

Appalachian State University

Strategic Energy

And

Water Management Plan

September 2013

Appalachian State University leads in creating a world where environmental, societal, and economic qualities exist in balance to meet the resource needs of today and of future generations. Our community of students, faculty and staff continually advance our understanding, capabilities and practices in this vital journey. As an institution of higher learning, we lead and educate by example, inspiring new generations prepared to share this knowledge, ingenuity and passion.

One critical step on this journey occurred on Earth Day 2008, when Appalachian State University Chancellor Kenneth Peacock signed the American College and University Presidents' Climate Commitment (ACUPCC), setting Appalachian on a journey of innovative leadership through the reduction of greenhouse gas emissions. The goal of the ACUPCC is the eventual reduction of greenhouse gas emissions to near zero. This process will intersect each and every element of our university.

As part of this commitment, the University has continually completed an annual greenhouse gas inventory to catalog the source and volume of the emissions we generate per year of operation. From these inventories, it is known that 78% of the annual carbon footprint is associated with the maintenance and operations of our campus buildings. Not surprisingly, the lion's share of the work required to meet the ACUPCC commitment lies with those responsible for our buildings. The Energy and Water Management section of this document details the successes and aspirations of the dedicated group who bear this important responsibility.

Aside from the sustainable advancement in our building operations, there are many other elements of the ASU community that champion the cause of sustainability; all seek to advance our knowledge, to demonstrate innovative practices, and to lead by example. The academic year 2012-2013 had several "points of pride" throughout our campus community. Some of the more notable are listed below:

- Appalachian State University hosted the second annual Appalachian Energy Summit (AES) over the summer of 2013; The AES is the annual gathering of the University of North Carolina Energy Leadership Challenge. Through this initiative, campus leaders from across higher education in North Carolina share goals to reduce energy expenditures, transform energy utilization, and reduce the environmental impacts of both higher education and the state.
- Adoption of a Zero Waste initiative, committing the university to strive toward producing zero landfilled materials by 2020. This program has avoided approximately \$65,000 in landfill tipping fees for FY 2012-2013.
- Maintaining the most diverse portfolio of renewable energy systems in the state. Including the largest wind turbine in NC, nine photovoltaic systems and eight solar thermal systems that produce 0.24% of ASU's yearly energy use.

- Robust portfolio of alternative transportation options including car sharing provided by UHaulCarShare and ridesharing provided by Zimride. These options accompany a no-fare bus system, regional bus routes and our first electric vehicle.
- A new and well organized student club focusing on transparency in university investments and eventual divestment of university endowment of the fossil fuel industry.

2013-2014 Strategic Initiatives

- In 2013-2014 Appalachian State University will begin the implementation of a \$16.5 million campus-wide energy efficiency project that will include heating and air conditioning systems and controls upgrades, lighting improvements and water conservation upgrades that will employ up to 266 workers during a 22-month construction period. The project, contracted with Pepco Energy Services, will provide upgrades to 2,000,000 square feet of campus facilities and will be highlighted by Aircuity's energy efficiency solutions in three science facilities as well as North Carolina based CREE LED lighting throughout the exterior of the campus. It will be financed through an Energy Savings Performance Contract (ESPC) that allows ASU to pay for the energy efficiency upgrades with guaranteed utility savings dollars.
- Sustainability at the highest level – App State will unveil a new five-year strategic plan by the end of the 2013 calendar year that places the highest emphasis on sustainability at all levels of the university.
- Climate Action Planning – Updates to the first iteration of the University's climate action plan; our climate footprint has increased from 2008-09 baseline, but both per person and per square-footage usage have decreased.
- Student Engagement – The Renewable Energy Initiative is a committee of students, with faculty and staff advisors that are responsible for allocating money towards the implementation of renewable energy on campus. The committee's annual operating budget comes from a self-imposed student fee of \$5 per student per semester.
- Large Scale Renewable Energy – Over the summer of 2013 App State released a RFP for the construction of a 300 kWh photovoltaic system on campus.
- National Leadership – App State is serving as a Host Institution for the largest nation conference of sustainability professionals in the nation. There are 26 members of the App State community scheduled to present at the AASHE conference this October in Nashville TN.

- Donor Community – Build relationships with donor community; leverage Appalachian’s leadership position with corporations and large donors; explore donor to investor strategies.

Energy and Water Management

In harmony with our commitment to minimize our impact on the environment; in alignment with the standards of good stewardship of our natural resources; and in accordance with North Carolina state law, Appalachian State University is dedicated to the principles of sustainability and to continual improvement in energy and water reduction efforts.

In August of 2007 the North Carolina State Legislature passed and the North Carolina Governor signed into law SL2007-546 (Senate Bill 668) establishing the goal of reducing energy consumption in state agencies by 30% by the end of year 2015 from a 2004 baseline year.

The North Carolina State Energy Office identified the use of BTUs per square foot (BTU/Ft²) as the best Key Performance Indicator by which state agencies should verify energy reductions.

Today, as a result of following the strategies identified in the following plan, we have succeeded in reducing energy consumption by 28% from the baseline year 2003-2004 (Figure 1).

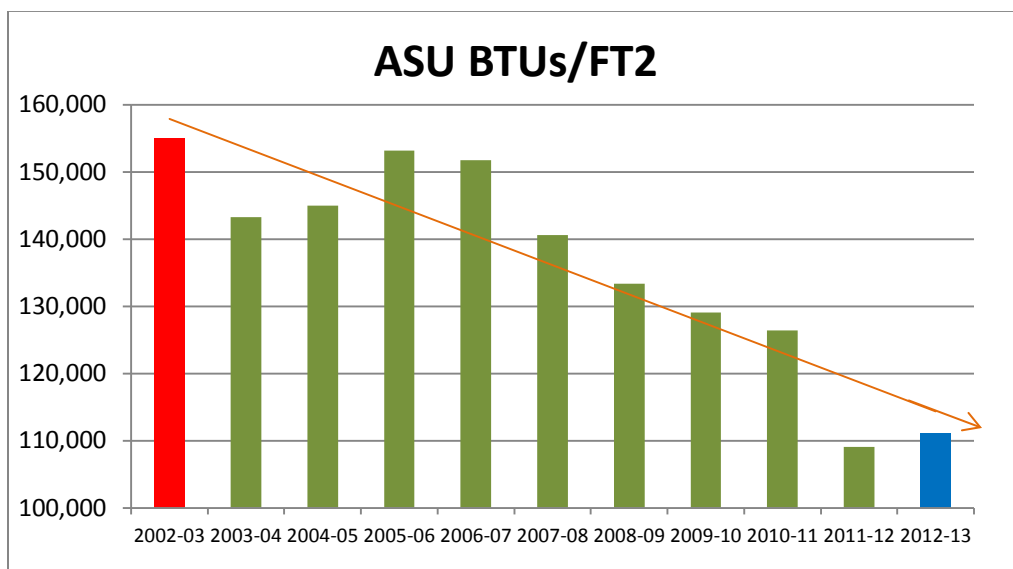


Figure 1

We have accomplished this goal while *increasing* the total square footage of the campus by 31% since 2004 as well as adding 541,254 square feet of additional cooling load through major renovations to existing buildings.

Although no goals have been set forward for reduction in water use, we have made aggressive investments in low flow plumbing fixtures and improved the percentage of steam system condensate return to yield impressive water savings reducing consumption by 49.7% as shown in figure 2.

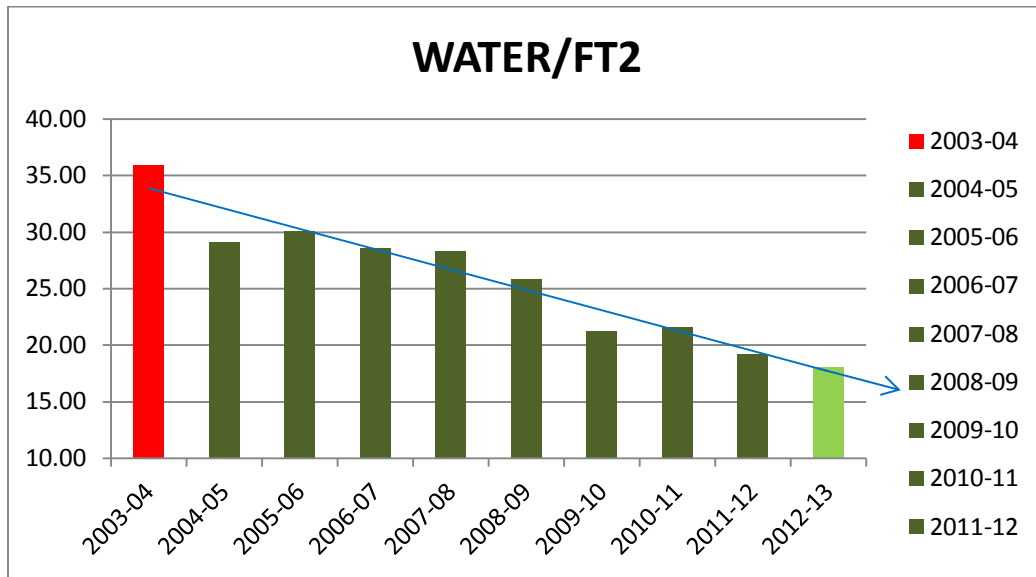


Figure 2

We will remain vigilant as there is still much that can be done. This Strategic Energy and Water Plan is a “living document” and must be carefully monitored and updated as technology and resources change. We have identified six key areas that must be involved in the continued success of the plan, which are:

- Energy policy
- Energy source management
- Operations
- Materials and equipment
- Education
- Transportation and
- Water

Below are our key strategies in each area.

Policy Strategies	
1	Eliminate the use and purchase of incandescent light bulbs and incorporate the use of LED lighting technology wherever practical.
2	Utilize highly efficient LED technology in all light fixtures designed for 12 or more hours of operation per day such as exit signs, security lighting, and most outdoor lighting applications including parking decks and lots, area post lighting, and building up lighting and canopy lighting.
3	Maintain standardized heating and cooling setpoints for all University owned facilities.
4	Act on all energy conservation projects having an expected "return on investment" of 2 years or less.
5	Continue to seek appropriate grants from Federal, State or local sources for energy and water conservation projects.
6	Funnel all energy billing/records for University owned facilities through Physical Plant Administration regardless of location or funding account.
7	Turn facility HVAC operation off or utilize temperature "set-backs" anytime the campus is closed for extended periods of time such as Spring, Fall, and holiday breaks.
8	Pursue LEED design in all new construction and major building renovation projects.

Source Management Strategies	
1	Install/maintain accurate sub-meters for each utility at each individual facility wherever possible.
2	Increase the use of solar photovoltaic, solar thermal, and other renewable energy resources.
3	Convert energy consuming systems to cleaner more efficient fuel sources when possible and practical such as converting from fuel oil to natural gas or from natural gas to solar thermal.

Operation Strategies	
1	Use energy only when needed through means of automated occupancy scheduling via the building automation system (BAS).
2	Utilize outdoor air for "free" cooling whenever possible through use of air side economizers.

Materials/Equipment Strategies	
1	Replace/retrofit all T-12 lighting and magnetic ballasts with energy efficient replacements such as T-8, T-5, or LED.
2	Incorporate the use of variable frequency drives or other variable energy technologies whenever feasible.
3	Maintain a professional Energy Manager, an Energy Data Analyst, and a team of specialists dedicated to digital controls maintenance and operations.

Education/Outreach Strategies	
1	Attend, assist, or encourage energy related organizations such as the Renewable Energy Initiative, the Sustainability Council, and others.
2	Educate the University community about energy use and conservation measures by obtaining, compiling, and disseminating energy consumption data.
3	Continued training in best energy conservation practices for physical plant staff.

Transportation Strategies	
1	Increase the use of alternative fuels or alternative fuel technologies in University owned vehicles such as bio-fuel, hybrid electric or total electric vehicles.

Water Management Strategies	
1	Install water saving devices on showers and lavatories.
2	Replace older model toilets with low consumption toilets.
3	Use rainwater harvesting and other water re-use strategies where appropriate.

The following pages provide details of our accomplishments this past year and our future year plans as we continue to strive to reduce energy use and improve efficiency across the University.

Past Year Activities	Measurement	Savings Actual or Calculated (\$)	Cost	Estimated Energy Saved	Utility Saved	Carbon Avoided	Funding Source
Installed Events2HVAC scheduling software in Student Union Addition	Meter readings	\$4,000	\$3,000	21,780 KWh	electricity	8.38 MTeCO ²	Student Union
				1,683 therms	natural gas	8.90 MTeCO ²	
Retro commissioned several campus facilities, optimizing controls and improving occupancy scheduling.	Meter readings	\$93,378	N/A	786,380 KWh	electricity	302.42 MTeCO ²	Salary
				18,000 therms	natural gas	95.25 MTeCO ²	
Purchased first total electric vehicle for campus security use.	N/A	N/A	\$37,674	N/A	gasoline	TBD	New River Light and Power

Planned Activities 2013-2014	Measurement	Estimated Savings (\$)	Cost	Estimated Energy Saved	Utility Saved	Carbon Avoided	Funding Source
Replace remaining outdated pneumatic controls in Plemmons Student Union with new direct digital controls and install Events2HVAC software for scheduling.	Meter readings	TBD	\$450,000	TBD	electricity	TBD	Plemmons Student Union Revenues
				TBD	natural gas	TBD	
Replace residence hall and other receipt supported facilities lighting with LED	Meter readings	TBD	TBD	TBD	TBD	TBD	UNC-GA ESPC
Replace remaining outdated pneumatic HVAC control systems with electronic digital controls.	Meter readings	TBD	TBD	TBD	TBD	TBD	Unknown
Replace inefficient and failing chiller at Quinn Recreation with new energy efficient model	Meter readings	\$4,500 yr.	\$65,000	4,500 KWh	electricity	1.73 MTeCO ₂	Physical Plant
Begin ASU's second energy savings performance contract	Celtic Energy	\$1,600,000 yr.	\$16,300,000	11,837,859 KWh	electricity	4552.54 MTeCO ₂	ESPC 2
				792,394 therms	natural gas	4193.27 MTeCO ₂	

Mandate

- We recognize that energy and water consumption can be managed to the benefit of Appalachian State University. Energy and water management is a responsibility of the students, faculty, and staff at each facility, guided and supported by the Energy Manager and USI liaison.
- This University will implement a Strategic Energy & Water Plan. The University energy manager is responsible for the success of the Program at Appalachian State University.
- The attached plan outlines the activities and expenditures required to reduce energy and water consumption to achieve the goals of the program.
- The Physical Plant staff will review progress and results quarterly, and will support staff attendance at training in energy and water management at least quarterly.

Strategic Energy & Water Plan Mandate- Goals

Appalachian State University will strive to reduce annual Total Energy Consumption by a minimum of 30% by the end of fiscal year 2014-2015 from a baseline fiscal year 2002-2003 (2003 NC State Energy Plan Goal). We will also reduce water consumption by 40%.

Strategic Energy & Water Plan Mandate- Measures

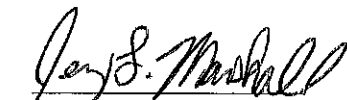
Our tracking measures will be the following Key Performance Indicators (KPI):

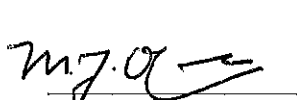
Total Energy Use Btu per Square Foot


Total Water Use Gallons per Square Foot


Strategic Energy & Water Plan Mandate- Commitment

I have read and support the Strategic Energy & Water Plan for my Organization Implemented this 30th day of September, 2013.


Energy Manager


Physical Plant Director


Vice Chancellor,
Business Affairs


Chancellor

This Energy & Water Mandate serves as a Memorandum of Agreement to support Strategic Energy & Water Plans for the state Utility Savings Initiative.

Director State Energy Office

Date