2013 - 2014
Strategic Energy Plan
Summary

NORTH CAROLINA A&T STATE UNIVERSITY

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Executive Summary

The North Carolina A & T State University (NC A&T) Strategic Energy Plan (SEP) was developed in accordance with the General Statute 143-64.10 - 12 'Energy Conservation in Public Facilities' - which mandates a comprehensive energy management program for the state government. It is in support of the State Utilities Savings Initiative (USI), established by the Governor's Efficiency Commission. The ultimate goal of the efficiency consumption is to ensure that energy consumption per gross square foot is reduced by 30% by 2015 compared to the base fiscal year 2002-2003.

Since 2003, the North Carolina A&T State University (NC A&T) has reduced its energy use by **21%**, or 102 billion BTUs of energy. Energy efficiency measures in place at the NC A&T's 123 buildings have saved enough energy to meet the power needs of 760 households for a year. In fiscal year 2011-12 alone, a 32.5 billion BTUs reduction in energy helped NC A&T avoid $386,274 in costs.

Our energy use was lower in 2011-2012 and the University is well on its way towards meeting the goal of reducing energy use by 30% by 2015. Energy efficiency measures in place at the University include:

- A comprehensive energy auditing process to identify improvement areas
- Development of a retro-commissioning process for existing buildings
- Energy efficient lighting retrofits
- Development of green network strategies

Looking forward, the NC A&T will continue to foster a culture of conservation by improving our understanding of how we use energy so we can continue to make informed decisions and invest in our buildings with energy efficient technology. By purposefully integrating our energy data collection tools to specific facility energy opportunities, along with educating and promoting employee energy awareness, we will strive to continuously drive behavioral change within the University.

This overall plan tracks and reports general NC A&T performance and highlights major activities and accomplishments:

- The total utility cost avoided by the University in 2011-2012 was **$1,119,382** when compared to the baseline year of 2002-2003.

- The University performed lighting upgrades in five buildings on campus namely Marteena Hall, Carver Hall, McNair Hall, 1020 Wendover and Campbell Hall. The projected annual reduction in electrical consumption is **211,589 Kwh/year**.

- The Facilities Department spent $76,560 in steam system repairs. The repair of leaks in the steam system resulted in a 51% reduction in the amount of water used in the steam plant, and 21% reduction in the amount of natural gas required to preheat the make-up water.

- The Facilities department continued to upgrade its metering systems and preventive maintenance systems. These upgrades will continue to ensure that the University is able to closely monitor its energy usage as well as take appropriate corrective action in the future to sustain energy savings.

- The University developed its four-year Energy Services and Sustainability Program.

- The University embarked on its first energy performance contracting project for a total of 17 high consuming buildings.
  - The Energy Savings Contractor has been selected and approved.
  - Projected savings of $451,000/year and a 9% reduction in utility consumption.

- The University created the Energy Services and Sustainability Department focused solely on helping to develop a systematic and integrated approach to the implementation of energy conservation measures to ensure that the University meets its overall goal of 30% reduction by 2015 and also sustain the measures beyond that date.

Proposed key strategies of the 2012-2013 Strategic Energy Plan include:

- Developing the Energy Services and Sustainability website and information portal.

- Utilization of EPA's Portfolio Manager to benchmark the energy performance of the residence halls to track improvement, and apply for recognition from the EPA.

- Implementing sustainable living policies to reduce energy consumption:
  - Providing training to create faculty, staff and student awareness of need to change behaviors that waste energy.
  - Conducting business systems' audit campus-wide and recommending sustainable business practices.
  - Improving organizational capacity to implement these changes across the departments.
  - Implementing pilot Telework project to help improve faculty and staff's work/life balance.
  - Projected overall energy savings goal is 5% reduction in energy consumption.

- Reviewing utility billing rates with suppliers annually (*Utility Expense Management*), and conducting a monthly audit of each utility invoice.

- **<u>Continuing with the Energy Savings Performance Contract Program</u>** *(Energy Efficiency/Management and Student and Faculty Engagement)*
  - Performing the Investment Grade Audit
  - Negotiating the final Construction Contract
  - Obtaining financing for the Energy Savings Performance Contract
  - Negotiating the final measurement and verification protocol
  - Program Highlights and Goals
    - i. Reduction of energy consumption and operating costs in 17 buildings – additional 15% reduction in energy consumption by 2015.
    - ii. Integrated automation system between all 17 buildings to enable control and communications
    - iii. Sustainability initiatives and energy awareness
    - iv. Student involvement throughout the process
    - v. Sustainable asset management and maintenance

- **<u>On-going University Sustainability Initiatives</u>** (*Student and Faculty Engagement, Community Outreach)*
  - Highlights

i. Department of Civil and Architectural Engineering Students - ongoing Building Energy Audits and Recommendations for the Facilities Department
ii. Green Paw Aggies - Dorm Room Sustainability Initiatives/Training, Community Outreach Programs
iii. Green For All Ambassadors - Bridging the Economic and Climate Gaps - Illustration of the reality of the climate gap and economic gap and how they are related, while inspiring excitement and providing info about the role of green-collar jobs in bridging these gaps.
iv. Center for Energy Research and Technology (CERT) - Energy Day (Outreach program)
v. Department of Construction Management – Carbon Inventory

- Working with the IT department to help implement Energy Management application system to track, capture, document, and manage energy usage data in a network environment.

- Analyzing NCA&T Data Center energy use and implementing strategic reduction policy

- Deploying a Student and Faculty Sustainability Initiative – Projected overall energy savings goal is 1% reduction in energy consumption through the identification, design and implementation of alternative and renewable energy systems campus-wide.

NC A&T Overall Utility Performance

As of January 1, 2012, NCA&T owns 123 buildings having a total of more than 3 million square feet of conditioned space. Total utility cost decreased as a result of the warmer winter months in 2012 and savings realized from the various energy retrofits on campus. The consumption of electricity and fuel has decreased by 21% from the baseline year of 2002-2003. The NCA&T is well on its way to meet and exceed the required goal of 30% by 2015.

NC A&T Overall Utility Cost

YEAR	TOTAL UTILITY COST $	TOTAL NCA&T BUILDING Sq. Ft.	$ / Sq. Ft.	% CHANGE from base year
Baseline	$3,830,952[1]	2,350,355	1.63	Base Year
2003-2004	$4,063,671[1]	2,468,338	1.65	1%
2004-2005	$3,901,799	2,590,037	1.51	-8%
2005-2006	$5,025,209	2,634,896	1.91	17%
2006-2007	$4,663,478	2,946,053	1.58	-3%
2007-2008	$5,437,918	3,050,500	1.78	9%
2008-2009	$4,968,908	3,052,889	1.63	0%
2009-2010	$5,343,921	3,056,789	1.75	7%
2010-2011	$5,455,095	3,183,241	1.71	5%
2011-2012	$5,240,457	3,185,567	1.65	1%
2012-2013	$5,276,466	3,187,644	1.66	2%

Notes

[1]Baseline data for 2002-2003 and subsequent years were adjusted to reflect actual billed charges after an audit of bills. See attached Spreadsheet for detailed usage.

NC A&T Energy Usage

YEAR	ELECTRICITY		NATURAL GAS, PROPANE & FUEL OIL		COST FACTORS AND % CHANGE FROM BASE YEAR				
	ANNUAL USE (million Btu)	ANNUAL COST ($)	ANNUAL USE (million Btu)	ANNUAL COST ($)	$/Building sq. ft.	$/million Btu	% Change $/million Btu	Btu/sq. ft.	% Change Btu/sq. ft.
2002-2003	162,951[1]	$2,210,928	173,465[1]	$1,148,701	$1.43	$9.51	Base Year	150,380	Base Year
2003-2004	168,066[1]	$2,354,078	162,120[1]	$1,275,001	$1.47	$10.67	12%	117,294	-8%
2004-2005	147,887	$2,146,065	142,915	$1,262,363	$1.32	$12.24	23%	107,016	-25%
2005-2006	165,492	$2,438,324	164,799	$2,000,587	$1.69	$13.32	40%	126,506	-16%
2006-2007	165,908	$2,487,580	173,635	$1,590,008	$1.38	$12.01	26%	115,254	-23%
2007-2008	174,628	$2,707,686	207,082	$2,087,817	$1.57	$12.56	32%	125,142	-17%
2008-2009	174,828	$2,713,719	186,355	$1,594,098	$1.41	$11.92	25%	118,400	-21%
2009-2010	180,705	$3,026,662	221,670	$1,512,375	$1.48	$11.28	19%	131,676	-12%
2010-2011	194,151	$3,217,585	214,755	$1,371,295	$1.44	$11.22	18%	128,510	-15%
2011-2012	190,098	$3,345,438	186,345	$1,143,287	$1.41	$11.90	25%	118,372	-21%
2012-2013									

Notes

[1]Baseline data for 2002-2003 and subsequent years were adjusted to reflect actual billed charges after an audit of bills. See attached Spreadsheet for detailed usage.

NC A&T Water Usage

YEAR	ANNUAL USE (mGal)	ANNUAL COST ($)	COST FACTORS AND % CHANGE FROM PREVIOUS YEAR			
			$/mGal	% Change $/mGal	Gal/Sq. Ft.	% Change Gal/sq. ft.
2002-2003	198,641[1]	$471,323	$2.37	Base Year	84.52[1]	Base Year
2003-2004	151,673[1]	$434,591[1]	$2.87	21%	61.45	-27%
2004-2005	128,097[1]	$493,372[1]	$3.85	62%	49.46	-41%
2005-2006	166,000	$584,331	$3.52	48%	63.00	-25%
2006-2007	152,100[1]	$567,890	$3.74	57%	51.59	-39%
2007-2008	150,000	$642,415	$4.28	80%	49.17	-42%
2008-2009	142,000	$661,091	$4.66	96%	46.51	-45%
2009-2010	164000	$804,885	$4.91	107%	53.65	-37%
2010-2011	189,063	$865,052	$4.58	93%	59.39	-30%
2011-2012	163,746	$751,732	$4.59	93%	51.40	-39%

Notes

[1]Baseline data for 2002-2003 and subsequent years were adjusted to reflect actual billed charges after an audit of bills. See attached Spreadsheet for detailed usage.

Supply Side Management

Strategy

a. Review all accounts with utility providers to ensure lowest cost rate schedule is in effect for each facility.
b. Identify locations, meter ID and account numbers for all existing primary meters.
c. Implement department-wide system for accurate data collection and review.
d. Accurate data management and analysis of electricity, fossil fuels and water usage, with monthly review of trends and costs.

Tactics

ACCOMPLISHMENTS Past 12 Months Activities	Measurements		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
On-going implementation of a policy to record energy consumption values through invoices paid by Accounts Payables staff	Monthly automated reports: Kwh, Gals, Therms		TBD		10 hrs. per month		Facilities and Accounts Payables	Salary
Continued data processing of energy by building and account number and data management system USI program	Consumption values		TBD		3 hrs. per month		Facilities and Accounts Payables	Salary
Installation of metering	6	12	TBD		$57,902		Physical Plant	R&R / Operations
Implemented policy requiring utility billing to be checked for accuracy	70 monthly bills		$600		16 hrs. per month		Facilities and Accounts Payables	Salary
Implemented policy requiring utility meter verification and rate verification for major users	1 per year		$500		2 hrs. per facility		Facilities	Salary

Supply Side Management (cont.)

GOALS Next 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Continue to implement policy to record energy consumption values through invoices paid by Accounts Payables staff; generate automated reports.	Monthly automated reports: Kwh, Gals, Therms		TBD		10 hrs. per month		Facilities and Accounts Payables	Salary
Continue data processing and data management system and tracking the results of energy reduction strategies. Continue data entry in EPA Portfolio Manager for Residence Halls.	Biannual		TBD		3 hrs. per month		Physical Plant and Environmental Health & Safety	Salary
Register NC A&T in the Climate Registry and create database to collect the emissions and carbon footprint information.	Registration		TBD		$750		Physical Plant and Environmental Health & Safety	SEO, NC A&T cost share
Refine and continue to implement policy requiring utility billing to be checked for accuracy.	70 monthly bills		$600		16 hrs. per month		Facilities and Accounts Payables	Salary
Refine and continue to implement policy requiring utility meter verification and rate verification for major users.	1 per year		$500		2 hrs. per facility		Facilities	Salary
Installation of metering in 10 buildings	17		TBD		$400,000		Physical Plant/ESPC	ESPC

Demand Side Management

Green Building at NC A&T

NC A&T is in the process of developing the Green Building Policy which will require the University to use sustainable and green building practices wherever feasible and practical.

In addition to reducing long-term costs and environmental impacts, green building practices play an important role in increasing environmental awareness and productivity among NCA&T's employees. Resources from N.C. Project Green at http://www.ncprojectgreen.com/buildings/home.asp.

Green Building Initiatives for the University include the following:

1. **New Student Health Center -** (*Green Buildings)*
   General Information:

   The design for the new health center at NC A&T focuses on the coalescing concepts of Body, Mind and Soul to promote Health and Wellness for the student population. The building's 27,000 SF is distributed in a story and a half and provides the basic program elements of Treatment, Lab, Pharmacy, Physician's Offices, Multi-Purpose Room, Health Resource Center, Women's Health, Wellness Center, Substance Abuse, Administration and Support Spaces.

   LEED target:

   SILVER

   Sustainable Components:

   - Alternate Transportation – Public Transportation Access
   - Water Efficient Landscaping
   - Water Use Reduction
   - Optimize Energy Performance
   - Day lighting and Views
   - Controllability of Lighting and Thermal Systems

2. **New General Academic Classroom Building Green Roof Project** *(Energy Efficiency/Management and Student & Faculty Engagement)*

   Sustainable Components:

   - Reduction of daily energy demand for air conditioning in the summer
   - Decreased exposure of waterproofing membranes to large temperature fluctuations, that can cause micro-tearing, and ultraviolet radiation
   - Educational opportunities for students to learn about biology, green roof technology, and the benefits of green roofs
   - Reduction in the amount of storm water runoff and also delay in the time at which runoff occurs, resulting in decreased stress on sewer systems at peak flow periods.

Demand Side Management

Strategy

a. Prioritize energy conservation activities as low, no-cost or capital, and identify/leverage potential funding sources and incentive programs.
b. Apply sustainable building practices in all major facility construction/renovation projects.
c. Utilize replacement strategy that considers life cycle cost analysis, simple payback, and increased efficiency.

Tactics

ACCOMPLISHMENTS Past 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Marteena Hall Chiller Replacement	494684 Kwh per year	527,141 Kwh	$29,119	$31,628	$577,310		Physical Plant and Engineering	ARRA/ Operations
Marteena Hall Light Replacement	303,733 Kwh (pre m&v)	219,129 Kwh (post m&v[3])	$9,206	$5,076	$58,602		Physical Plant/ Engineering	ARRA/ Operations
Campbell Hall Light Replacement	40,533 Kwh (pre m&v)	32,967 Kwh (post m&v)	$1,399	$453	$12,769		Physical Plant/ Engineering	ARRA/ Operations
McNair Hall Light Replacement	268,144 Kwh (pre m&v)	192,716 kwh (post m&v)	$55,190[4]	$4165	$59,631		Physical Plant/ Engineering	ARRA/ Operations
1020 Wendover Light Replacement	6,668.2 Kwh (pre m&v)	4938.6 Kwh (post m&v)	$649	$103	$1,227		Physical Plant/ Engineering	ARRA/ Operations
Carver Hall Light Replacement	137,435 Kwh (pre m&v)	94,620 Kwh (post m&v)	$4,988	$2,568	$30,058		Physical Plant/ Engineering	ARRA/ Operations
Steam Plant and campus-wide steam line/leak repair	278,636 Therms	277,639 Therms	$157,151	$156,588	$44,500		Physical Plant	Operations

Notes:

[3] *M&V – measurement and verification*
[4] *Please, note the investment expended on McNair Hall - lighting Replacement against actual savings.*

Demand Side Management (cont.)

GOALS Next 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Performance Contracting – - Investment Grade Audit- 17 buildings	Btu/gsf, gallons/gsf		13,124 Btu/gsf; 5 gal/gsf		$5-$10 million		Engineering, Physical Plant/SEO	ESCO Guarantee/USI
Williams Dining Hall and Student Residence Audits and Re-commissioning – 7 Buildings in total	650,000 Kwh/year		$39,000		TBD		Physical Plant/Energy Services/Faculty	Operations/ USI
Campus Peak Load Shavings	Kwh		TBD		TBD		Physical Plant/ Engineering	R&R
Analyze IT Data Center energy usage and strategic reduction using Joulex Energy Manager	Kwh		TBD		170,000		Energy Services & Sustainability	EPA Grant/ University funding

Water Management

Strategy

a. Prioritize water conservation activities as low, no-cost or capital, and identify/leverage potential funding sources and incentive programs.
b. Utilize replacement strategy that considers life cycle cost analysis, simple payback, and increased efficiency.

Tactics

ACCOMPLISHMENTS Next 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Continue to install low flow toilets and fixtures campus wide	Gallons/$	TBD	TBD	TBD	TBD		Physical Plant	Operations
Steam Plant and campus-wide steam line/leak repair	Gallons/$	12,736,944 Gallons (reduction)	$157,151	$46,799	$44,500		Physical Plant	Operations

GOALS Next 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Campus Water Baseline Survey	Gallons/$		TBD		TBD		Energy Management	R&R
Install gray water reuse system for irrigation	Gallons/$		TBD		TBD		Physical Plant	Operations
Continue to install low flow toilets and fixtures campus wide	Gallons/$		TBD		TBD		Physical Plant	Operations

Awareness and Training

Strategy

a. NC A& T's Green Aggies Team (GAT), the energy conservation team, will be made up of members from all Divisions.
b. Inspire a culture of sustainability within NC A &T by promoting environmentally responsible actions.
c. Educate staff, faculty and students that energy conservation reduces operating expenses, thus providing more funds for programs that support NC A&T's mission.

Tactics

ACCOMPLISHMENTS Past 12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Developed Energy Services and Sustainability program plan	12 meetings		NA		NA		All divisions are represented on GAT	Salary
Engineering Students performed preliminary audits on 17 state owned buildings	TBD		NA		NA		GAT	Salary
Technology Students started the NC A&T Carbon Inventory and Carbon Footprint Analysis project.	TBD		TBD		NA		GAT	Salary
Green Aggie newsletter distributed by e-mail to employees/staff/students	Monthly		NA		NA		GAT	Salary
Cross-functional team attended and participated in the Appalachian State Energy Summit. As a result, the different committee members are working on integrating sustainability and conservation into the classroom.	Annual	Annual	NA		$495		GAT	NC A&T

Awareness and Training Cont.

GOALS Next12 Months Activities	Measurement		Savings		Investment	Jobs	Assigned To	Funding Source
	Expected	Actual	Expected	Actual				
Create Energy Services and Sustainability Website and information portal	1 year phase in		TBD		NA		GAT and Energy Management Team	Salary
Collaborate with NC Project Green to develop online conservation education module for all NC A&T staff	# staff who participate		TBD		TBD		Energy Management Team and IT	Salary
Host NC A&T Sustainability Week with emphasis on work-place energy management	# staff who participate		TBD		TBD		GAT and Energy Management Team	Salary
NC A&T Sustainability Awards for individual and group projects	Annual		NA		TBD		GAT and Energy Management Team	Salary
Training (HVAC Building Automation System Scheduling)	Annual				$8,000		Physical Plant	Operations

Declaration Page

We recognize energy as a controllable operating expense wherein savings result in dollar for dollar increase in funds available for reinvestment back into the continuing renewal of the campus infrastructure mission of the University. Energy conservation is the responsibility of the entire Aggie Family, guided and supported by the Facilities staff.

I have read the Strategic Energy and Water Plan for North Carolina Agricultural and Technical State University.

The plan, as present, supports the reduction required in Senate Bill 668 and G.S. 143-64.10-12(a).

Implemented this 2nd day of October, 2012

James J. Johnson, Utility Coordinator	Mary Ann Ibeziako, Director Energy Services & Sustainability	Carey Baldwin, Director, Physical Plant
Andrew M. Perkins, Jr. Asst. Vice Chancellor for Facilities	Robert M. Pompey, Jr. Vice Chancellor of Business & Finance	Dr. Harold L. Martin, Jr. Chancellor, NCA&TSU