

## An Energy Mandate for Western Carolina University

Western Carolina University recognizes that most energy usage is a controllable expense, wherein savings may result in reducing overall operating cost. Energy management is a responsibility of the staff, faculty, and students, guided by the Utility Manager and supported by all campus constituents..

- Western Carolina University will continue to implement an Energy Management Program. George W. Wooten is responsible for the success of the Program at Western Carolina University's campus facilities.
- The Utility Manager is responsible for implementation of Western Carolina University's Strategic Energy Plan and will support Department Heads and other staff with implementation of the university's Energy Management Program.
- Facilities Management administration will review progress and results quarterly and annually.

### **Energy Mandate – Goals**

Western Carolina University's goal is to reduce annual Total Energy Consumption by a minimum of 4% (NC State Energy Plan Goal), adjusted for enrollment and additional square footage, respectively.

### **Energy Mandate – Measures**

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

- *Total Utilities Cost and Use per Square Foot*
- *Total Energy Cost and Use per Square Foot*
- *Electric kWh Cost and Use per Square Foot*
- *Water/Sewer Cost and Use per Square Foot*
- *Fuel Oil #6 Cost and Use per Square Foot*
- *Fuel Oil #2 Cost and Use per Square Foot*
- *Natural Gas Cost and Use per Square Foot*

### **Energy Mandate – Commitment**

Implemented this 1<sup>st</sup> day of October, 2005

  
Utility Manager

  
Director of Facilities

  
Chief Financial Officer

  
Chancellor

This Energy Mandate serves as a Memorandum of Agreement to support Strategic Energy Planning for state government.

Director State Energy Office

Date

# **Western Carolina University**

## **STRATEGIC ENERGY PLAN** **Fiscal Year 2004 –2005 Report**

October 1, 2005

# **Strategic Energy Plan**

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## **Executive Summary**

### **Scorecard Results**

An assessment of fiscal year 2004 – 2005 energy management efforts was performed. Current performance falls primarily into the **BASIC/ADVANCED** category of the SEP-Performance Scorecard. Western Carolina University touches on all categories, and addresses some areas much better than others. The university has continued its actions in several of the (five) key strategic focus areas. In particular, the assessment revealed the following strengths and weaknesses in current efforts and initiatives.

- **Energy Data Management:** The university does not currently have an Energy Manager position that is 100% dedicated to specifically managing all areas of campus energy conservation. Approval has recently been given to hire an Energy Manager in 2005-2006. The university continues to record and monitor utility data. Prior WCU energy plans were only based on expended state funds, in state funded buildings, using state funded GSFT. The SEO now wants use and cost data for all campus facilities and sources of funding. This has resulted in having to find historical cost and use data for budgets and buildings previously not included in prior reports, and some data for previous fiscal years may be incomplete. In this report, such occurrences will be noted and explanation will be given for how estimated figures have been derived.
- **Energy Supply Management:** The university has dual fuel capability for its steam plant operation boilers and is an interruptible natural gas customer. PSNC Energy, our natural gas provider, offers a #6 fuel oil rate 160 matching plan. With this rate plan, PSNC will inform us at the end of each month whether or not they are able to match the cost of state contract #6 fuel oil, with natural gas. This has been an excellent rate plan for us because the cost of state contract transportation gas has never been cost competitive. If PSNC Energy is unable to match the fuel oil cost, all avenues of cost analysis are still investigated to find the best price for the fuel we will burn.
- **Energy Use in Facilities:** Light switch-plate conservation stickers remain in campus buildings, but have largely become “too routine” and are seemingly no longer noticed. Phased installation of Automated Energy Management Systems continues in buildings. Established 1975 university policy regarding energy conservation remains in effect. Campus constituents have been informed of the pros and cons, and repeatedly urged to keep external windows and doors closed to eliminate outside air infiltration.
- **Equipment Efficiency:** WCU continues to implement and add to its rigorous and extensive Preventive Maintenance program, for maintaining all building equipment and ensuring efficiencies. The university continues to replace inefficient ballasts, lamps, and belts with energy efficient ones, at the time such inefficient parts fail. \$3 million 2004 – 2005 Phase II of steam and condensate return lines for upper part of campus completed, funded from 2000 Higher Education Bonds.
- **Organization Integration:** Inefficient ballast, lamps, and belts have been eliminated from existing inventory – unless a unique and specific exception calls for such a part. Campus-wide and building specific E-mail has largely been the only means of spreading the word about energy conservation efforts. When hired in 2005 – 2006, the newly approved Energy Manager position will be expected to actively engage campus constituents and form a Conservation Awareness Team (CAT) in order to cultivate and promote energy awareness and cooperation. The EM will be expected to maintain a visible, action-oriented presence, and ensure that campus energy behaviors and consumption change for the better. The position will also be responsible for gathering

and analyzing metered data, work in conjunction with Facilities Management to ensure that corrective maintenance actions are taken, review conservation design standards for projects, and pursue a Performance Contracting agreement(s) to finance campus energy saving projects.

### **Baseline Utility and Energy Use**

Using 2004 – 2005 fiscal year data, Western Carolina University's state and auxiliary budgets expended a combined \$3,800,000 in direct utility consumption costs. The total campus direct *utility cost mix* was approximately fifty-three percent (53%) electricity, ten percent (10%) #6 fuel oil, two percent (2%) #2 fuel oil, one percent (1%) propane, twenty-four percent (24%) natural gas, one percent (1%) water production, and nine percent (9%) sewer. For direct utilities, overall cost percentage changes per gsft remained relatively static, *while overall relative gsft consumption was decreased 4.85%*.

State and auxiliary budgets expended a combined \$3,410,000 in direct energy consumption costs. The total campus direct *energy cost mix* was approximately fifty-nine percent (59%) electricity, eleven percent (11%) #6 fuel oil, 2.4% #2 fuel oil, 0.6% propane, and twenty-seven percent (27%) natural gas.

### **Actions**

The assessment also identified the following ACTIONS that, if taken, can help move Western Carolina University to a higher performance level of utility savings. These actions are addressed in this Strategic Energy Plan under the following categories:

#### **Process Improvement:**

- Energy Manager – Having a true energy manager hired and in place will enable Western to do everything it currently does, better. This position will also allow the university to move into other areas of process improvement.

#### **Program Implementation:**

- Energy Manager, CAT Team, other campus engagement to facilitate programs for organizational integration
- Continued ballast, lamp, and belt replacement for equipment efficiency
- Continued steam trap preventive maintenance program
- Supply management through dual fuel boiler capability helps ensure reliability and quantity

#### **Projects:**

- Energy Manager – Having a true energy manager hired and in place will enable Western to do everything it currently does, better. This position will also allow the university to move into other areas of project improvement.
- Include separate budget line item for building commissioning, within capital improvement requests
- Major steam and condensate return line repairs on lower part of campus
- Performance contracting
- Energy Management Systems
- As time allows, continue metering of non-metered facilities

### **Savings Estimate & Financial Evaluation**

An undetermined amount of savings will occur once the behaviors and attitudes of campus constituents have been modified. The only savings estimate at this time relates to our worn and aging steam and condensate return lines. Repair of these lines must become the top infrastructure priority for Western Carolina University, based upon the financial evaluation presented in section 4.0 of the plan.

### **Goals & Measures**

The primary goal for Western Carolina University is to hire an Energy Manager. Once this hire has been accomplished, the Energy Manager will have the time and focus that it will take to administer and effectively run a proper utilities savings operation to far exceed 4% per year reductions in energy consumption.

To maintain relative comparisons, measurements will be made based upon comparative fiscal year data, using percentage changes in cost and consumption per gross square feet (GSFT).

#### **1.0 Baseline Energy Use**

Based on collected data, for fiscal year 2004 – 2005, Western Carolina University's state and auxiliary budgets expended a combined \$3,800,000 in direct utility consumption costs. The total campus direct *utility cost mix* was approximately fifty-three percent (53%) electricity, ten percent (10%) #6 fuel oil, two percent (2%) #2 fuel oil, one percent (1%) propane, twenty-four percent (24%) natural gas, one percent (1%) water production, and nine percent (9%) sewer. In addition to the above direct utility consumption costs, indirect utility costs for water analysis testing, filter and valve repairs (#1, #2, and #3 filters), and other related water production facility costs totaled approximately \$135,000 – while boiler, steam traps, and other indirect steam related utility costs added roughly \$25,000; raising all related direct and indirect utility expenses for WCU to approximately \$3,960,000.

Of the \$3,800,000 in direct consumption costs, approximately \$2,878,000 was used in state funded buildings and \$922,000 was used for auxiliary receipt funded buildings. If the 2005 – 2006 price increases for natural gas, fuel oil, and chemicals continue, direct and indirect utility costs could possibly exceed a total of \$5 million.

Of 355,405,282,840 total campus Btu's (British thermal units), the combined 2004 – 2005 total campus direct *energy use Btu mix* was approximately forty percent (40%) electricity, sixteen percent (16%) #6 fuel oil, two percent (2%) #2 fuel oil, one percent (1%) propane, and forty-one percent (41%) natural gas.

For WCU, 2004 – 2005 electricity represents approximately fifty-nine (59%) of total direct *energy* cost and forty percent (40%) of total Btu's consumed.

Utility	2004 – 2005 Units/gsf Consumed	2003 – 2004 Units/gsf Consumed	Relative units/gsf Consumed % ▲ ▼
Electricity	15.30 kWh/gsf	15.73 kWh/gsf	3% ▼
Natural Gas	0.53 Therms/gsf	0.68 Therms/gsf	23% ▼
#6 Fuel Oil	0.14 gal/gsf	0.07 gal/gsf	95% ▲
#2 Fuel Oil	0.020 gal/gsf	0.019 gal/gsf	5% ▲
Propane	0.008 gal/gsf	0.012 gal/gsf	34% ▼
Water	47.9 gal/gsf	49.13 gal/gsf	2% ▼
Sewer	29.6 gal/gsf	36.33 gal/gsf	19% ▼

Based on square footage, Western Carolina University has made some progress when it comes to relative percentage decreases of utilities consumed per gross square foot. With the percentage decreases per GSFT achieved (and the increases) the overall utility cost per relative GSFT for fiscal year 2004 – 2005 decreased only 0.84% when compared to the 2003 – 2004 cost per GSFT total. Overall cost percentage changes per gsf remained relatively static, **while overall relative gsf consumption was decreased 4.85%.**

Per GSFT, propane decreased thirty-four percent (34%), compared to FY 2003 – 2004. This large drop in per GSFT consumption has most likely occurred because the newly added 378,791 GSFT compared to the relatively small amounts of propane used. Therefore, this fact alone most likely renders this percentage drop an unreliable indication of any real savings. In the newly added 378,791 GSFT, propane only serves in emergency generator capacities; thus, greatly skewing this decrease in consumption percentage. That being said, propane use is so small, its percentage changes will most likely not have a significant effect on the university's overall total consumption reduction.

Due to WCU's dual fuel capability for steam production, natural gas is used when #6 fuel oil is not – and vice versa. In this data, 2004 – 2005 #6 fuel oil's consumption percentage greatly increased over fiscal year 2003 – 2004 because of the effective cost comparison between natural gas and fuel oil. Fuel oil is used when PSNC Energy, our natural gas supplier, can not provide us with gas at the cost equivalency of state contract residual #6. Cost analysis is the primary determining factor in Western Carolina University's decision to use one fuel instead of the other. In the event #6 oil (plus the cost of chemicals) can not compete on price, natural gas is always preferred because it burns clean for the environment and ultimately helps reduce boiler maintenance. The twenty-three (23%) decrease in T/GSFT can most likely be attributed to the completion of the 2004 – 2005 Phase II repair and replacement of old steam and condensate return lines on the upper part of campus, as well as some minor repairs made to the lower part of the campus steam distribution system. However, data indicates that condensate return is only in the neighborhood of forty percent (40%). It is also likely that T/GSFT decreased in 2004 – 2005 because our natural gas provider could not sell us gas at a competitive rate to #6 fuel oil; therefore we used the cheaper #6 oil.

It is the university's opinion that the three percent (3%) decrease in electricity is the greatest achievement in 2004 – 2005. The steam distribution system does not feed 80,250 GSFT (of the added 378,791 GSFT in 2004 – 2005); even so, this is not enough to completely reverse the T/GSFT percentage decrease achieved. The added 80,250 GSFT is a new residence hall "community" -- with rooms heated and cooled by electric PTAC units. The added lighting demands for parking lots, rooms, common areas, etc. also require and consume a significant amount of electricity. Regardless of this residence hall's *complete* dependence on electricity,

overall campus kWh/GSFT declined 3%. Likewise, campus has added a few other new large area buildings, street lights, accompanying parking lot lights, and field lighting. This decrease in electricity consumption is a major achievement for the university, and next to our historical sewage reduction/identification, could perhaps be the most significant savings achievement for Western Carolina University, to date. Presumably, WCU's continued program for replacement of ballasts, lamps, and belts (with energy efficient ones), and replacement of some HVAC systems controls, has helped in this kWh/GSFT reduction – in addition to other not so identifiable reasons.

## **2.0 Planned Actions & Projects**

The SEP Performance Scorecard reveals the processes, programs, and projects that should be undertaken to drive Western Carolina University's energy management performance to the next level. The actions, encompassing each of the five focus areas: energy information, energy supply, facilities operations, systems and equipment, and business integration. These areas can be grouped into the following three categories.

### **2.1 Process Improvement:**

- 2005 – 2006 Hire Energy Manager position; improvement of all conservation related processes hinge upon this position specifically dedicated to campus energy management

### **2.2 Program Implementation:**

- 2005 – 2006 Hire Energy Manager position
- 2005 – 2006 Energy Manager to establish Conservation Awareness Team(s) (CAT)
- 2004 – 2005 continued replacement of inefficient ballasts, lamps, and belts (upon part's failure), with new energy efficient ballasts, lamps, and belts
- 2004 – 2005 Began recycling program for laser printer toner cartridges
- 2004 – 2005 Continued steam trap preventive maintenance program

### **2.3 Projects:**

- 2004 – 2005 Phase II steam and condensate return lines replacement on upper campus – complete - \$3 million, Higher Education Bond
- 2004 – 2005 Hired consultant to clearly identify storm drain lines and sanitary sewer lines, using smoke and dye tests, in order to correct storm water flows into sanitary sewer.
- 2005 – 2006 Phase II Stillwell lab wing renovations: Total HVAC replacement, energy efficient energy management system and controls, Venturi variable volume valve controlled hoods - \$2.8 million, Higher Education Bond
- 2005 – 2006 Forsyth Building comprehensive renovation: Total HVAC replacement, energy efficient energy management system and controls - \$1.5 million, Higher Education Bond
- R&R Phase III project is on the books to expand automated energy management systems in other campus buildings. However, there is no funding available; almost all \$2 million of allocated 2005 – 2006 R&R funding is going to repair of lower steam and condensate return lines.
- 2005 – 2006 Hire Energy Manager to pursue performance contracting
- 2005 – 2006 Include separate budget line item for building commissioning within capital improvement requests

### 3.0 Savings Opportunity Assessment

In the 2005 – 2006 fiscal year, Western Carolina University faces two primary challenges in the initiative to conserve its comparative utilities usage and costs. The institution's single most formidable challenge is not to just gain campus-wide buy-in to the idea of conservation efforts – the challenge is to actually modify behaviors in order to realize genuine and consistent conservation actions from *all* of its campus constituents. The second greatest priority challenge for WCU is to shore up its worn and aging steam and condensate return lines.

By far, being able to effectively address the campus energy awareness and cooperation challenge represents perhaps the largest savings opportunity for Western; it may also help serve North Carolina in the form of *off-campus* conservation behaviors and practices, as well.

In the 2004 – 2005 fiscal year, Western Carolina University made some progress; of course, WCU is capable of much greater conservation achievements. It is felt that 2004 – 2005 progress, as with the previous year, did not achieve the savings it otherwise might have realized because the university lacked an Energy Manager specifically assigned, and 100 percent dedicated, to the task of campus energy conservation. However, in the later part of fiscal year 2005 – 2006, positive change and solid results are anticipated because approval has recently been given to fund and hire a campus Energy Manager position at Western Carolina University.

The primary duty of the Energy Manager position at Western Carolina University will be to actively engage campus constituents, in order to cultivate and promote energy awareness and conservation. The EM will be expected to maintain a visible, action-oriented presence, and ensure that campus energy behaviors and consumption change for the better. The position will also be responsible for gathering and analyzing metered data, work in conjunction with Facilities Management to ensure that corrective maintenance actions are taken, review conservation design standards for projects, and pursue a Performance Contracting agreement(s) to finance campus energy saving projects.

Likewise, in 2005 – 2006, a majority of Western's allocated \$2 million R&R funds are expected to be spent repairing the lower campus' failing steam and condensate return lines. It is estimated that repairing these distressed lines may potentially save the university \$300,000 per year in the form of fuel, make-up water, and chemicals. The greater the cost of fuel, water, and chemicals become, the greater the savings that can be achieved.

### 4.0 Financial Assessment

Assuming a normal plant efficiency of 90% steam condensate return. In 2004 – 2005, data indicates that condensate return loss is 50%, or 40% is currently being returned.

#### At 40% return:

Estimated average 35,000 gal/day make-up water required to replenish lost condensate to generate steam

- 35,000 gallons/day of make-up water used = 1,458 gal/hr needed
- 1,458 gallons of water = 12,145 lbs.
- It will take 12,145 Btu's to raise 1,458 gallons of water 1 degree in 1 hour
- Make-up water coming into the system at 50 degrees will require enough Btu's to raise the water's temperature to 220 degrees

- 12,145 Btu's X 170 degrees = 2,064,674 Btu's to provide 1,458 GPH of water at 220 degrees
- 1 Therm of natural gas = 100,000 Btu's
- 20.65 Therms of natural gas is necessary to supply 1,458 GPHour of water at 220 degrees
- 495.60 Therms of natural gas is necessary to supply 35,000 GPDay of water at 220 degrees
- 180,894 Therms of natural gas is necessary to supply 12,775,000 GPYear of water at 220 degrees
- As of 10/1/05, 1 Therm of natural gas = \$1.59
- Needing to use 180,894 Therms of natural gas to heat make-up water because only 40% of steam condensate is being returned will cost the university an estimated \$290,000; the additional water production will cost the university an estimated \$4,000.
- **At current fuel prices, annual savings that may potentially be achieved by repairing steam and condensate return lines: roughly \$300,000/year.**

### 5.0 Goals and Measures

- Hire an Energy Manager in 2005 – 2006
- Complete energy projects identified for 2005 – 2006

Continue to try and reduce annual total energy consumption by a minimum of 4%, adjusted for enrollment and additional square footage, respectively. Western Carolina University's tracking measures will be the following Key Performance Indicators (KPI):

- Total utilities cost and use per GSFT
- Total energy cost and use per GSFT
- kWh cost and use per GSFT
- Water/Sewer cost and use per GSFT
- Fuel Oil #6 cost and use per GSFT
- Fuel Oil #2 cost and use per GSFT
- Natural gas cost and use per GSFT

### 6.0 Creating an Energy Mandate

North Carolina's 2003 – 2004 Energy Plan states, "Looking to the future, with the passage of the higher education bonds in 2000 representing \$3.1 billion in additional buildings and renovations at state community colleges and universities, the higher education share of energy expenditures will undoubtedly increase." Western Carolina University has been the fortunate recipient and steward of approximately \$100 million of these higher education bond funds. Additionally, WCU has constructed new self-liquidating structures that contribute to increasing the overall totals for campus energy consumption.

In the 2005 – 2006 fiscal year, Western Carolina University faces two primary challenges in the initiative to conserve its comparative utilities usage and costs. The institution's single most formidable challenge is not to just gain campus-wide buy-in to the idea of conservation efforts – the challenge is to actually modify behaviors in order to realize genuine and consistent conservation actions from *all* of its campus constituents. The second greatest priority challenge for WCU is to shore up its worn and aging steam and condensate return lines.

*Strategic Energy Plan*

Improved utility and cost management must become an urgent and integral part of Western Carolina University's strategic plan. Without adversely impacting learning environments, utilities must be recognized as a controllable operating expense wherein savings can be available for critical infrastructure areas of need. All members of the campus community: students, faculty, administrators, and staff -- have important roles to play in a successful energy management program. Of particular importance are the roles of the Chancellor and Provost, who must fervently support and actively communicate the priority of energy conservation and management to *every* department on campus. If energy conservation becomes their priority, it becomes everyone's priority.

Admittedly, WCU has a long way to go, in order to become THE model institution for energy conservation. Given the financial challenges facing higher education and the excessive cost of today's fossil fuels, there may be no better object impetus for striving to become that model. In the 2005 - 2006 fiscal year and beyond, Western Carolina University must escalate its progressive pace of utility conservation, and aspire to become a shining example of institutional stewardship for North Carolina.

Appendix 1  
**SEP – Performance Scorecard**

Level	Energy Data Mgmt	Energy Supply Management	Energy Use in Facilities	Equipment Efficiency	Organization Integration
Processes	<ul style="list-style-type: none"> <li>• Accessibility</li> <li>• Monthly Bills</li> <li>• KPI &amp; Benchmarking</li> <li>• Reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Error resolution</li> <li>• Account Management</li> </ul>	<ul style="list-style-type: none"> <li>• Facility walk-through</li> <li>• Energy improvement opportunities identified</li> </ul>	<ul style="list-style-type: none"> <li>• Corrective Maintenance Program</li> <li>• System Control</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness &amp; Participation</li> <li>• Energy Manager's Role</li> </ul>
Programs	<ul style="list-style-type: none"> <li>• Spreadsheets Used to track data</li> <li>• TOU not applicable</li> <li>• Utilize Automated Energy Management System Controls</li> </ul>	<ul style="list-style-type: none"> <li>• Supplier choice for boiler fuels</li> <li>• Supply Reliability &amp; Quantity (dual fuel capable)</li> </ul>	<ul style="list-style-type: none"> <li>• Cost improvement opportunities targeted</li> <li>• Operating Procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Preventive Maintenance Program</li> <li>• Lighting &amp; cogged-v belt Upgrades</li> <li>• Alternate Fuels (#6 oil &amp; natural gas)</li> </ul>	<ul style="list-style-type: none"> <li>• Energy &amp; Planning</li> <li>• Performance &amp; Training</li> <li>• Resource Mgmt</li> <li>• Budget Prep</li> </ul>
Projects	<ul style="list-style-type: none"> <li>• Expand Energy Management Systems use in campus bldgs</li> </ul>	<ul style="list-style-type: none"> <li>• Risk Management</li> </ul>	<ul style="list-style-type: none"> <li>• Commissioning of new buildings exists, but yet to be used</li> <li>• On-going Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• System Upgrades</li> <li>• Standards</li> <li>• New Technology</li> </ul>	<ul style="list-style-type: none"> <li>• Project Approval</li> <li>• Financial Impact &amp; Incentives</li> </ul>

This is your last three years of data as I have it recorded in the SEO data base. Please verify that all values and units are correct. You may make changes directly on these tables. Please highlight changes in red so they stand out. If changes are made please email spreadsheet with corrections to leonard.hoey@ncmail.net

year	name	kwh/\$	NG\$/	2_oil\$	6_oil\$	propane\$	water\$	sewer\$
01-02	WESTERN CAROLINA UNIVERSITY	\$1,552,070.00	\$0.00	\$33,134.64	\$865,286.00	\$15,054.36	\$45,018.00	\$393,140.00
02-03	WESTERN CAROLINA UNIVERSITY	\$1,604,515.00	\$111,053.00	\$51,114.39	\$888,599.00	\$21,038.03	\$37,837.00	\$361,657.00
03-04	WESTERN CAROLINA UNIVERSITY	\$1,747,534.00	\$975,042.48	\$52,605.89	\$153,188.00	\$28,452.00	\$35,870.00	\$308,136.00
04-05	WESTERN CAROLINA UNIVERSITY	\$2,013,292.00	\$930,263.64	\$82,939.03	\$360,080.42	\$21,854.67	\$40,600.00	\$349,810.00

year	name	kwh	NG,therms	2_oil_gals	6_oil_gals	propane_gals	water_gal X 1000	sewer_gal X 1000
01-02	WESTERN CAROLINA UNIVERSITY	34,305,600	0	41,645	1,142,480	22,805	145,220	120,942
02-03	WESTERN CAROLINA UNIVERSITY	34,665,600	1,444,810	47,971	996,969	22,026	122,056	95,213
03-04	WESTERN CAROLINA UNIVERSITY	37,039,200	1,606,150	45,498	171,870	28,620	115,711	85,570
04-05	WESTERN CAROLINA UNIVERSITY	41,841,570	1,444,806	55,712	389,041	21,798	130,967	80,886

year	name	reported_gsf	SRO_gsf	UNC_GA
01-02	WESTERN CAROLINA UNIVERSITY	2,355,330	2,269,017	2,355,330
02-03	WESTERN CAROLINA UNIVERSITY	2,355,330	2,269,017	2,355,330
03-04	WESTERN CAROLINA UNIVERSITY	2,355,330	2,269,017	2,355,330
04-05	WESTERN CAROLINA UNIVERSITY	2,734,121	2,734,121	2,734,121

The values listed below were calculated in our data base from the above information. They are included for your information only.

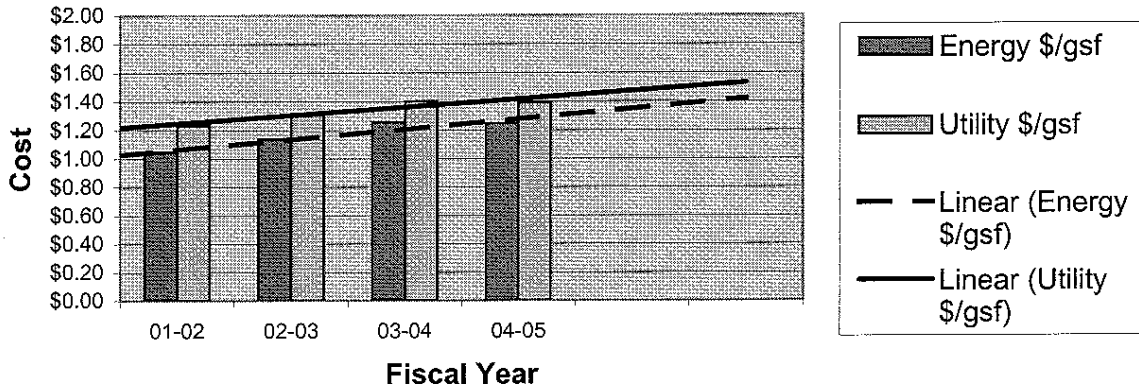
year	name	energy\$ gsf	\$ mmbtu	btu_gsf	tot energy \$	tot_util \$	tot btu	water \$/Mgal	sewer \$/Mgal
01-02	WESTERN CAROLINA UNIVERSITY	\$1.05	\$8.32	125,821	\$2,465,545.00	\$2,903,703.00	296,351,067,200	\$0.31	\$3.25
02-03	WESTERN CAROLINA UNIVERSITY	\$1.14	\$6.36	178,764	\$2,676,319.42	\$3,075,813.42	421,047,709,200	\$0.31	\$3.80
03-04	WESTERN CAROLINA UNIVERSITY	\$1.26	\$9.19	136,616	\$2,956,822.37	\$3,300,828.37	321,776,010,400	\$0.31	\$3.60
04-05	WESTERN CAROLINA UNIVERSITY	\$1.25	\$9.59	129,989	\$3,408,429.76	\$3,798,839.76	355,405,282,840	\$0.31	\$4.32

year	name	kwh/\$ gsf	kwh/used/gsf	NG\$/gsf	Thermsused/gsf	2_oil\$/gsf	2_oil used/gsf	6_oil\$/gsf	6_oil used/gsf
01-02	WESTERN CAROLINA UNIVERSITY	\$0.66	14.57	\$0.0000	0.0000	\$0.0141	0.0177	\$0.3674	0.4851
02-03	WESTERN CAROLINA UNIVERSITY	\$0.68	14.72	\$0.0471	0.6134	\$0.0217	0.0204	\$0.3773	0.4233
03-04	WESTERN CAROLINA UNIVERSITY	\$0.74	15.73	\$0.4140	0.6819	\$0.0223	0.0193	\$0.0650	0.0730
04-05	WESTERN CAROLINA UNIVERSITY	\$0.74	15.30	\$0.3402	0.5284	\$0.0303	0.0204	\$0.1317	0.1423

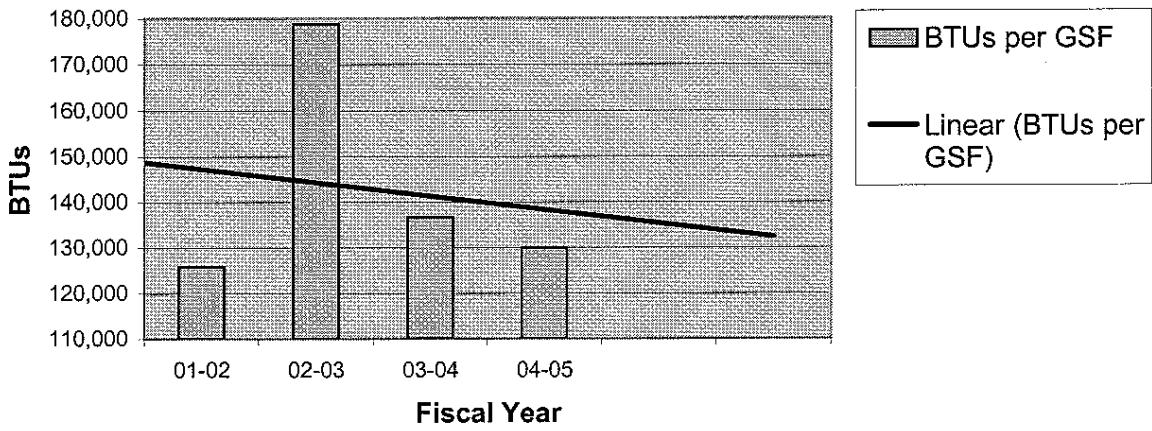
**SUMMARY DATA**

year	name	tot_util \$/gsf	energy\$ gsf	btu_gsf
01-02	WESTERN CAROLINA UNIVERSITY	\$1.23	\$1.05	125,821
02-03	WESTERN CAROLINA UNIVERSITY	\$1.31	\$1.14	178,764
03-04	WESTERN CAROLINA UNIVERSITY	\$1.40	\$1.26	136,616
04-05	WESTERN CAROLINA UNIVERSITY	\$1.39	\$1.25	129,989

**Summary Data  
Fiscal Years 2002 - 2005**



**Summary Data  
Fiscal Years 2002 - 2005**



<b>Total Energy Cost</b>	<b>Total Btu</b>	<b>Cost/Btu</b>		
\$3,408,429.46	355,405,282,840	\$9.59		
<b>Total Utility Cost</b>	<b>GSF</b>	<b>UtilityCost/GSF</b>	<b>EnergyCost/GSF</b>	<b>Elec.Cost/GSF</b>
\$3,798,839.46	2,734,121	\$1.39	\$1.25	\$0.74
<b>Total Btu</b>	<b>GSF</b>	<b>Btu/GSF</b>		
355,405,282,840	2,734,121	129,989		
	<b>Water/Sewer cost/Mgal</b>			
	\$4.63			
<b>Btu Mix</b>		<b>% Total</b>		
Electric Btu	142,763,436,840	40%		
Natural Gas Btu	144,480,600,000	41%		
Propane Btu	2,005,416,000	1%		
Fuel Oil #2 Btu	7,799,680,000	2%		
Fuel Oil #6 Btu	58,356,150,000	16%		
		100%		
<b>Cost Mix</b>		<b>% Total</b>		
Electric Cost	\$2,013,292.00	53.00%		
Natural Gas Cost	\$930,263.34	24.49%		
Propane Cost	\$21,854.67	0.58%		
Fuel Oil #2 Cost	\$82,939.03	2.18%		
Fuel Oil #6 Cost	\$360,080.42	9.48%		
Water Cost	\$40,600.00	1.07%		
Sewer Cost	\$349,810.00	9.21%		
		100.00%		
<b>Energy cost mix</b>				
Electric Cost	\$2,013,292.00	59.1%		
Natural Gas Cost	\$930,263.34	27.3%		
Propane Cost	\$21,854.67	0.6%		
Fuel Oil #2 Cost	\$82,939.03	2.4%		
Fuel Oil #6 Cost	\$360,080.42	10.6%		
		100.0%		

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**Purpose:** The state financial systems only capture utility costs, not units purchased. That makes this report our only source of unit consumption data. Consumption, as well as cost data is critical to evaluate the effectiveness of our conservation efforts. The information reported on this form should include data on all buildings whether they are appropriated or receipt funded. Thank you for your assistance.

**The Form:** This form consists of 4 individual sheets for you to enter utility information on. The gray shaded areas are provided to enter usage (consumption) and cost data. For those utilities that can be billed in more than one type of unit (water may be billed in cubic feet or gallons) we have included multiple columns for your convenience so that you can record your billed units without performing a conversion. The headings in **bold dark red** indicate the units the Energy Office will utilize in its reporting. Units entered in the other columns are automatically converted to these units for SEO use. The 'conv factors' sheet contains the conversion factors that should be used if you wish to perform your own energy calculations. Use of these factors will ensure consistency of reporting to the Energy Office by all agencies and universities.

**Contact:** If you have any questions about this form, or problems in filling it out please contact-

Len Hoey  
Program Manager  
919-733-1891  
[leonard.hoey@ncmail.net](mailto:leonard.hoey@ncmail.net)

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	Agency		Gross Square Feet
	41001000 ADMINISTRATION GENERAL		2,734,121
	University		Renovated A/C GSF
	60005010 WESTERN CAROLINA UNIVERSITY		14,655
	Reported by		GSF Under Construction
	Mike Stewart		85,586
<p>The Agency and University cells are drop down lists. Please select appropriate data from lists. If Gross Square Footage is known please record in appropriate cell. Include parking decks and receipt funded buildings and new buildings approved for occupancy in this number. If this cell is left blank the State Property Office value will be used.</p>			
<p>* Renovated A/C GSF is the amount of existing building square footage that has had air conditioning/cooling added during a renovation in the last year.</p>			
<p>* GSF Under Construction should include all buildings to which utilities are being provided but are not yet approved for beneficial occupancy.</p>			
Please fill out all relevant sections			



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		GALLONS							
Fuel Oil	Start Inventory	purchases	End Inventory	Consumption	Total Cost \$				
#6	104,698	405,093	120,750	389,041	\$360,080.42	total cost includes chemicals to treat #6			
#2	28,163	51,829	24,280	55,712	\$82,939.03				
		GALLONS							
	Start Inventory	purchases	End Inventory	Consumption	Total Cost \$				
Propane	8,845	21,658	8,705	21,798	\$21,854.67				
		TONS							
	Start Inventory	purchases	End Inventory	Consumption	Total Cost \$				
Coal	0	0	0	0	\$0.00				
		TONS							
	Start Inventory	purchases	End Inventory	Consumption	Total Cost \$				
Wood	0	0	0	0	\$0.00				

If these items are metered at point of use, consumption may be entered directly. Otherwise enter inventory and purchase data where requested and consumption will be calculated. Total cost should include all dollars spent on purchases for reporting period including transportation and taxes. Report fuels used in buildings only- no motor fuels.