

Appalachian State University

Strategic Energy

And

Water Management Plan

September 2011

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 reducing our overall energy consumption a minimum of 30% by the end of fiscal year 2014-2015

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 20% by the end of fiscal year 2009-10 and 30% by the end of fiscal year 2014-15 from a 2003-04 baseline year.

Based on BTUs per square foot (BTU/Ft²), a Key Performance Indicator used by the State Energy Office to measure energy efficiency, ASU will need to achieve an energy use ratio of 108,700 BTU/Ft² to achieve the goal of 30% energy reduction. The chart below (Figure1) shows that ASU had been moving in the wrong direction and by 2006 we were well above 150,000 BTU/Ft².

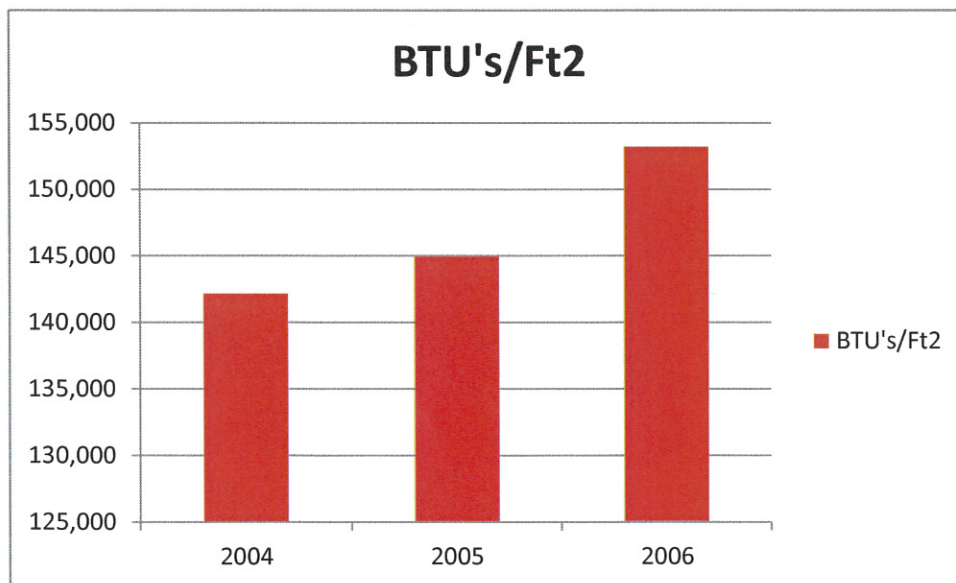


Figure 1

Recognizing that this trend must be changed, the leadership at ASU embarked upon an aggressive campaign to reduce energy and began the formulation of a Strategic Energy and Water Plan

Today, as a result of following the strategies identified in this plan we have succeeded in reducing energy by **19%** from our 2003-2004 baseline year and are two-thirds of the way to our ultimate goal of reducing energy consumption by 30% by 2015 (Figure 2).

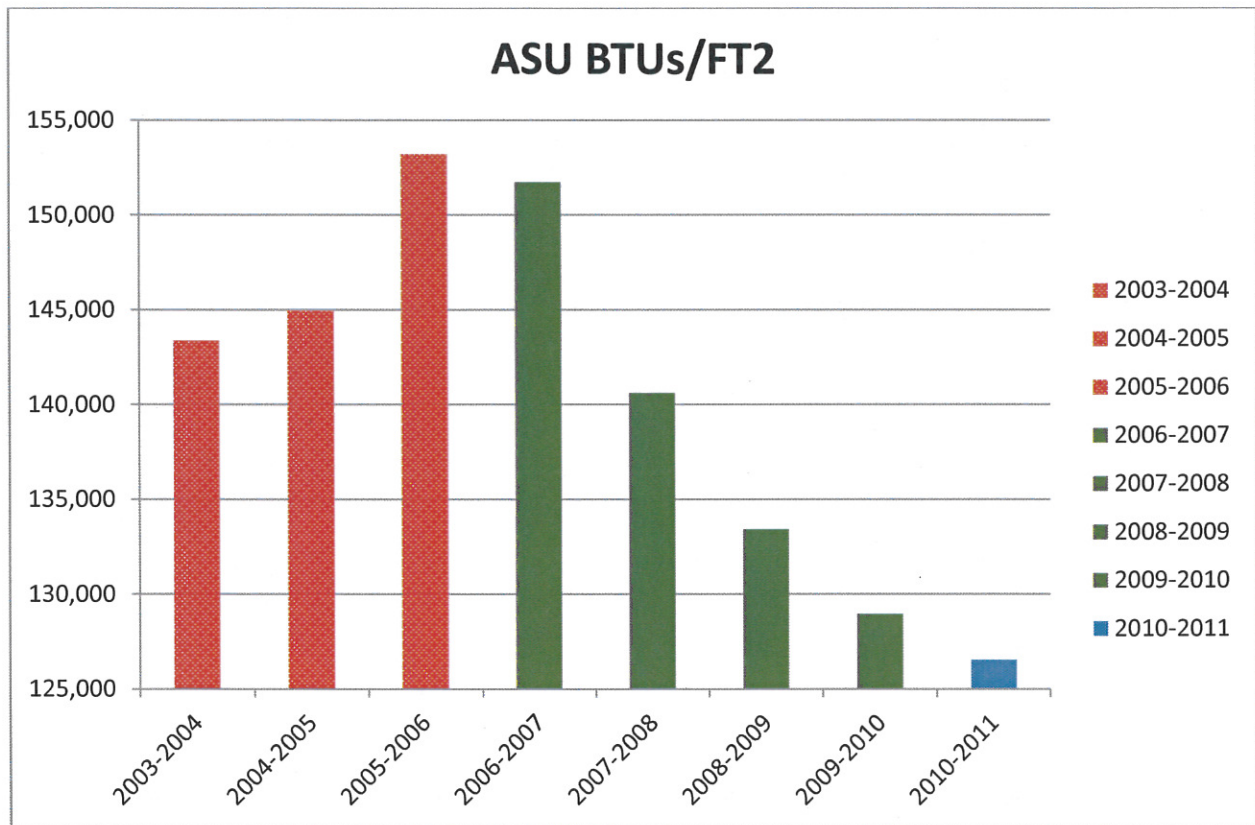


Figure 2

While we have not quite achieved the first step of 20% reduction in BTUs/Ft² from the 2004 level, part of the reason for that is due to the fact that we have renovated several dormitories since 2004 each time adding air-conditioning to buildings that originally had none effectively doubling the energy use for those facilities. Since 2004 we have added 522,884 square feet of additional cooling load to our campus. One way to account for this added energy load is to calculate total building square footage as original square

footage plus additional cooling square footage [BTU/(orig. Ft²+add. cooling Ft²)]. Based on this metric we have reduced our energy consumption by **27%** from the 2004 baseline.

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 as shown in figure 3.

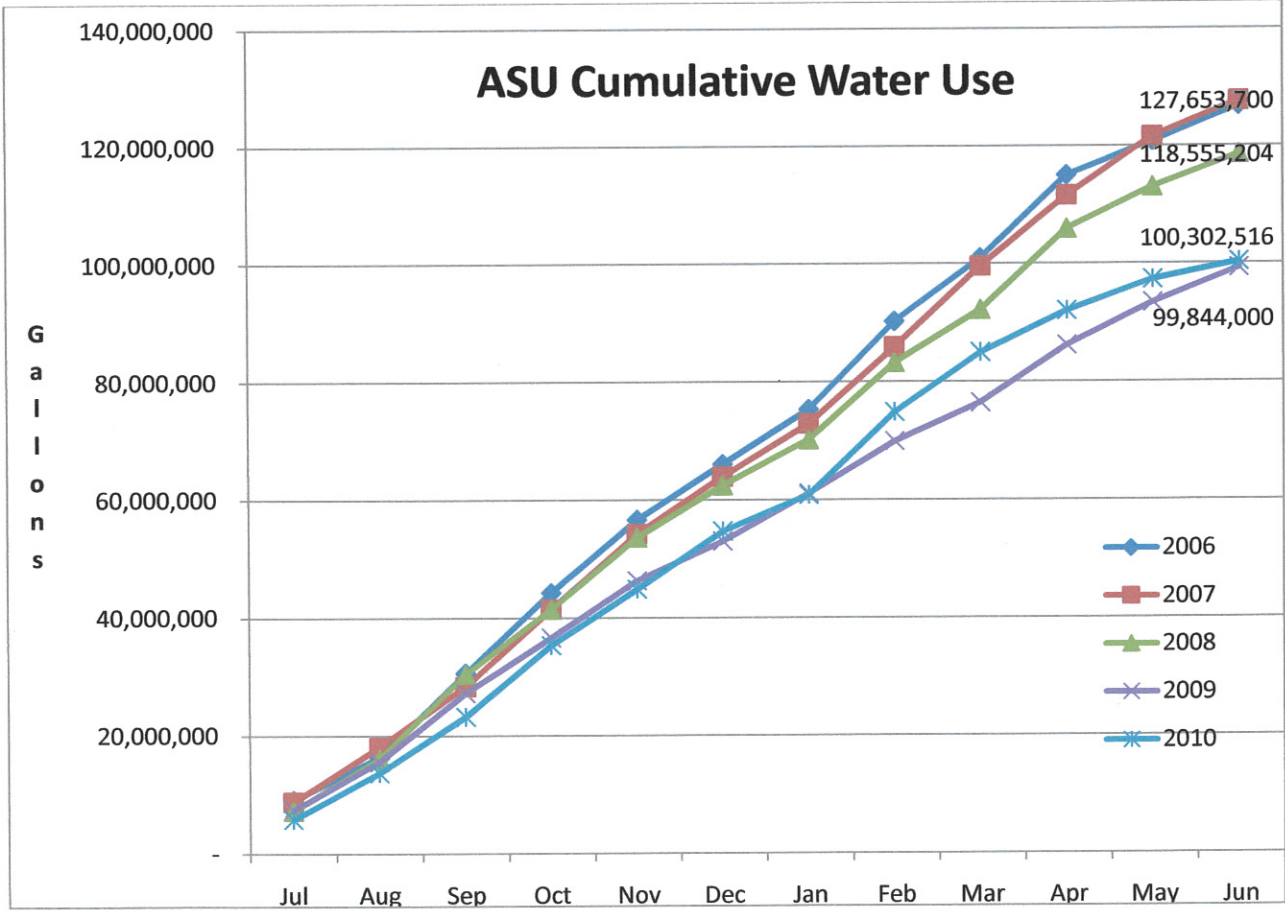


Figure 3

We will remain diligent as there is still much to 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 we must be involved in any successful 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
2	Utilize highly efficient LED technology in all light fixtures designed for 24 hour operation such as exit signs and parking deck lighting
3	Establish 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 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 of 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 for 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

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
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Water Management Strategies

1	Install water saving devices on showers and lavatories
2	Replace older model toilets with 1.6 gpf 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	Funding Source
Completed First Energy Savings Performance Contract	Third party M&V company	\$597,000 Yr.	\$5,300,000	ESPC 1
Annual boiler tuning	Stack gas	CO2 reduction	\$3,000	Steam revenue fund
Winkler Residence Hall lighting retrofit	3 rd party M&V	\$12,500 Yr.	\$26,000	ARRA Grant
Belk Residence Hall lighting retrofit	3 rd party M&V	\$9,000 Yr.	\$18,000	ARRA Grant
Install Speed Drives on AHUs at Plemmons Student Union, Sanford Hall, and West Campus Chiller Loop. Also controls retrofit and water balance at Wey Hall.	3 rd party M&V	\$12,500 Yr.	178,000	
Duncan Hall lighting retrofit	3 rd party M&V	\$13,200 Yr.	\$33,000	ARRA Grant
Sanford Hall lighting retrofit	3 rd party M&V	\$11,500 Yr.	\$47,000	ARRA Grant
Hire full-time energy Data Analyst	Meter Readings	\$170,000 Yr.	\$85,000	ARRA Grant
Replace cobrahead street lamps in Freshman Parking Lot with LED	Meter Readings	\$3,000 Yr.	\$28,000	ARRA Grant
University Bookstore lighting retrofit	3 rd party M&V	\$4,200 Yr.	\$8000	ARRA Grant
Replace 220 incandescent exit signs with LED	3 rd party M&V	\$3,000 Yr.	\$6,501	ARRA Grant
East Residence Hall Lighting retrofit	3 rd party M&V	\$10,000 Yr.	\$23,000	ARRA Grant

Planned Activities 2011-2012	Measurement	Savings Estimated	Cost	Funding Source
Install enterprise level network computer power management software on the University Information Technology System	network energy monitoring	\$150,000 yr	\$30,000	TBD
Retrofit 900 post lamps with LED lighting	Before and after fixture electricity measurement	\$30,000 yr	\$600,000	TBD
Implement Building Occupancy Scheduling	Meter readings	\$100,000 Yr.	N/A	Salary
Improve and expand ASU Campus Energy Policy	Meter Readings	TBD	N/A	Salary
Appalachian Panhellenic Hall Solar Thermal and Energy Conservation Project	Propane offsets and electric metering	\$37,000 yr	\$280,000	TBD

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 4th day of October, 2011.

Ken S. Marshall
Energy Manager

Michael J. O'Neil
Physical Plant Director

Gregory M. Law
Vice Chancellor, Business Affairs

Kenneth E. Peacor
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