

Strategic Energy Plan



UNIVERSITY OF ARKANSAS
FOR MEDICAL SCIENCES

Fiscal Year 2011

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Executive Summary

Act 1494 of the 87th General Assembly Regular Session – 2009, promotes the conservation of energy and natural resources in buildings owned by public agencies and institutions of higher education with primary goals to reduce total energy consumption by 20% by 2014 and 30% by 2017 when compared to Fiscal Year 2008 (July 1, 2007 through June 30, 2008). Under its own governance, each institution of higher education shall develop and administer policies, procedures, and methods for compliance with the criteria, performance standards, and goals as detailed in Act 1494. The specific strategies and efforts by each higher education institution to achieve these goals should be documented in a Strategic Energy Plan (StEP). This StEP is hereby submitted on behalf of the University of Arkansas for Medical Sciences (UAMS), a state-supported institution of higher education, to document its compliance with the requirements of Act 1494.

The UAMS campus, located in Little Rock, Arkansas is a state-supported academic medical center consisting of approximately 50 individual buildings including academic, research, laboratory, and acute care hospital spaces. In 2004, UAMS began a period of growth with more than \$400 million in construction of new facilities or expansion projects, with the emphasis of improving patient care, research and education services, and energy efficiency. This period of growth continues today with future planned improvements on the campus.

UAMS employs the use of the Energy Star Program's Portfolio Manager to monitor and track energy consumption for its facilities on campus. Utility and energy data is collected each month for the entire campus and is entered into Portfolio Manager. Energy use on a per square foot basis (i.e., Energy Use Index or EUI) for Fiscal Year 2008 was determined to be 301 kBtu/SF for the entire UAMS campus. A 20% reduction from this baseline would result in a EUI of 241 kBtu/SF with a 30% reduction yielding a EUI of 211 kBtu/SF.

UAMS' commitment to sustainability and energy efficiency has resulted in substantial energy and cost reductions over the past several years. When compared to Fiscal Year 2008 baseline energy use, UAMS has reduced its EUI campus-wide by 13.6%. Future planned projects on campus totaling an estimated capital investment of \$30,053,282 will further improve energy efficiency on campus. With these planned projects, UAMS anticipates a EUI of 220 kBtu/SF by April 2013 (a net 27% reduction from FY2008) and 125 kBtu/SF by June 2013 (a net 58% reduction from FY2008). These anticipated reductions are compliant with the goals established by Act 1494.

Facility Listing

The following table is a list of facilities located on the UAMS campus.

Facility	Year Built	Floor Area
Central Building	1955	588,254
Shorey	1957	166,265
Head and Neck Clinic	1958	4,532
Main Central Plant	1959	20,349
Barton Research	1960	64,113
Paint/Storage	1966	2,608
Computer Building	1970	9,195
Westmark Building	1972	25,097
Education II	1977	266,096
Outpatient Center	1979	101,043
North Parking Deck	1982	614,833
Physical Plant	1984	32,463
Family Medical Clinic	1986	27,617
MRI & Gamma Knife	1986	13,045
Winthrop P. Rockefeller Cancer Institute	1988,2009	468,385
Outpatient Diagnostic Clinic	1989	8,665
Mediplex Apartments	1990	5,032
Bio-Medical Research I	1993	153,479
Jones Eye Institute	1993	122,062
Education III	1993	43,780
Distribution Center	1994	48,942
Ward Tower	1997	199,600
Radiation Oncology	1998	34,495
East Parking Deck	1999	322,800
Institute on Aging	2000	96,000
Education South	2001	16,482
Arkansas Bio-Sciences (Bio-Medical Research II)	2003	141,695
Bio-Technology	2003	16,065
College of Public Health	2003	119,386
Stephens Spine & Neurosciences	2003	214,499
PET Building	2005	11,627
Bookstore	2006	4,000
Residence Hall – Admin	2006	6,076
Residence Hall – North	2006	24,270
Residence Hall – South	2006	62,445
I. Dodd Wilson Education Building	2007	44,384
West Central Energy Plant	2007	22,936
College of Health Related Professions Bldg 1	2008	13,295
College of Health Related Professions Bldg 2	2008	2,600
College of Health Related Professions Bldg 3	2008	4,210
College of Health Related Professions Bldg 4	2008	25,600
College of Health Related Professions Bldg 5	2008	25,600
College of Health Related Professions Bldg 6	2008	4,000
College of Health Related Professions Bldg 7	2008	4,000
South Parking Deck	2008	434,247
Psychiatric Research Institute	2008	101,950
Patient Bed Tower	2009	552,998
Walker Annex	2009	15,300
Primary Data Center	2010	15,000
Total		5,201,829

Key Performance Indicators

Key performance indicators typically refer to benchmark metrics used in determining energy and cost efficiencies of a facility. These metrics often include:

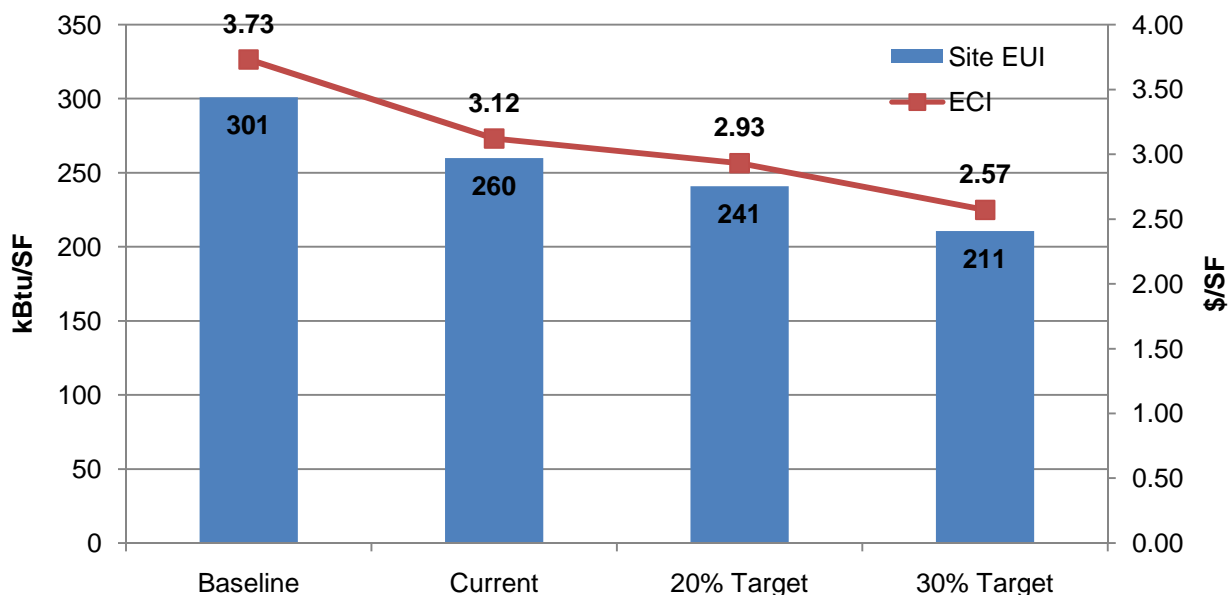
- Energy Use Index (EUI) - reflects the energy intensity of a facility in terms of 1000 British Thermal Units (Btus) per square foot (kBtu/SF)
- Energy Cost Index (ECI) - reflects the energy cost intensity of a facility in terms of dollars per square foot (\$/SF).

For UAMS, district energy systems are employed throughout the campus to provide the necessary utility services to facilities including: chilled water, steam, heating water, natural gas, electricity, and domestic water. Individual building metering is not present on all UAMS facilities. Therefore, determining individual building key performance indicators are not possible in many cases. As a result, UAMS employs a campus-wide metric in its StEP with the use of available individual building metering when present.

In conjunction with this campus-wide approach, UAMS has established and maintains a Portfolio Manager Account within the Energy Star program. While many of the space types and functions present on the UAMS campus are not available in the Energy Star program, this resource is a valuable tool in monitoring energy use and key performance indicators from a campus perspective.

The following table provides a summary of the key performance indicators for the UAMS campus for the Baseline Period (Fiscal Year 2008), the Current Period, and Targeted levels based on a 20% and 30% reduction as stipulated by Act 1494. The following information was generated by Energy Star's Portfolio Manager.

Metric	Baseline FY2008	Current (May 2010)	20% Target Reduction	30% Target Reduction
Site EUI (kBtu/SF)	301	260	241	211
ECI (\$/SF)	3.73	3.12	2.93	2.57
Annual Cost (\$/Yr)	10,719,701	11,944,486	11,224,230	9,831,090



Goals and Strategies

UAMS has experienced substantial growth over the past five (5) years and expects this growth to continue over the next several years. UAMS is committed to energy conservation for both its new and existing facilities and this commitment is demonstrated by the historical reduction of key performance indicators as detailed in the previous section (13.6% reduction from the Baseline to date). While the energy conservation efforts completed thus far have been successful, this is only the beginning of a long term campaign to realize sustainable and energy efficient operations on the UAMS campus.

Sustainability Statement

UAMS strives to create a campus consistent with the principles of triple bottom line management – People, Planet, and Profit:

People – socially attentive

Planet – environmentally conscientious

Profit – economically viable

The objectives of these principles are:

- Improve the personal well-being of staff, students, faculty, patients, and community
- Decrease UAMS' impact on the environment and improve environmental quality
- Maintain fiscal responsibility

Act 1494 Performance Goals

- Reduce total energy use per gross square foot by twenty percent (20%) by the end of Fiscal Year 2014 (June 30, 2014).
- Reduce total energy use per gross square foot by thirty percent (30%) by the end of Fiscal Year 2017 (June 30, 2017).

Capital Projects

With the continued growth on the UAMS campus, several capital projects have been identified not only to meet future load growth, but also to improve energy efficiencies of existing systems. The following information provides a summary of identified projects that UAMS is expected to pursue.

1. Campus District Energy Infrastructure Expansion and Improvements – Involves multiple phases or steps including:
 - a. Expansion of District Chilled Water and Heating Water Systems to Stephens Spine & Neurosciences (NSI) and Institute on Aging (IOA).
 - i. NSI and IOA presently have independent plants to provide heating and cooling to each respective building. This phase of the project provides for the connection of these buildings to the more energy efficient campus district chilled water and heating water systems.
 - b. Connection of Distribution Center to District Chilled Water and Heating Water Systems

- i. The Distribution Center presently has an independent plant to provide heating and cooling. This phase of the project provides for the connection of this facility to the more energy efficient campus district chilled water and heating water systems.
 - c. Install Plate and Frame Heat Exchanger at the West Central Energy Plant
 - i. This phase of the project provides for the installation of a plate and frame heat exchanger at the West Central Energy Plant to transfer excess heat from the heat pump chiller heater to the cooling towers. This will provide for additional energy savings and also increase the chilled water capacity of the plant.
 - d. Expand the District Heating Water System to the Main Campus
 - i. This phase of the project provides for the expansion of the Main Central Energy plant with a 2,000 ton heat pump chiller heater, heating water converters, and heating water pumps to provide heating water to selected buildings. Buildings to be connected will be the Physical Plant, Central Building, Shorey, Education II, Barton, MRI, PET Building, Outpatient Center, Outpatient Diagnostic Clinic, Radiology Oncology, and Jones Eye Institute.
 - e. Connect Family Medical Clinic to District Chilled Water and Heating Water Systems
 - i. The Family Medical Clinic presently has an independent plant to provide heating and cooling. This project provides for the connection of this facility to the more energy efficient campus district chilled water and heating water systems.
 - f. Expand District Heating Water System to Bio-Medical Research, Arkansas Bio-Sciences, and Ward Tower.
 - i. This project provides for the connection of Bio-Medical Research, Arkansas Bio-Sciences, and Ward Tower domestic hot water equipment to the campus district heating water system.
 - g. Capital Investment = \$21,412,490
 - h. Energy Savings = 372,819,482 kBtu/Year
 - i. Cost Savings = \$3,616,765
 - j. Campus EUI Reduction = 95.2 kBtu/SF
 - k. Planned Schedule: April 1, 2011 to June 30, 2012
- 2. Controls Programming Modification and Retro-Cx of Bio-Medical Research II
 - a. This project provides for a change to variable volume operation with six air changes per hour minimum and adjustable setpoints during unoccupied periods.
 - b. Capital Investment = \$169,682
 - c. Energy Savings = 8,556,842 kBtu/Year
 - d. Cost Savings = \$81,290
 - e. Campus EUI Reduction = 2.2 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
- 3. Retro-Commissioning of Ward Tower

- a. This project provides for retro-commissioning of Ward Tower.
 - b. Capital Investment = \$182,033
 - c. Energy Savings = 7,263,158 kBtu/Year
 - d. Cost Savings = \$69,000/Year
 - e. Campus EUI Reduction = 1.9 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
4. Retro-Commissioning of Shorey Building
 - a. This project provides for retro-commissioning of the Shorey Building.
 - b. Capital Investment = \$136,524
 - c. Energy Savings = 5,147,368 kBtu/Year
 - d. Cost Savings = \$48,900/Year
 - e. Campus EUI Reduction = 1.3 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
5. Retro-Commissioning of original Winthrop P. Rockefeller Cancer Institute
 - a. This project provides for retro-commissioning of the original (excluding the expansion) of the Winthrop P. Rockefeller Cancer Institute.
 - b. Capital Investment = \$173,280
 - c. Energy Savings = 6,105,263 kBtu/Year
 - d. Cost Savings = \$58,000/Year
 - e. Campus EUI Reduction = 1.6 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
6. Retro-Commissioning of the Jones Eye Institute
 - a. This project provides for retro-commissioning of the Jones Eye Institute.
 - b. Capital Investment = \$95,324
 - c. Energy Savings = 2,515,789 kBtu/Year
 - d. Cost Savings = \$23,900/Year
 - e. Campus EUI Reduction = 0.6 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
7. Jones Eye Institute Lighting Retrofit
 - a. This project provides for the retrofit of existing lighting fixtures with high efficiency lighting and electronic ballasts for the Jones Eye Institute.
 - b. Capital Investment = \$99,018
 - c. Energy Savings = 2,598,947 kBtu/Year
 - d. Cost Savings = \$24,690/Year
 - e. Campus EUI Reduction = 0.7 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to October 31, 2011

8. Bio-Medical Research I Lighting Retrofit
 - a. This project provides for the retrofit of existing lighting fixtures with high efficiency lighting and electronic ballasts for Bio-Medical Research I.
 - b. Capital Investment = \$202,088
 - c. Energy Savings = 4,808,421 kBtu/Year
 - d. Cost Savings = \$45,680/Year
 - e. Campus EUI Reduction = 1.2 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to October 31, 2011
9. Retro-Commissioning of the Institute on Aging
 - a. This project provides for retro-commissioning of the Institute on Aging.
 - b. Capital Investment = \$121,282
 - c. Energy Savings = 2,585,263 kBtu/Year
 - d. Cost Savings = \$24,560/Year
 - e. Campus EUI Reduction = 0.7 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
10. Education II Lighting Retrofit
 - a. This project provides for the retrofit of existing lighting fixtures with high efficiency lighting and electronic ballasts for Education II.
 - b. Capital Investment = \$325,947
 - c. Energy Savings = 6,789,474 kBtu/Year
 - d. Cost Savings = \$64,500/Year
 - e. Campus EUI Reduction = 1.7 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to October 31, 2011
11. Outpatient Center Lighting Retrofit
 - a. This project provides for the retrofit of existing lighting fixtures with high efficiency lighting and electronic ballasts for Outpatient Center.
 - b. Capital Investment = \$99,960
 - c. Energy Savings = 2,032,632 kBtu/Year
 - d. Cost Savings = \$19,310/Year
 - e. Campus EUI Reduction = 0.5 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to October 31, 2011
12. Retro-Commissioning of the Stephens Spine & Neurosciences Building
 - a. This project provides for retro-commissioning of the Stephens Spine & Neurosciences Building.
 - b. Capital Investment = \$153,004
 - c. Energy Savings = 3,042,105 kBtu/Year
 - d. Cost Savings = \$28,900/Year

- e. Campus EUI Reduction = 0.8 kBtu/SF
 - f. Planned Schedule: January 1, 2011 to June 30, 2011
13. Shorey Building Lighting Retrofit
- a. This project provides for the retrofit of existing lighting fixtures with high efficiency lighting and electronic ballasts for the Shorey Building.
 - b. Capital Investment = \$224,676
 - c. Energy Savings = 4,340,526 kBtu/Year
 - d. Cost Savings = \$41,235/Year
 - e. Campus EUI Reduction = 1.1 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to October 31, 2011
14. Education II HVAC Renovation
- a. This project provides for the converting 14 existing AHU's from constant volume, bypass multi-zone, steam reheat type to variable volume, hydronic heat type. The project also includes the installation of an exhaust air energy recovery system and an upgrade of the automatic temperature control system. The AHU's, controls, and exhaust air energy recovery system will be commissioned.
 - b. Capital Investment = \$2,929,528
 - c. Energy Savings = 44,808,421 kBtu/Year
 - d. Cost Savings = \$425,680/Year
 - e. Campus EUI Reduction = 11.4 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to June 30, 2012
15. Energy Management System Upgrade and Pneumatic Controls Replacement
- a. This project provides for the replacement of all pneumatic controls with DDC controls and upgrades of the Siemens and JCI energy management systems to current technology.
 - b. Capital Investment = \$3,728,345
 - c. Energy Savings = 54,164,211 kBtu/Year
 - d. Cost Savings = \$514,560/Year
 - e. Campus EUI Reduction = 13.8 kBtu/SF
 - f. Planned Schedule: April 1, 2011 to June 30, 2012

Capital Project Summary

Project Number	Capital Investment (\$)	Energy Savings (kBtu/Yr)	Cost Savings (\$/Yr)	EUI Reduction (kBtu/SF)	Scheduled Completion
1	21,412,590	372,819,482	3,616,765	95.2	June 2012
2	169,682	8,556,842	81,290	2.2	June 2011
3	182,033	7,263,158	69,000	1.9	June 2011
4	136,524	5,147,368	48,900	1.3	June 2011
5	173,280	6,105,263	58,000	1.6	June 2011
6	95,324	2,515,789	23,900	0.6	June 2011
7	99,018	2,598,947	24,690	0.7	October 2011
8	202,088	4,808,421	45,680	1.2	October 2011
9	121,282	2,585,263	24,560	0.7	June 2011
10	325,947	6,789,474	64,500	1.7	October 2011
11	99,960	2,032,632	19,310	0.5	October 2011
12	153,004	3,042,105	28,900	0.8	June 2011
13	224,676	4,340,526	41,235	1.1	October 2011
14	2,929,528	44,808,421	425,680	11.4	June 2012
15	3,728,345	54,164,211	514,560	13.8	June 2012
Total	30,053,282	527,577,903	5,086,970	134.7	June 2012

Summary and Conclusion

UAMS has already initiated the steps towards sustainable and energy efficient operations on its campus through the use of innovative technology, energy efficient design, and sustainable practices. Act 1494 reinforces the awareness and importance of these principles and establishes aggressive, but achievable goals.

With the anticipated energy conservation projects discussed in this StEP, UAMS will achieve both performance goals as provided by Act 1494. Based on the anticipated schedules for identified projects, UAMS shall reach the 20% reduction goal by April 2013 with the 30% reduction goal by June 2013. By June 2013, UAMS is anticipated to reduce its Energy Use Index (EUI) from 301 kBtu/SF established in FY2008 to 125 kBtu/SF at the end of FY2013. This results in a 58% reduction of energy use for the entire UAMS campus and is approximately four (4) years ahead of the schedule required by Act 1494. Below is a graphic depicting the forecasted Energy Use Index for UAMS.

