\$1,386,674	\$8.15	37%	39.52	-20%
2008-09	\$2,062,209	\$9.20	55%	36.13	-27%
2009-10	\$2,278,549	\$11.09	87%	32.19	-35%
2010-11	\$3,467,671	\$12.43	109%	29.82	-40%
2011-12	\$4,171,910	\$12.85	116%	28.10	-43%

Table 4: Potable Water Usage Summary

*"When the well is dry, we know the worth of water."
Benjamin Franklin*

Potable Water – Summary of Activities

Supply side reductions occur by encouragement and change-over of potable water use to non-potable water use where available and feasible. See non-potable water summary and explanation for more information.

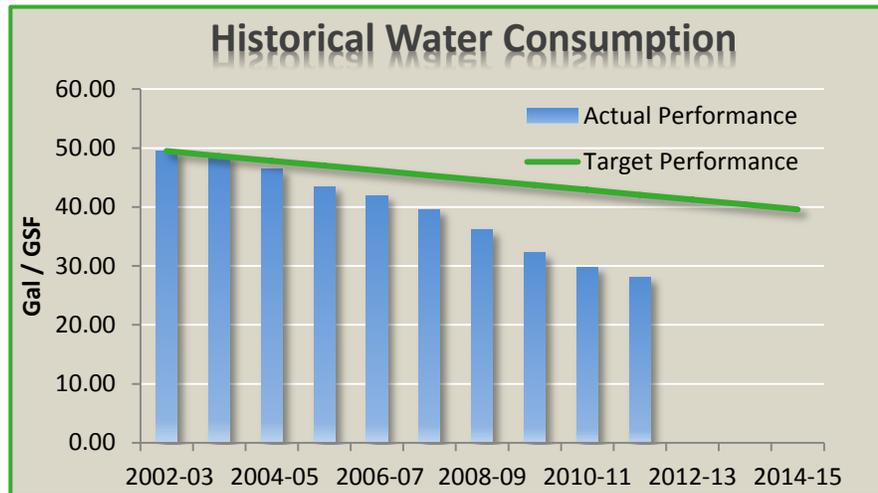


Table 5: Comparison of Water Consumption Intensity to Target Consumption

Non Potable Water – Summary of Activities

UNC-Chapel Hill operates an integrated non-potable water system that supplies non-drinking water for approved uses and thereby reduces the use of potable water. Sources of non-potable water used at UNC-Chapel Hill are reclaimed water, stormwater/rainwater, and condensate. In FY2011-12, the university used 196,364,000 gallons of non-potable water for cooling tower make-up water, toilet flushing, and irrigation. Additionally in FY2011-12, five sites were irrigated with rainwater stored in cisterns that were not metered.

In FY2011-12, non-potable use began at the following sites:

- NC Botanical Garden began using reclaimed water for toilet flushing in August 2011. In 11 months of use, 63,000 gallons of reclaimed water were used instead of potable water. This use was directly metered by OWASA. The cost was included in the previously completed

Reclaimed Water Phase II project funded by Energy Services, and the NC Botanical Garden Visitor Center Capital Project.

- NC Botanical Garden also began using harvested rainwater for landscape irrigation. This use is not currently metered. The cost was included in the capital project.
- Anderson Stadium and Williams Field, the UNC-CH Softball Complex, began using reclaimed water for athletic field irrigation in May 2012. In two months of use, 85,000 gallons of reclaimed water were used instead of potable water. This was directly metered by OWASA. The cost was included in the previously completed Reclaimed Water Phase II project.
- Boshamer Stadium, the Football Practice Field and Fetzer Field received reclaimed water service in June 2012 as a back-up to existing rainwater harvesting systems. No meter data is available for FY2011-12. The cost was included in the previously completed Reclaimed Water Phase II project.

In FY2012-13, non-potable water use is expected to begin at the following sites:

- The new Genome Sciences Building began beneficial occupancy on June 28, 2012. The building uses non-potable water for toilet flushing. The Genome Sciences Building landscaping was installed during the summer of 2012, with non-potable water meeting the entire irrigation demand. These uses are metered, so measured water savings will be reportable next year. The cost was included in the capital project budget.

- Landscape irrigation at the Tomkins Chilled Water Plant will be switched to reclaimed water from potable water. The cost is expected to be approximately \$5,000 and will be funded by Energy Services.
- The new Dental Sciences building includes a cistern for landscape irrigation. The irrigation system was installed during the summer of 2012. This use is not currently metered.

The future Biomedical Imaging Research Building originally slated for completion in FY2012-2013 is now anticipated for completion in FY2013-14. It will include a cistern for irrigation and toilet flushing.

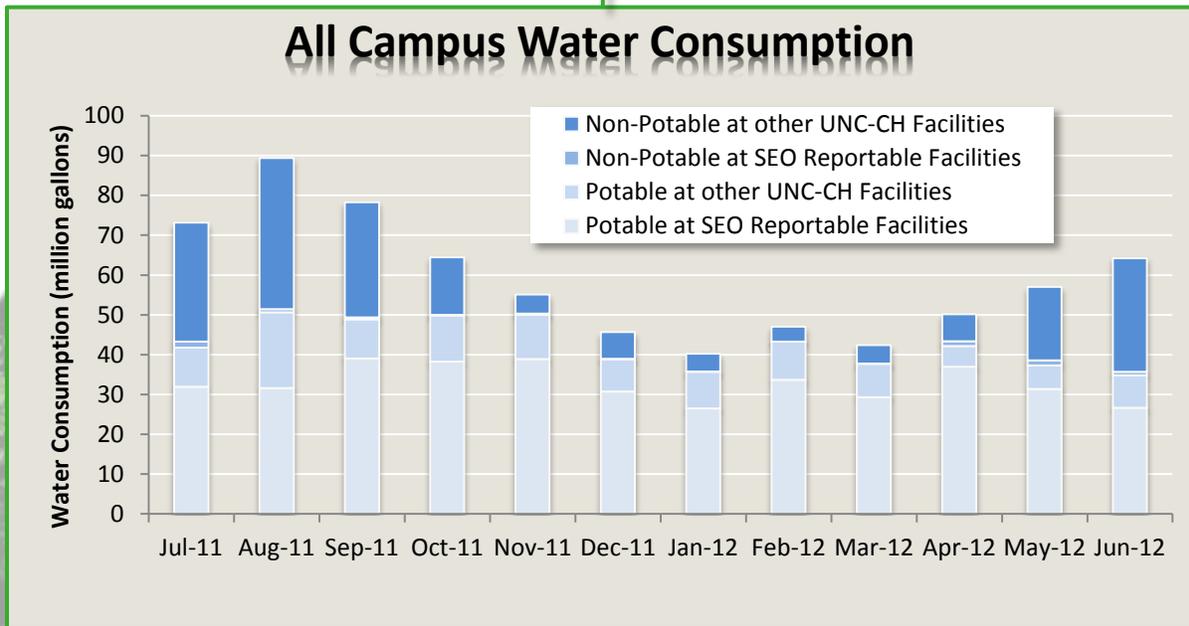


Table 6: Sources of Monthly Water Consumption and their Contribution



APPENDIX

State Energy Office Campus Consumption Spreadsheet FY 2011-12

Can be found attached to this document.

Projects at Carolina

Project	Building	Cost	Status
FY2011-12 Projects			
Energy Conservation Measure Program	All Campus	\$ 75,000	Complete
Student Internship	All Campus	\$ 28,800	Complete
Update Bas Standards	All Campus	\$ 5,000	Complete
Replace Chiller For Building With Air Cooled Unit	Aycock Family Medicine	TBD	Complete
Exterior Envelope Repairs	Brinkhous-Bullitt	\$ 250,000	Complete
Fire Alarm & HVAC Upgrades	Brinkhous-Bullitt	\$ 9,144,776	Complete
Replace Terminal Boxes	Brinkhous-Bullitt	TBD	Complete
Install Chilled Water Valves	Caudill, W Lowry & Susan S Labs	TBD	Complete
Commissioning	Frank Porter Graham Student Union	\$ 23,500	Complete
Chiller Plant Upgrade	Friday Center	\$ 2,770,000	Complete
Perform Database Support Services For Energy Management	Horney Building, Giles F.	\$ 18,187	Complete
Steam Coil Modification	Jackson Hall	TBD	Complete
Install LED Lamps In Chandeliers	Knapp-Sanders Bldg	\$ 2,800	Complete
Design And Replacement Of Airhandlers 8 & 9 On Roof.	Lenoir (133)	\$ 306,250	Awaiting Funding
Energy Conservation Study -Lab Ventilation Plan	Lineberger Cancer Research Center	\$ 99,000	Complete
Commissioning	Loudermilk (Kenan Stadium Addition)	\$ 85,400	Complete
Energy Conservation Study -Lab Ventilation Plan	MacNider Hall	\$ 13,000	Complete
Water Heater Replacement	Mary Ellen Jones	\$ 180,000	Complete
Circular Stairs Lighting	McColl Bldg	\$ 27,800	Complete
Energy Conservation Study -Lab Ventilation Plan	McGavran-Greenberg Hall	TBD	Complete
Replace Preheat Valves. AHU2	Medical Biomolecular Research Bldg	\$ 5,000	Complete
Dehumidification Upgrades	NC Botanical Garden Visitor Info Center	TBD	Complete
Correct Chill Water Connection On AHU 3	Taylor Hall	TBD	Complete
Install Chill Water Valves And Process Heat Loop Controls	Thurston-Bowles Center	\$ 15,000	Complete
Energy Efficiency Improvement, Heat Exchangers	Tomkins Chiller Plant	\$ 600,000	Complete

Commissioning	Woollen Gym Renovations	\$ 9,500	Complete
Steam Piping Repairs	Woollen Gym	TBD	Complete
Controls Upgrade	Kerr, Banks Dayton Hall (357)	\$ 450,000	Design Complete
HVAC & Window Replacement	Upper Quad	\$ 650,000	Design Complete
Commissioning	Biomedical Research Imaging Building (IRB)	\$ 871,189	In Construction
Facility Steam Tunnel Replacement	Co-Generation	\$ 48,000,000	In Construction
Replace Chillers At East Chiller Plant	East Chiller Plant	\$ 650,000	In Design
Commissioning	Genome Sciences Building	\$ 644,570	In Construction
Commissioning	Koury Oral Health Science Building (Dental Sciences Building)	\$ 486,863	In Construction
Make Up AHU	MacNider (202)	\$ 343,400	In Construction
Alternative Energy Project	Carolina North	\$ 7,500,000	In Construction
LED Lighting & Electrical Upgrades	Dogwood Parking Deck	2800000	In Design
Energy Savings Performance Contract	23 Buildings	\$ 20,000,000	In Design
Commissioning	Carolina North - Collaborative Sciences Building	\$ 44,860	Programming

FY2012-13 Projects

Building Envelope Restoration -	212 Finley Golf Course Rd	\$20,000	Programming
Provide VFD On Chilled Water Pumps	Acc	\$18,180	Awaiting Funding
Provide VFD On Chilled Water Pumps	Ackland Art Museum	\$12,400	Awaiting Funding
Add Economizer Capability To AHU	Ackland Art Museum	\$50,000	Awaiting Funding
Preliminary Design To Identify Incandescent Replacement Projects For Campus	All Campus	\$15,000	Awaiting Funding
Replace Jace R2 Gateway Study	All Campus	\$30,000	Awaiting Funding
Hot Water Flushing	All Campus	\$50,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Berryhill Hall	\$18,180	Awaiting Funding
Install Two New Replacement Cw Valves	Berryhill Hall	\$25,000	Awaiting Funding
Replace AHU#2 (DLAM)	Berryhill Hall	\$500,000	Awaiting Funding
Bowman Gray Pool - Cracked In Several Locations And Is Losing Water.	Bowman Gray Pool	\$50,000	Awaiting Funding
Upgrade Pneumatic Controls On VFDs To DDC, 6th Flr Replace 12 Of 24 Pneumatic Boxes On 6th Flr	Brinkhous Bullitt	\$48,000	Awaiting Funding
Add AEGIS Grounding Accessories And Line Reactors To Previously Installed VFDs & Synchronized Drive	Brinkhous-Bullitt	\$12,000	Awaiting Funding
Add AEGIS Grounding Accessories And Line Reactors To Previously Installed VFDs & Synchronized Drive	Burnett Womack	\$12,000	Awaiting Funding
Upgrade Wall Packs To LED	Campus	\$25,000	Awaiting Funding
Replace Relief Air Fan And Exhaust Ductwork And AHU Relief Dampers In Basement ME Room. Replace OA And Relief Dampers In AHUs In Penthouse ME Rooms.	Carrington	\$23,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Carrington Hall	\$12,400	Awaiting Funding

Davie Hall Add AHU Freeze Protection.	Davie Hall	\$16,000	Awaiting Funding
Repair Backdraft Dampers At Davis Library.	Davis Library	\$6,500	Awaiting Funding
CO For VFD Upgrades	Davis Library	\$46,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Davis Library	\$18,180	Awaiting Funding
Lighting Controls To Stacks	Davis Library	\$40,000	Awaiting Funding
Replace Spray Coils	Davis Library	\$341,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Dey Hall	\$12,400	Awaiting Funding
Provide VFD On Chilled Water Pumps	Eddie Smith Field House	\$12,400	Awaiting Funding
Modify Hot Water Converter Condensate Drain To Eliminate Lifting Condensate	Fetzer Gym	\$9,000	Awaiting Funding
Replace (4) Environmental Chambers	Fordham Hall	\$360,000	Awaiting Funding
Replace Chilled Water Control Valves At Friday Center To Facilitate Improved Chilled Water Distribution For Complex. Current Valves Are Bypass Valves And Do Restrict Flow Properly.	Friday Center	\$15,000	Awaiting Funding
HVAC Upgrades For UB17	Genetic Medicine	\$9,000	Awaiting Funding
Replace AHU#1 And #2	Glaxo Building	\$550,000	Awaiting Funding
HVAC Controls Communication Backbone	Greenlaw	\$75,000	Awaiting Funding
Replace MH With LED	Ha Bookstore	\$4,571	Awaiting Funding
HVAC Controls Communication Backbone		\$75,000	Awaiting Funding
Replacement Basement AHU-3	Hill Hall	\$250,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Kenan Center	\$12,400	Awaiting Funding
Add VFDs For DLAM Exhaust	Kerr Hall	\$8,000	Awaiting Funding
Replace Pneumatic Tubing In Main Control Panels To Field Devices	Lineberger	\$6,000	Awaiting Funding
HVAC Controls Communication Backbone	Lineberger	\$75,000	Awaiting Funding
Replace Air Compressors	Lineberger	\$100,000	Awaiting Funding
Replace Worn Out Terminal Boxes	Manning Hall	\$6,500	Awaiting Funding
Replace AHU#1	Mary Ellen Jones	\$500,000	Awaiting Funding
Install One New Replacement Cw Valves	Mary Ellen Jones	\$15,000	Awaiting Funding
Replace Air Compressors	Mary Ellen Jones	\$100,000	Awaiting Funding
AHU-1 Replacement	Mary Ellen Jones	\$250,000	Awaiting Funding
Add AEGIS Grounding Accessories, Synchronized Drive, And Line Reactors To Previously Installed VFDs	MBRB	\$35,000	Awaiting Funding
Upgrade Steam Piping Preheat Coils	MBRB	\$75,000	Awaiting Funding
Upgrade Pneumatic To Digital Controls For Animal Quarters	MBRB	\$100,000	Awaiting Funding
Replace AHU 8	McGavran Greenburg	\$300,000	Awaiting Funding
Upgrade Pneumatic To Digital Controls For Animal Quarters	McGavran Greenberg	\$471,000	Awaiting Funding
Provide VFD On Chilled Water Pumps	Mitchell Hall	\$15,200	Awaiting Funding
Replace DI Piping System	Morehead Chemistry	\$117,600	Awaiting Funding
Provide VFD On Chilled Water Pumps	Morehead Planetarium	\$15,200	Awaiting Funding
Replace Failed Steam Traps	Neurosciences	\$4,600	Awaiting Funding
Replace MH With LED	Neurosciences	\$13,110	Awaiting Funding
Provide VFD On Chilled Water Pumps	Paul Green Theatre	\$12,400	Awaiting Funding

Provide VFD On Chilled Water Pumps	Phillips Hall	\$30,580	Awaiting Funding
Window Replacement	Sitterson Hall	\$156,000	Awaiting Funding
Replace MH With LED	Tarrson Hall	\$9,833	Awaiting Funding
Replace Domestic Hot Water Heater	Tarrson Hall	\$27,000	Awaiting Funding
Add VFDs To Hot Water System	Tate Turner Kuralt	\$7,500	Awaiting Funding
Provide VFD On Chilled Water Pumps	Tate Turner Kuralt	\$12,400	Awaiting Funding
HVAC Controls Communication Backbone	Tate Turner Kuralt	\$30,000	Awaiting Funding
DDC Building Automation System	Tate Turner Kuralt	\$515,000	Awaiting Funding
Upgrade Pneumatic To Digital Controls For Animal Quarters	Taylor Hall	\$418,000	Awaiting Funding
Replace Dezurik 3-Way Valve On HW Loop	Taylor Student Health	\$5,000	Awaiting Funding
Finish Control Work On Exhaust Fan Status (Aprox 18 Remain - Wire And Program)	Thurston Bowles	\$3,000	Awaiting Funding
Install Dedicated OA Units	Wilson Hall	\$800,000	Awaiting Funding
Controls Upgrade	Kerr, Banks Dayton Hall (357)	\$ 450,000	Awaiting Funding
Commissioning	Koury Oral Health Science Building (Dental Sciences Building)	\$ 486,863	Awaiting Funding
Make Up AHU	MacNider (202)	\$ 343,400	Awaiting Funding
HVAC & Window Replacement	Upper Quad	\$ 650,000	Awaiting Funding

ENERGY MANDATE

I have read the strategic Energy and Water Plan for my Organization. The plan, as presented, supports the reductions required in Session Law 546.

Implemented this 8th day of October, 2012



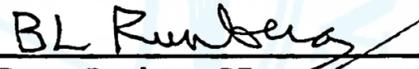
Chris Martin, PE
Director of Energy Management



Ray DuBose, PE
Director of Energy Services



Anna Wu, FAIA
Assistant Vice Chancellor &
University Architect



Bruce Runberg, PE
Associate Vice Chancellor for
Facilities Services