

**MEMORANDUM**

**To:** Board of Regents  
**From:** Board Office  
**Subject:** Annual Report on Energy Conservation  
**Date:** September 8, 2003

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**Recommended Actions:**

1. Receive the Annual Report on Energy Conservation.
  2. Encourage the institutions to continue to pursue energy conservation measures and other methods to control energy costs, as funding allows, in addition to the measures currently planned for FY 2004.
  3. Incorporate energy conservation items and life cycle costs analyses into major capital projects as part of the Board's direction adopted in June 2003 to minimize the need for increased operating funds related to new construction and renovations, as well as for other existing campus facilities, while continuing to emphasize funding needed for on-going maintenance and repairs.
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**Executive Summary:**

Annually, the Board receives a report on energy conservation efforts at the Regent institutions.

- This report provides a means of assessing the effectiveness of the institutions' stewardship of public resources, and efforts to identify and implement best practices, consistent with Priority 4.2 of the Board's 2004-2009 Strategic Plan.

The report:

- Provides information on FY 2003 energy usage and energy costs, and energy conservation measures undertaken at the Regent institutions;
- Addresses the institutions' plans to continue to control energy costs in FY 2004 and future years; and
- Fulfills a statutory requirement to provide a status report on the implementation of energy conservation measures (projects) identified in the 1989 energy audits of the campus facilities.

**FY 2003 Energy  
Consumption  
Levels**

The FY 2003 energy conservation efforts of the Regent institutions helped to limit the total increase in energy consumption per gross square foot to an average of 1.9 percent over FY 2002 (see Table 1, page 5).

- This average includes a 12.5 percent increase in BTUs per gross square foot at the Iowa School for the Deaf due, in part, to the first full year of operation of the Lied Multipurpose Complex; the School plans to track closely the energy usage for the facility in FY 2004 and investigate potential energy reduction measures.
- The remaining institutions reported minor changes from FY 2002 to FY 2003 in energy consumption on a BTU per gross square foot basis.

FY 2003 energy consumption reflects an average reduction of 26.7 percent on a BTU (British Thermal Unit) basis per gross square foot since FY 1979, the peak consumption year.

**FY 2003 Energy  
Costs**

Total energy expenditures at the Regent institutions increased 6.5 percent, or approximately \$1.8 million, from FY 2002 (see Table 2, page 6).

- With the exception of the Iowa School for the Deaf, the increased expenses are not as closely linked to increased consumption, but rather are primarily the result of increased energy costs, particularly for natural gas.
  - All of the Regent institutions report significant increases in the unit cost of natural gas from FY 2002 to FY 2003, with increases ranging from 15 percent to 50 percent.

**FY 2003 Energy  
Conservation  
Efforts**

In FY 2003, the Regent institutions continued to implement the energy conservation measures begun in FY 2002 in an effort to control or further reduce energy usage and expenditures in response to budget constraints.

- The University of Iowa continued the implementation of its "Principles for Energy Conservation" begun in August 2001. (The principles are outlined in Appendix B, page 19).
  - Partially as a result of the implementation of these principles, the increase in the University's FY 2003 energy consumption (BTUs per gross square foot) compared to FY 2002 was limited to 4.3 percent, while total heating degree days increased 23 percent over the previous fiscal year.

- Iowa State University continued the implementation of its comprehensive plan begun in FY 2002 to provide general fund energy savings totaling \$1.5 million per year. (The plan is outlined in Appendix B, pages 20 and 21).
  - The plan, as well as less severe weather conditions, resulted in a 3 percent reduction in total energy consumption per gross square foot from FY 2002; this is in addition to a 9.8 percent reduction in energy consumption from FY 2001 to FY 2002.
- The University of Northern Iowa continued the implementation of its unoccupied energy cycle programs, building temperature and lighting controls, and the distribution of campus communications to promote energy awareness and reduced consumption levels.
  - These efforts, particularly the success of campus communications, limited the University's FY 2002 increase in energy consumption to 1.6 percent over FY 2002.

The institutions also worked to identify and evaluate new possibilities for energy conservation efforts to further improve energy savings.

#### Capital Projects

In FY 2003, the institutions completed individual energy conservation projects in existing campus buildings including chilled water improvements, roof replacements, mechanical upgrades, and lighting and mechanical control installations; these improvements have contributed to the limited increase in total energy consumption per gross square foot reported in FY 2003.

The institutions also initiated or continued major utility upgrades and building renovation projects in FY 2003 with energy conservation components; the energy savings from these projects will impact energy consumption reported in future years, following completion of the projects.

Further details on the institutions' FY 2003 energy conservation projects and plans are included in Appendix B.

#### Impact of Energy Conservation on Building Operating Costs

With Board approval of the new policies for major capital projects in June 2003, the institutions were directed to minimize the need for increased operating funds for new construction and renovations, while continuing to emphasize funding needed for on-going maintenance and repairs. The institutions were also asked to evaluate operations and maintenance costs for other campus facilities.

The energy conservation measures undertaken by the institutions in existing campus buildings help to reduce the operating costs of the facilities.

- Many older campus facilities were not designed or constructed for energy efficiency.

The institutions also incorporate energy conservation elements into the design of new construction and renovation projects to reduce the additional impact on total campus energy consumption when the facilities become operational.

- The University of Iowa participates in the MidAmerican Energy Efficient Commercial New Construction Program, which recommends various energy conservation strategies for new construction and major remodeling projects.

**FY 2004 and  
Future Energy  
Conservation  
Efforts**

The institutions are continuing in FY 2004 the implementation and communication of established energy conservation guidelines, focusing primarily on reducing building temperatures and equipment and lighting usage, in an effort to further control energy consumption and building operating costs.

The institutions are also continuing to undertake capital projects for improved energy conservation, as funding is available, and continuing their efforts to identify and implement new energy conservation measures to further reduce energy expenditures and operating costs for the campus facilities.

**1989 Energy  
Conservation  
Audits**

The Board is required, in accordance with Iowa Code §473.12, to report by October 1 of each year to the Department of Natural Resources on the results of energy usage analyses of the Board's facilities and the status of energy conservation measures identified in the comprehensive engineering analyses completed by the institutions in 1989.

Since 1989, the institutions have completed a total of 688 energy conservation measures identified in comprehensive engineering analyses. Approximately \$28.2 million have been spent to date on identified energy conservation measures, saving approximately \$6.5 million annually for a simple payback of 4.3 years.

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**Strategic Plan**

The Annual Report on Energy Conservation provides a means of assessing the effectiveness of the institutions' stewardship of public resources, and efforts to identify and implement best practices, consistent with Priority 4.2 of the Board's 2004-2009 Strategic Plan.

**Background and Analysis:**

**Energy Usage and Costs**

**Energy Usage** Table 1 summarizes institutional reports of total energy consumption per gross square foot for 1979 (the peak consumption year), and from FY 2000 through FY 2003.

TABLE 1  
Energy Consumption (BTUs/GSF)

	<u>FY 1979</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 79 to FY 03</u>	<u>% Change FY 02 to FY 03</u>
SUI	523,030	410,786	412,901	387,947	404,730	(22.6)	4.3
ISU	635,606	419,604	419,736	378,598	367,074	(42.2)	(3.0)
UNI	409,364	340,194	351,932	340,882	346,168	(15.4)	1.6
ISD	N/A	155,631	141,354	124,528	140,131	N/A	12.5
IBSSS	N/A	110,992	122,879	106,132	105,131	N/A	<u>(0.9)</u>
<b>WEIGHTED AVERAGE</b>							<b>1.9</b>

**Energy Usage** FY 2003 energy consumption per gross square foot at the Regent institutions increased by an average of 1.9 percent from FY 2002; the institutions' continued energy conservation efforts have helped to limit this increase.

- The most significant increase in consumption (BTUs per gross square foot) was reported at the Iowa School for the Deaf (12.5 percent) due in part to the first full year of operation of the Lied Multipurpose Complex.
- Operation of the facility significantly contributed to an increase in the School's consumption levels for both natural gas (7.6 percent) and electricity (64.7 percent) from FY 2002, as outlined on Tables 6 and 7 in Appendix A (pages 14 and 15).
- The School plans to track closely the energy usage for the Lied Multipurpose Complex in FY 2004 and investigate potential energy reduction measures for the facility, realizing that there is a "shake-out" period for mechanical systems in new buildings.

- Energy consumption on a BTU per gross square foot basis also increased at the University of Iowa (4.3 percent) and the University of Northern Iowa (1.6 percent).
- The increase at the University of Iowa can be attributed to a 23 percent increase in heating degree days over the previous fiscal year.
- Iowa State University and the Iowa Braille and Sight Saving School report decreases in energy consumption from FY 2002 due to their energy conservation efforts on campus.

The changes in energy consumption per gross square foot are generally consistent with changes in total consumption, as outlined on Table 5 in Appendix A (page 14).

The FY 2003 energy consumption rates reflect a significant reduction on a BTU (British Thermal Unit) per gross square foot basis since FY 1979, the peak consumption year:

	<u>BTU/GSF Change</u> <u>FY 1979 – FY 2003</u>
University of Iowa	(22.6 percent)
Iowa State University	(42.2 percent)
University of Northern Iowa	(15.4 percent)

The reductions since 1979 are more impressive than the data indicate considering the growth in the installation of energy-consuming research and diagnostic equipment, personal computers and air conditioning equipment.

Information detailing energy consumption by fuel source at the institutions is included in Appendix A.

**Energy Costs**

The following table summarizes institutional reports of total energy costs from FY 1997 through FY 2003. It does not include water, sewer or personnel costs.

**TABLE 2**  
**Total Energy Costs**

	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change</u> <u>FY 2002-</u> <u>FY 2003</u>
SUI	\$12,712,118	\$13,248,367	\$13,272,715	\$13,798,666	\$16,071,459	\$15,200,996	\$16,280,223	7.1
ISU	7,056,472	7,195,315	7,516,343	7,562,904	9,338,125	9,310,120	9,442,412	1.4
UNI	2,460,272	2,279,672	2,263,235	2,309,343	2,731,833	2,518,216	2,978,270	18.3
ISD	190,727	172,155	166,353	168,151	267,431	194,082	275,072	41.7
IBSSS	122,645	98,245	87,080	90,221	136,828	82,746	98,037	18.5
<b>TOTAL</b>	<b><u>\$22,542,234</u></b>	<b><u>\$22,993,754</u></b>	<b><u>\$23,305,726</u></b>	<b><u>\$23,929,285</u></b>	<b><u>\$28,545,676</u></b>	<b><u>\$27,306,160</u></b>	<b><u>\$29,074,014</u></b>	<b><u>6.5%</u></b>

Total FY 2003 energy costs at the Regent institutions increased 6.5 percent, or approximately \$1.8 million, compared to FY 2002 total energy costs.

- The largest cost increase (41.7 percent) was reported at the Iowa School for the Deaf, consistent with its increased consumption due, in large part, to the first full year of operation of the Lied Multipurpose Complex.
- The FY 2003 total cost increases at the remaining institutions were more closely linked with increases in the cost of energy rather than with increased consumption levels.
  - Significant total energy cost increases were also reported at the University of Northern Iowa (18.3 percent) and the Iowa Braille and Sight Saving School (18.5 percent).
  - However, these cost increases occurred while total consumption levels changed only slightly.
    - Total energy consumption (BTUs per gross square foot) increased by 1.6 percent at the University of Northern Iowa, and decreased 0.9 percent at the Iowa Braille and Sight Saving School, as outlined on Table 1 (page 5).
    - The increase in total energy costs at the two institutions is generally consistent with their energy cost increases per gross square foot and per million BTU.
- The most significant factor in the increase in the institutions' cost of energy in FY 2003 was the significant increase in the unit cost of natural gas.
  - The natural gas unit cost increases from FY 2002 to FY 2003, as reported by the institutions, range from 15 percent to 50 percent as outlined on Table 9 in Appendix A (page 16).
- The University of Northern Iowa also experienced a significant increase (42.5 percent) in its price for coal from the previous fiscal year as outlined on Table 11 in Appendix A (page 17).
  - The University reports that the increase is the result of the use of a coal supply that was bid in FY 2001 at a time of higher market rates.

There are wide differences among the institutions in the cost of energy; changes in energy costs by institution by year represent fluctuations in the mix of fuels, fluctuations in coal, natural gas and purchased electricity prices and the availability of economy power.

**TABLE 3**  
**Total Energy Costs (\$/GSF)**

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 – FY 2003</u>	<u>% Change FY 2002 – FY 2003</u>
SUI	\$1.15	\$ 1.06	\$ 1.11	(3.5)	4.7
ISU	.91	.88	.88	(3.3)	--
UNI	.72	.66	.78	8.3	18.2
ISD	.86	.63	.75	(12.8)	19.0
IBSSS	.72	.43	.52	(27.8)	20.9

**TABLE 4**  
**Total Energy Costs (\$/Million BTUs)**

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 – FY 2003</u>	<u>% Change FY 2002 – FY 2003</u>
SUI	\$2.78	2.73	2.75	(1.1)	0.7
ISU	2.17	2.33	2.39	10.1	2.6
UNI	2.05	1.92	2.25	9.8	17.2
ISD	6.10	5.03	5.36	(12.1)	6.6
IBSSS	5.85	4.10	4.90	(16.2)	19.5

Information detailing energy costs by fuel source at the institutions is included in Appendix A.

**Capital Projects**

In FY 2003, the institutions completed energy conservation projects and incorporated energy conservation measures into new construction and remodeling projects.

- The University of Iowa completed the installation of a chilled water system to serve the Arts Campus, replaced roofs for several campus buildings, and upgraded the air handling units in the Ambulatory Surgery Center in the UIHC Colloton Pavilion.
- The University also continued major renovation projects in the Biological Sciences Buildings, Medical Laboratories, and Spence Laboratories of Psychology, all of which include energy conservation components including window replacements and mechanical upgrades.



- Iowa State University completed chilled water improvements at the Veterinary Medicine complex, replaced control systems at the Power Plant, and installed lighting and mechanical controls in various campus buildings.
- The University of Northern Iowa completed the installation of lighting controls in the Performing Arts Center.
  - The University also continued with the upgrade of its campus steam distribution system, and initiated the replacement of the heating, ventilating and air conditioning systems of the Towers Center.
- In light of increasing energy costs, the institutions should continue these efforts, as funding allows, including conservation measures in the residence system facilities, if they are cost effective and feasible.

Further details on the institutions' FY 2003 energy conservation measures and FY 2004 plans are included in Appendix B.

**Impact of Energy  
Conservation on  
Building  
Operating Costs**

With Board approval of the new policies for major capital projects in June 2003, the institutions were directed to minimize the need for increased operating funds for new construction and renovations, as well as for other existing campus facilities, while continuing to emphasize funding needed for on-going maintenance and repairs. The institutions were also asked to evaluate operations and maintenance costs for other campus facilities.

The institutions' energy conservation improvements in existing campus buildings serve to reduce a portion of the operating costs of the facilities.

- Many older campus facilities were not designed or constructed for energy efficiency.

The following are examples of energy conservation improvements undertaken by the institutions and the impact on building operating costs:

- The upgrade of heating, cooling and other mechanical systems with more energy efficient components improves the efficiency of the building operating systems, thereby reducing the cost of heating and cooling the facilities.
- The replacement of aging roofs and windows can significantly reduce energy loss from the buildings.
- The installation of new or the upgrade of existing campus utility systems can improve the efficiency and cost-effectiveness of heating and cooling the campus facilities, particularly for older buildings.

Prior to proceeding with any energy conservation improvement, the institutions evaluate the project cost relative to the estimated energy savings, the estimated payback period (the period of time for the energy savings to match the project cost), and available funds.

The institutions also incorporate energy conservation elements into the design of new construction and renovation projects to reduce the additional impact on total campus energy consumption when the facilities become operational.

**FY 2004 and  
Future Energy  
Conservation  
Efforts**

The institutions are continuing the implementation and communication of established energy conservation guidelines in FY 2004, focusing primarily on reducing building temperatures and equipment and lighting usage, in an effort to further control energy consumption and building operating costs.

As further outlined in this section, the institutions are also continuing to undertake capital projects for improved energy conservation, as funding is available, and continuing their efforts to identify and implement new energy conservation measures to further reduce energy expenditures and operating costs for the campus facilities.

**University of Iowa**

The University plans to begin construction on the West Campus Chilled Water Plant Development/Expansion project in FY 2004.

- The project will construct an addition to the existing plant to increase its chilled water capacity to serve the expanding needs of the west campus and Arts Campus in the most energy-efficient manner.

The University will continue with several renovation projects currently underway which include the upgrade of heating, ventilating and air conditioning systems and window replacements.

- Included are the Biological Sciences Renovation/Replacement—Phase 2 project, the Medical Laboratories—Cancer Biology and Immunology Renovation and Medical Laboratories Remodel Rooms 3186-3198 projects, and the Spence Laboratories of Psychology—Phase 2 project.

The University also plans to continue the replacement of roofs on selected facilities, particularly at University Hospitals and Clinics, the replacement of piping systems and windows at the Mayflower Residence Hall, the replacement of windows at Medical Laboratories building, and the replacement of air handling units in the Bowen Science Building,

The University is continuing with the MidAmerican Energy Efficient Commercial New Construction Program, which recommends various energy conservation strategies for new construction and major remodeling projects.

- The University reports that this program will result (when construction is complete) in construction incentives to the University totaling approximately \$962,173, and energy savings estimated at \$1,021,477, for nine of 12 major new construction and renovation projects which have been identified for the program.
- The majority of the University's current major new construction projects are included in this program: the Blank Honors Center, Carver Biomedical Research Facility, Pomerantz Center, Art Building, Adler Journalism and Mass Communications Building, and the UIHC Center of Excellence in Image-Guided Radiation Therapy.
- Projects completed under the program include the Medical Education and Biomedical Research Facility and the Hawkeye Athletic/Recreation Facilities Complex—Visitors Center/Hall of Fame building.
- The University also reports that two future major construction projects, the Medical Education and Biomedical Research Facility—Phase C, and the West Campus Residence Hall, would participate in this program.

Iowa State  
University

Iowa State University plans to install more energy efficient lighting in the Town Engineering Building, and install occupancy controls for the fume hoods in the Molecular Biology Building.

- These measures were identified in the University's FY 2002 energy audit of six of its more energy intensive campus buildings; the audit recommended energy conservation projects totaling \$1.2 million, with an estimated payback of approximately four years.
- The University plans to undertake additional energy improvements identified in the audit as funding is available.

University of  
Northern Iowa

The University of Northern Iowa is continuing the implementation of its unoccupied energy cycle programs during evenings, weekends and holidays, building temperature controls, and the distribution of campus communications requesting cooperation in reducing the use of lights, computers and other equipment.

- The University is expanding this effort with the establishment of a campus energy advisory committee, with involvement of the University's Center for Energy and Environmental Education, for the purpose of developing ideas to better educate campus energy users and further support energy awareness.
- The University also plans to evaluate the recommendations of a student study which analyzed and developed a marketing plan to further communicate energy awareness on campus.

A campus cooling study is currently underway to evaluate the feasibility of utilizing chilled water systems to cool campus buildings; potential energy usage and operating costs will be evaluated as part of this study.

The University plans to undertake a cost-benefit analysis for the possible development of a utility enterprise system.

#### Special Schools

The Iowa School for the Deaf reports it plans to track closely the energy usage for the Lied Multipurpose Complex and investigate potential energy reduction measures for the facility, realizing that there is a "shake-out" period for mechanical systems in new buildings.

The Iowa Braille and Sight Saving School will continue its efforts to conserve energy through operational improvements and energy efficiency upgrades.

- This could include expansion of the geothermal energy system (which currently provides heating and cooling for the Rice Hall dormitory) to heat a portion of the main building, the Rice Hall domestic water supply, and the Natatorium pool areas.
- The School plans to improve the utilization of its energy management system to further reduce usage of building heating and cooling systems during unoccupied periods, install more energy efficient lighting, and further evaluate operating and maintenance procedures.
- The School also plans to continue staff education to promote cooperation in the School's energy conservation efforts.

#### Status Report on Implementation of Energy Conservation Measures

##### 1989 Identified Projects

In accordance with Iowa Code §473.12, the institutions undertook analyses in 1989 to identify energy conservation measures in an effort to reduce energy consumption and control energy costs.

The analyses identified a total of \$80.4 million (2003 dollars) in energy conservation measures, which were to be implemented if economically feasible and practical, and if they had a simple payback period of six years or less.

- The simple payback formula (total project cost divided by estimated annual savings) was used in all 1989 analyses to determine the estimated amount of time needed to realize energy savings equal to the project cost.
- The simple payback for the identified projects ranged from less than one month to more than 25 years.

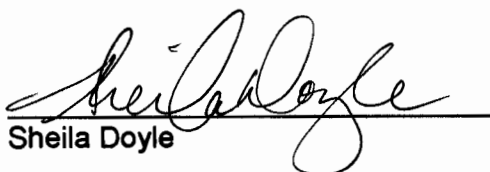
Projects totaling \$44.6 million had individual payback periods of six years or less and were identified as the projects most likely to be implemented. It was estimated that these projects would save approximately \$11.1 million (2003 dollars) annually for a simple payback of 4.03 years.

Many of the projects identified in the technical assistance studies have not been completed because the payback period is greater than six years, the project was not feasible when further analyzed, or it was determined that installation costs were excessive due to unusual construction circumstances.

To date, approximately \$28.2 million have been spent on 688 completed energy conservation measures (73 percent of the identified energy conservation measures with payback periods of six years or less), saving approximately \$6.5 million annually for a simple payback of 4.3 years.

The majority of the energy conservation measures implemented at the institutions were completed a number of years ago; the institutions report that they will work to address the remaining measures to the extent that funding is available.

The costs and savings associated with the identified energy conservation projects are measured in 2003 dollars and are summarized by institution on Table 12 in Appendix C (page 23).

  
Sheila Doyle

Approved:

  
Gregory S. Nichols

Appendix A

Energy Consumption and Cost Data

Consumption

The following information details institutional changes in total consumption (MMBTUs), and the consumption of natural gas, electricity, and coal in FY 2003.

The changes in consumption vary greatly by institution and by fuel type. In general, the institutions work to utilize the most cost-effective energy source wherever possible.

TABLE 5  
Total Consumption (Million BTUs)

	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 01 to FY 02</u>	<u>% Change FY 02 to FY 03</u>
SUI	5,610,185	5,784,098	5,576,887	5,915,953	2.3	6.1
ISU	3,945,248	4,237,999	4,299,408	3,999,393	(5.6)	(7.0)
UNI	1,274,158	1,333,936	1,311,480	1,322,863	(0.8)	0.9
ISD	48,246	43,820	38,604	51,277	17.0	32.8
IBSSS	<u>21,127</u>	<u>23,389</u>	<u>20,201</u>	<u>20,011</u>	(14.4)	(0.9)
TOTAL	10,898,964	11,423,242	11,246,580	11,309,497	(1.0)	0.6

The changes in total energy consumption at the institutions are generally consistent with the changes in consumption per gross square foot as outlined on Table 1 (page 5).

TABLE 6  
Natural Gas Consumption (Million BTUs)

	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 to FY 2003</u>	<u>% Change FY 2002 to FY 2003</u>
SUI	5,103,942	4,513,081	5,093,725	5,473,700	21.3	7.5
ISU	1,364,360	1,460,637	1,266,564	1,125,670	(22.9)	(11.1)
UNI	42,995	52,661	23,274	22,324	(57.6)	(4.1)
ISD	32,045	26,754	21,537	23,171	(13.4)	7.6
IBSSS	9,995	12,730	9,654	10,161	(20.2)	5.3

Natural Gas

The University of Iowa and the two special schools reported moderate increases in natural gas consumption ranging from 5.3 percent to 7.6 percent in FY 2003.

- The University of Iowa attributes its increase in natural gas consumption (7.5 percent) to the 23 percent increase in heating degree days over the previous fiscal year.

- Weather conditions significantly affect natural gas usage at the special schools; the schools can only use natural gas for heating since their boilers do not burn coal.
- The FY 2003 increase in natural gas consumption at the Iowa School for the Deaf can also be attributed to operation of the heated swimming pool in the Lied Multipurpose Complex.
- Despite the use of additional natural gas to heat the pool, the School's increase in natural gas consumption was mitigated due to energy efficiencies resulting from the installation of new steam mains and returns in FY 2002.

TABLE 7  
Electrical Consumption (Million BTUs)

	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 to FY 2003</u>	<u>% Change FY 2002 to FY 2003</u>
SUI	2,570,657	2,370,970	2,483,762	2,547,205	7.4	2.6
ISU	792,582	863,647	881,912	842,673	(2.4)	(4.4)
UNI	429,298	433,885	431,650	413,985	(4.6)	(4.1)
ISD	16,201	17,066	17,067	28,106	64.7	64.7
IBSSS	11,132	10,659	10,547	9,850	(7.6)	(6.6)

**Electrical**

Electrical consumption increased significantly at the Iowa School for the Deaf due in large part to the first full year of operation of the Lied Multipurpose Complex.

Purchased electricity decisions affect the total BTUs reported by the universities; the universities buy power when economically feasible and cogenerate when that is the most cost-effective option.

The University of Iowa reported a slight increase in electrical consumption (2.6 percent); the remaining institutions reported decreases.

TABLE 8  
Coal Consumption (Tons)

	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 to FY 2003</u>	<u>% Change FY 2002 to FY 2003</u>
SUI	99,361	120,426	106,383	109,833	(8.8)	3.2
ISU	136,963	142,591	127,360	127,662	(10.5)	0.2
UNI	26,912	29,164	29,192	23,436	(19.6)	(19.7)

**Coal** In FY 2003, coal consumption remained relatively stable at the University of Iowa and Iowa State University.

The University of Northern Iowa decreased its coal consumption in FY 2003 by 19.7 percent in response to a sharp increase (42.5 percent) in the University's cost per MMBTU for coal.

- The reduced coal usage was partially offset by an increased use of petroleum coke which was a more cost-effective alternative to coal.

**Costs** The following information details institutional changes in the cost of natural gas, electricity, and coal in FY 2003.

With the exception of natural gas costs, which increased significantly at all five institutions, the changes in energy costs vary greatly by institution and by fuel type.

TABLE 9  
Natural Gas Costs (\$/Million BTUs)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 – FY 2003</u>	<u>% Change FY 2002 – FY 2003</u>
SUI	7.18	3.71	5.57	(22.4)	50.1
ISU	6.65	5.78	6.65	--	15.1
UNI	5.67	4.23	5.50	(3.0)	30.0
ISD	6.65	4.70	5.96	(10.4)	26.8
IBSSS	6.70	3.52	5.23	(21.9)	48.6

**Natural Gas** In FY 2003, natural gas unit costs increased significantly at all of the Regent institutions, with increases ranging from 15.1 percent to 50.1 percent.

- The institutions report greater volatility with respect to the unit prices charged by natural gas suppliers during FY 2003.

At the special schools, large increases in the unit cost of natural gas can have a dramatic impact on energy costs since the schools do not have the ability to burn coal as an alternative fuel.



TABLE 10  
Electrical Costs (\$/Kwh)<sup>1</sup>

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 – FY 2003</u>	<u>% Change FY 2002 – FY 2003</u>
SUI	0.040	0.039	0.038	(5.0)	(2.6)
ISU <sup>2</sup>	0.031	0.037	0.036	16.1	(2.7)
UNI	0.029	0.030	0.033	13.8	10.0
ISD	0.061	0.063	0.056	(8.2)	(11.1)
IBSSS	0.056	0.050	0.053	(5.4)	6.0

<sup>1</sup>Purchased electricity only

<sup>2</sup>Average of monthly unit costs, not weighted average cost per Kwh

**Electrical**

Electrical costs per kilowatt hour remained relatively stable at the Regent institutions in FY 2003 (decreasing an average of .08 percent).

However, the University of Northern Iowa reports a 10 percent increase in the electrical rates (cost per kilowatt hour) charged by its municipal utility; even with this increase, the University's rates remained the lowest among the Regent institutions.

Iowa State University attributes the increase in its purchased electricity costs since FY 2001 (16.1%) to additional competition for electrical power and transmission line delivery restrictions during this time period.

TABLE 11  
Coal Costs (\$/Million BTUs)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>	<u>% Change FY 2001 – FY 2003</u>	<u>% Change FY 2002 – FY 2003</u>
SUI	1.55	2.04	1.73	11.6	(15.2)
ISU	1.87	2.02	2.11	12.8	4.5
UNI	1.69	1.67	2.38	40.8	42.5

**Coal**

The difference in coal costs among the three universities is a function of the coal specifications, timing of the purchase, and transportation costs.

- The universities' coal specifications reflect differences in coal sizing and content for use in the boilers.
- The universities each purchase coal at different times of the year, which results in varying market prices.
- Transportation costs differ among the universities due to their varying distances from the Mississippi River where the coal is shipped to the state via barge.

The University of Northern Iowa reports a sharp increase in its FY 2003 coal costs (42.5 percent) over the previous fiscal year.

- The University used during FY 2003 coal which was bid in FY 2001 at a time of higher market rates.

The increase in coal costs at Iowa State University (4.5 percent) can also be attributed to the use of higher-priced coal bid in FY 2001.

The decrease in coal costs at the University of Iowa (15.2 percent) is attributed to a moderation in the University's coal prices following the 32 percent cost increase between FY 2001 and FY 2002.

Appendix B

Highlights—Energy Conservation Activities

University of Iowa

**FY 2003 Energy  
Conservation  
Projects**

The University completed the following energy conservation measures during FY 2003.

- Construction of a central chilled water system for the Arts Campus.
- Roof replacements at University Hospitals and Clinics, Calvin and Seashore Halls, the Power Plant, Field House and Medical Laboratories.
- Upgrade of the air handling units serving the Ambulatory Surgery Center in the UIHC Colloton Pavilion.

**Principles for  
Energy  
Conservation**

The following are highlights of the University's "Principles for Energy Conservation" (adopted August 2001):

- The University's energy conservation practices will be guided by its 2001-2005 strategic plan to respond to reductions in state appropriations, the availability and cost of energy resources, and the University's responsibility for environmental stewardship.
- The energy conservation initiatives and practices must not impede the University's ability to attract and retain students nor the teaching and research mission of the University.
- Classrooms will be scheduled to make efficient use of energy.
- Energy conservation measures must provide tolerable environmental conditions for faculty, staff and students; where possible, building temperatures will be set to 78 degrees in the summer and 68 degrees in the winter during operating hours, and set back further during off-hours and weekends.
- The University will provide communications to promote and implement energy conservation initiatives and awareness among faculty, staff and students.

**1989 Energy  
Audit Projects**

Annual savings are estimated at approximately \$5.9 million from 495 projects identified in the 1989 studies and implemented to date.

In FY 2003, the University completed four additional projects identified in the 1989 analyses.

- Included were the final phases of lighting improvements in the Lindquist Center and the Seamans Center for the Engineering Arts and Sciences, and the installation of mechanical system controls in the International Center and the Theatre Building.

**Iowa State University**

**FY 2003 Energy  
Conservation  
Projects**

The University completed the following energy conservation measures during FY 2003:

- Replacement of chilled water coils and the addition of variable speed chilled water pumps at the Veterinary Medicine Complex; this freed up chilled water capacity to serve the Veterinary Medicine Biosecurity Unit without increasing the chilled water capacity of the Veterinary Medicine Power Plant. (The Biosecurity Unit is currently under construction with an anticipated completion date of September 2003.)
- Replacement of the control system for the Power Plant Boiler #4 for more energy efficient operations.
- Installation of occupancy sensors to control lighting systems in the public areas of the main campus buildings, and installation of heating, ventilating and air conditioning system controls in various campus buildings.
- Removal of asbestos, and installation of more energy efficient and safer insulation in the University's steam distribution system.

**FY 2002  
Comprehensive  
Plan**

In FY 2002, the University implemented a comprehensive plan to provide general fund energy savings totaling \$1.5 million per year.

- The plan began with audits of each campus building to evaluate potential energy saving strategies and building system performance, install energy control devices, and identify other potential energy conservation measures for future implementation.
- The plan has included the following:
  - Operating most campus buildings at 78 degrees in the cooling months (April through September) and 68 degrees in the heating months (October through March).

- Continuing the operation of the off-hour activity center program which clusters night classes and meetings into designated night activity areas.
- Shutting down as many building air handling systems as possible during the evenings and weekends.
- Communication of energy conservation efforts and results on the University's web site.
- Continuing to review new building and renovation projects for energy conservation opportunities.

**1989 Energy  
Audit Projects**

Annual savings are estimated at \$223,318 from 108 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years.

For the general university, the energy conservation measures identified in the comprehensive engineering analyses with payback periods of less than six years have been completed, incorporated into renovations, or determined not to be feasible.

**University of Northern Iowa**

**FY 2003 Energy  
Conservation  
Projects**

In FY 2003, the University completed the installation of lighting controls in the Performing Arts Center to reduce the electrical costs for the facility.

The University also proceeded with the following major utility and renovation projects:

- The University continued with the Steam Distribution System Replacement—Phase 1 project which will address the need for a reliable campus steam distribution system and improve the energy efficiency of the system.
- The University initiated the Towers Center Improvements project which will upgrade the heating, ventilating and air conditioning systems of the dining facility.

**1989 Energy  
Audit Projects**

Annual savings are estimated at \$328,668 from 62 projects identified in the 1989 studies and implemented to date; the majority of these projects have been complete for a number of years.

**Iowa School for the Deaf**

**FY 2003 Energy Conservation Projects**      **Projects undertaken in FY 2003 consisted of the installation of a more energy efficient heating system for the staff residences.**

**1989 Energy Audit Projects**      **Annual savings are estimated at \$11,952 from 11 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years and represent all of the energy conservation measures identified for implementation.**

**Iowa Braille and Sight Saving School**

**FY 2003 Energy Conservation Projects**      **Projects undertaken in FY 2003 included the continued shut down of building heating and cooling systems during unoccupied periods, and the installation of more energy efficient lighting components.**

**1989 Energy Audit Projects**      **Annual savings are estimated at \$18,310 from 12 projects identified in the 1989 studies and implemented to date; these projects have been complete for a number of years and represent all of the energy conservation measures identified for implementation. The School has completed all practical energy conservation measures with a payback period of six years or less.**

TABLE 12  
SUMMARY  
ENERGY CONSERVATION MEASURES - IDENTIFIED AND COMPLETED

	Projects Identified in 1989 Engineering Analyses				Identified Projects with Payback Periods of Less than 6 Years				Identified Projects Completed to Date			
	# of Proj.	Identified Capital Costs (2003\$)	Projected Annual Energy Savings (2003\$)	Est. Pay-back Prd. (Yrs)	# of Proj.	Identified Capital Costs (2003\$)	Projected Annual Energy Savings (2003\$)	Est. Pay-back Prd. (Yrs)	# of Proj.	Actual Capital Costs (2003\$)	Annual Energy Savings (2003\$)	Est. Pay-back Prd. (Yrs)
<b>University of Iowa</b>												
General Fund - Main Campus	659	\$16,923,015	\$3,178,858	5.32	453	\$7,867,005	\$2,002,274	3.93	404	10,358,389	2,002,724	5.17
General Fund - Oakdale	67	438,748	75,558	5.81	45	144,709	35,962	4.02	29	309,478	54,561	5.67
Athletics	14	151,772	30,064	5.05	10	97,288	23,156	4.20	10	108,970	22,080	4.94
Hospital	17	15,859,710	3,306,745	4.80	12	11,834,995	2,936,140	4.03	13	8,777,723	2,086,279	4.21
Hospital School	7	690,601	137,969	5.01	4	559,193	126,610	4.42	4	568,087	121,006	4.69
Iowa Memorial Union	11	300,936	58,209	5.17	8	209,668	46,832	4.48	5	89,015	15,189	5.86
Residence Halls	100	1,319,003	284,251	4.64	62	806,690	219,642	3.67	28	404,919	100,962	4.01
Utility Enterprise	9	20,840,385	4,325,013	4.82	8	19,768,531	4,163,818	4.75	2	6,170,200	1,533,768	4.02
<b>Subtotal</b>	<b>884</b>	<b>\$56,524,171</b>	<b>\$11,396,667</b>	<b>4.96</b>	<b>602</b>	<b>\$41,288,081</b>	<b>\$9,554,435</b>	<b>4.32</b>	<b>495</b>	<b>\$26,786,781</b>	<b>\$5,936,569</b>	<b>4.51</b>
<b>Iowa State University</b>												
General Fund Buildings	507	\$11,783,948	\$1,164,329	10.12	180	\$1,012,213	\$696,049	1.45	108	\$458,885	\$223,318	2.05
<b>Subtotal</b>	<b>507</b>	<b>\$11,783,948</b>	<b>\$1,164,329</b>	<b>10.12</b>	<b>180</b>	<b>\$1,012,213</b>	<b>\$696,049</b>	<b>1.45</b>	<b>108</b>	<b>\$458,885</b>	<b>\$223,318</b>	<b>2.05</b>
<b>University of Northern Iowa</b>												
General Fund Buildings	228	\$10,700,314	\$1,505,950	7.11	63	\$1,382,652	\$562,815	2.46	38	\$592,811	\$292,353	2.03
Residence Halls	90	1,130,642	256,203	4.41	80	828,070	239,543	3.46	24	239,398	36,315	6.59
<b>Subtotal</b>	<b>318</b>	<b>\$11,830,955</b>	<b>\$1,762,153</b>	<b>6.71</b>	<b>143</b>	<b>\$2,210,722</b>	<b>\$802,358</b>	<b>2.76</b>	<b>62</b>	<b>\$832,209</b>	<b>\$328,668</b>	<b>2.53</b>
<b>Iowa School for the Deaf</b>	<b>16</b>	<b>\$151,720</b>	<b>\$28,942</b>	<b>5.24</b>	<b>11</b>	<b>\$59,664</b>	<b>\$18,136</b>	<b>3.29</b>	<b>11</b>	<b>\$66,889</b>	<b>\$11,952</b>	<b>5.60</b>
<b>Iowa Braille &amp; Sight Saving</b>	<b>21</b>	<b>\$113,875</b>	<b>\$22,379</b>	<b>5.09</b>	<b>11</b>	<b>\$60,742</b>	<b>\$17,556</b>	<b>3.46</b>	<b>12</b>	<b>\$71,334</b>	<b>\$18,310</b>	<b>3.90</b>
<b>TOTAL</b>	<b>1,746</b>	<b>\$80,404,669</b>	<b>\$14,374,470</b>	<b>5.59</b>	<b>947</b>	<b>\$44,631,421</b>	<b>\$11,088,535</b>	<b>4.03</b>	<b>688</b>	<b>\$28,216,098</b>	<b>\$6,518,817</b>	<b>4.33</b>