

Appalachian State University

Sustainability

Energy

And

Water Management Plan

September 2012

Sustainability

"Sustain Appalachian is an essential part of who we are, and while we know there is much work to do, we do our best each day to walk the walk. Truly a community effort, our students, faculty, staff and administration all continue to take the leadership roles necessary to transform our campus and to educate our students with the skills necessary to become the leaders of tomorrow."

– Chancellor Kenneth E. Peacock

In the past year, there have been many "points of pride" related to sustainability on our campus.

2011-2012 Sustainability Successes

- Held the first Appalachian Energy Summit (summer 2012), Hosted all 17 UNC institutions and five private universities with over 200 participants. Working teams continue to address complex issues around financial and regulatory issues, transportation, building efficiencies, technological integration, energy operations and management and academic integration.
- Opened two USGBC LEED compliant residence halls.
- Opened a new composting facility which expanded existing capacity by 175 percent and will allow the composting of post-consumer food waste.
- Host over 40 student organizations with a focus on environmental, social or financial sustainability.
- Offer a robust portfolio of alternative transportation options including car sharing provided by UHaulCarShare and ridesharing provided by Zimride. These options accompany a biodiesel-fueled, no-fare bus system, regional bus routes and purchase of our first electric vehicle.
- Procured over 10 percent of our dining hall food from growers within 250 miles of campus.
- Installed four campus renewable energy systems using photovoltaic and solar thermal technology.
- Implemented a unique Sustainability and the Arts grant program in conjunction with the Turchin Center for Visual Arts. Two notable projects include; art made from trash collected on Appalachian's campus, and a 110 pound aluminum

spoon sculpture created by adjunct faculty member Joe Bigley using 110 pounds of discarded aluminum from our central dining hall.

- Avoided \$3.25 million in energy costs through energy efficiency efforts.
- Dr. Susan Doll (professor in the Department of Technology and Environmental Design) won a \$696,000 research grant to study the connection between energy efficiency and indoor air pollution.

2012-2013 Strategic Initiatives

- Curriculum and Research – Exploring sections as they relate to sustainability; promote related degree programs; endorse faculty/student research efforts; integrate with chosen Quality Enhancement Program (international focus)
- Climate Action Planning – Updating two year old climate action plan; our climate footprint has not significantly changed from 2005-06 baseline; climate planning effort requires cross-campus leadership
- Student Engagement – Creating opportunities for “green-minded” students to assume campus leadership positions
- Large Scale Renewable Energy – Reducing carbon emissions; secure long-term energy future
- Waste Reduction – Recycling programs have evolved into a “zero waste” campaign; 90% landfill diversion by 2022; campus-wide waste audit conducted this year
- National Leadership – Encouraging faculty, staff and students to submit to sustainability journals/conferences; seek leadership positions in national organizations
- Local and Sustainable Food – Increasing local food procurement; seek deeper connections with farms and cooperatives
- Donor Community – Building relationships with donor community; leverage Appalachian’s leadership position with corporations and large donors; explore donor to investor strategies
- High School Students – Connecting our sustainability message to North Carolina High Schools and community colleges; seek to increase awareness of sustainability issues in our student community

Energy and Water Management

Energy

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, energy and water efficiency.

In August of 2007, SL2007-546 (Senate Bill 668) established the goal of reducing energy consumption in state agencies by 30% by the end of year 2015 from a 2004 baseline year, based on BTUs per square foot (BTU/Ft²).

As we began our energy efficiency efforts, Figure 1 shows that the campus was moving in the wrong direction and by 2006 campus energy use was increasing well above 150,000 BTU/Ft².

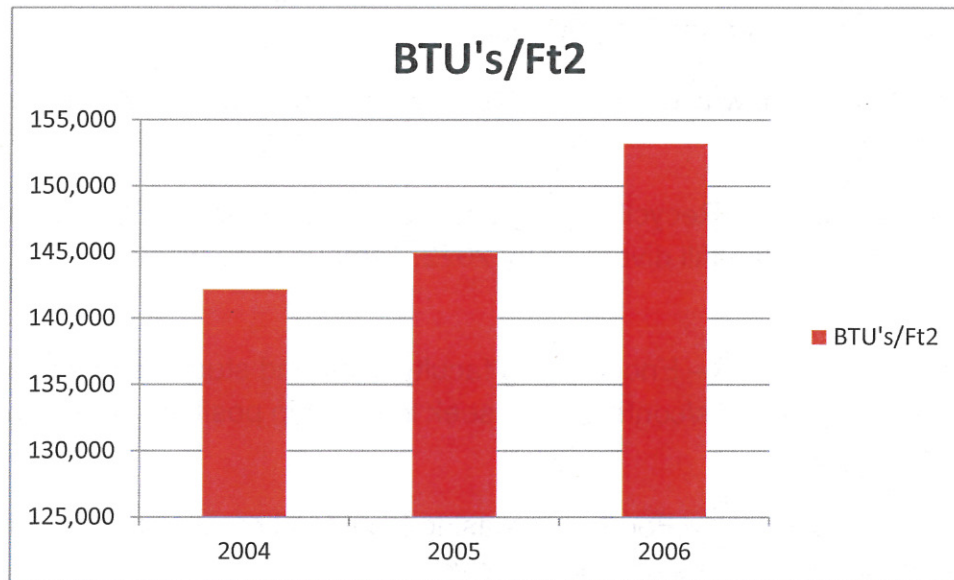


Figure 1

To reverse this trend, the campus leadership embarked upon an aggressive energy reduction campaign to and began to formulate a living Strategic Energy and Water Plan.

Today, as a result of implementing the strategies identified in the strategic plan we have succeeded in reducing energy each year since 2006 as shown in Figure 2. And this year, we achieved our 30 percent reduction goal three years ahead of schedule.

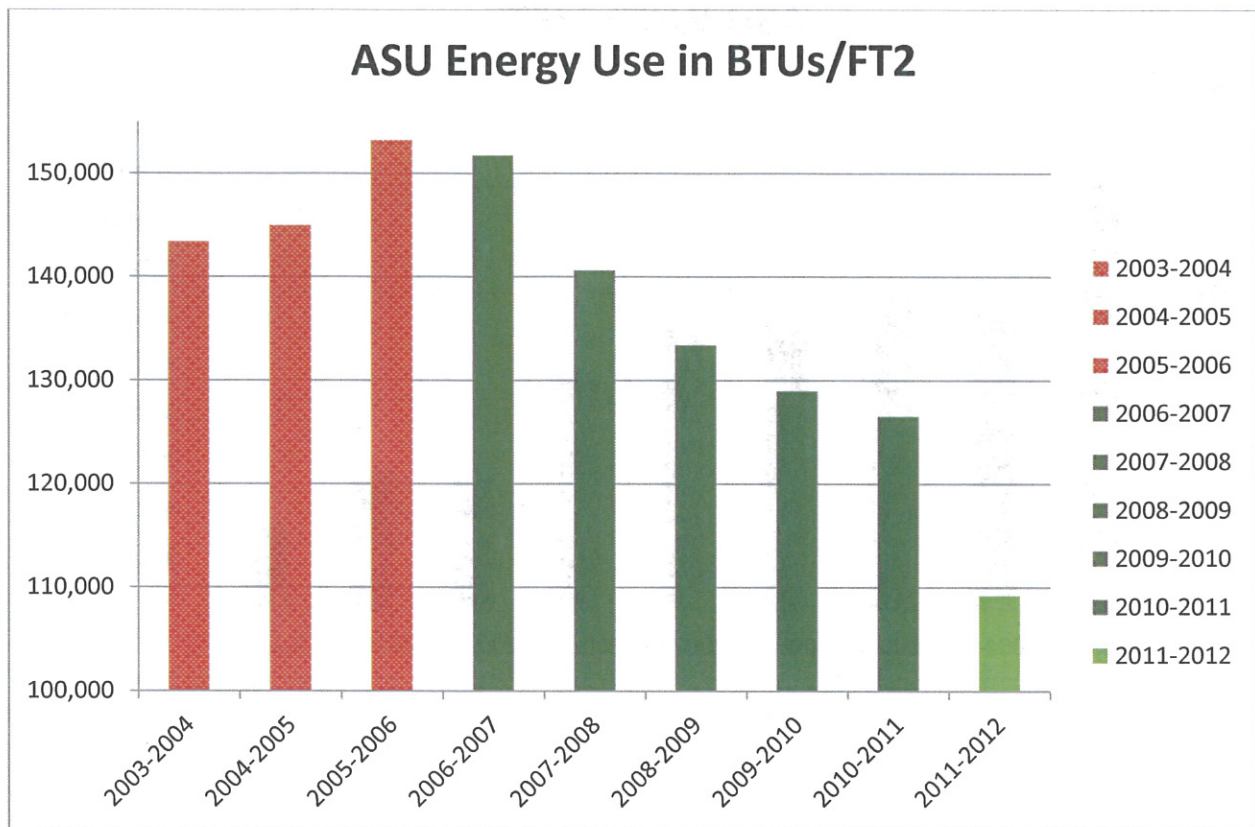


Figure 2

Amazingly, this achievement was made in spite of the fact that since 2004 the campus has added energy intensive air conditioning to 522,884 square feet of facilities not previously air conditioned.

Water Management

Although no formal water reduction goals have been set, the university has made aggressive investments in low flow plumbing fixtures and the steam distribution system renovations to improve condensate return. As shown in figure 3, our investments have yielded a 46.5 percent reduction in cumulative water use over our 2004 base line. Reducing water use yield further energy savings since the less water used, the less energy is needed to treat, pump, and store the potable water, and to treat the resulting waste water.

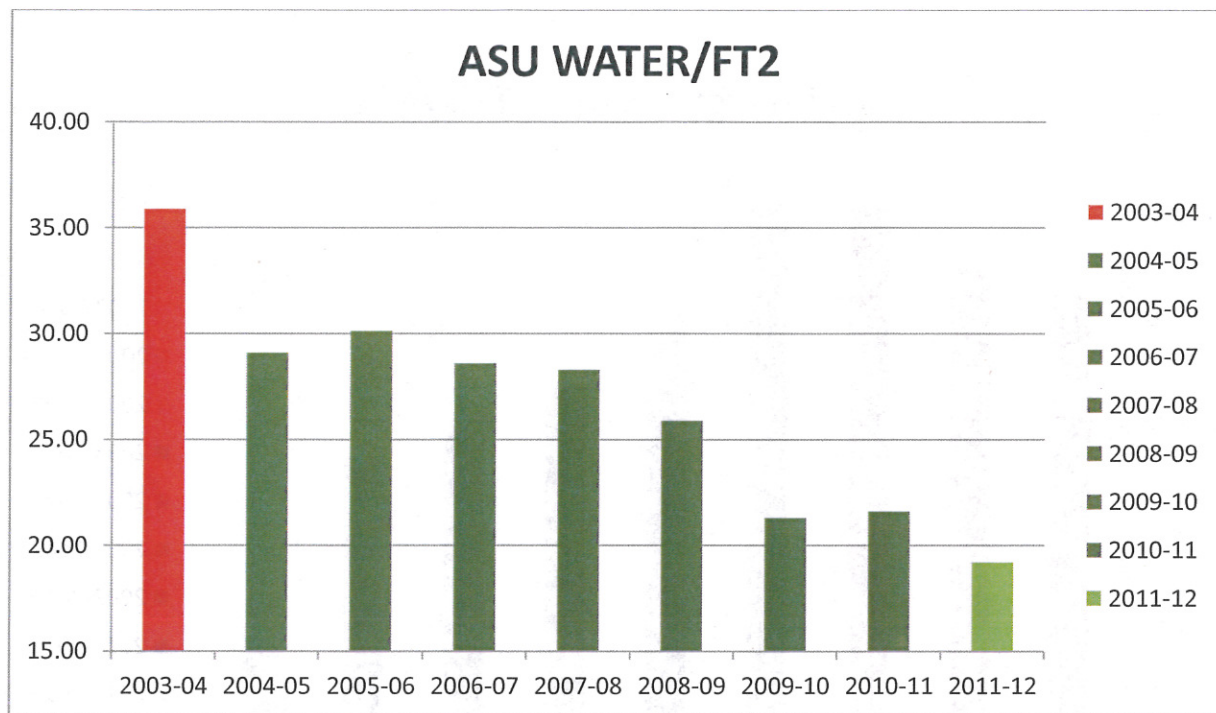


Figure 3

Strategic Goals

Appalachian State University will remain vigilant and continue to aggressively implement strategies to further reduce our energy and water use.

We have identified the following six key areas essential to further reductions:

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

The following charts summarize campus goals by key strategic areas for this revised plan.

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, and converting all outdoor lighting such as street lighting, parking lot lighting, post and canopy lighting to LED.
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 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 certification 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, 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.
4	Improve steam distribution system condensate return.

The following tables provide details of this past year's accomplishments and our future year plans.

Past Year Activities	Measurement	Savings Actual or Calculated	Cost	Funding Source
Implemented full campus shutdown where possible during Thanksgiving and Christmas holidays.	Meter readings	\$125,000/yr.	N/A	Salary
Annual boiler tuning	Stack gas	CO2 reduction	\$3,000	Steam revenue fund
Made Energy Data Analyst position permanent	Meter readings	\$170,000/yr.	\$85,000	Salary
Involved students in Residence Hall Energy Reduction Competition.	Meter readings	\$2,500 onetime reduction	Salary	Salary
Repaired and optimized two energy recovery wheels at New Belk Library and re-Commissioned facility HVAC operations.	Meter readings	\$65,500/yr.	Salary	Salary
Re-Commissioned and Optimized HVAC for University Bookstore	Electric meter readings	\$36,000/ yr.	Salary	Salary
Optimized HVAC in Raley Hall	Meter readings	\$25,000/yr.	Salary	Salary
Implemented aggressive facility scheduling for Plemmons Student Union.	Meter readings	\$86,500/yr.	Salary	Salary
Improved training for maintenance staff including 4 receiving Building Operators Certification and 1 receiving Professional Energy Management Certification.	N/A	TBD	\$5,000	Grant & Operations
Insulated hot water piping in mechanical room at Procurement Services and re-commissioned boiler	Meter readings	\$5,000	\$1,600	Grant and salary

Planned Activities 2012-2013	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	ESPC
Improve Building Occupancy Scheduling	Meter readings	\$100,000 Yr.	N/A	Salary
Improve and expand ASU Campus Energy Policy	Meter readings	TBD	N/A	Salary
Replace all outdoor lighting with LED	Meter readings			
Replace all residence hall lighting with LED	Meter readings	TBD	TBD	UNC GA ESPC
Replace all remaining pneumatic control systems in buildings with electronic building automation system	Meter readings	TBD	TBD	ESPC
Replace inefficient and failing chillers with new highly efficient models	Meter readings	TBD	TBD	ESPC
Continuously re-commission all buildings with DDC Controls for maximum efficiency and optimized facility scheduling	Meter readings	TBD	N/A	Salary

Mandate

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 10th day of October, 2012.

Ken S. Marshall M.J.V. Energy Manager Physical Plant Director

Gregory J. Lami Vice Chancellor, Business Affairs

Kenneth E. Peacock 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

