

Energy Use in South Carolina's Public
Facilities, FY 1998

TABLE OF CONTENTS

| | |
|--|-----|
| Executive Summary | i |
| Introduction..... | 1 |
| Purposes..... | 1 |
| Review of Responses..... | 1 |
| Findings | 2 |
| Performance Indicators..... | 2 |
| Cost Overview | 4 |
| School District Findings..... | 6 |
| State Agency Findings..... | 8 |
| Colleges with Housing Findings | 11 |
| Colleges without Housing Findings | 13 |
| Conclusion | 15 |
| Appendix A: Legal Requirements | A-1 |
| Appendix B: Responding and Non-Responding Entities | B-1 |
| Appendix C: Information Received from Respondents..... | C-1 |

EXECUTIVE SUMMARY

This report summarizes fiscal year 1998 energy consumption and cost data for most public school districts, state agencies and public institutions of higher learning in South Carolina. It is required by the South Carolina Energy Conservation and Efficiency Act of 1992.

Table 1. Energy Expenditures (in millions of dollars) by Fuel Source - FY 1998

| Fuel Source | School Districts | State Agencies | Colleges with Housing | Colleges without Housing | TOTALS |
|---------------------------|-------------------------|-----------------------|------------------------------|---------------------------------|------------------|
| Electricity | \$66.336 | \$24.534 | \$25.541 | \$6.501 | \$122.914 |
| Natural Gas | \$6.643 | \$6.112 | \$6.153 | \$0.987 | \$19.887 |
| Fuel Oil | \$0.211 | \$0.147 | \$0.034 | \$0.001 | \$0.394 |
| Propane | \$0.529 | \$0.732 | \$0.018 | \$0.005 | \$1.286 |
| Coal | 0 | 0 | \$0.886 | 0 | \$0.886 |
| Total Expenditures | \$73.720 | \$31.526 | \$32.635 | \$7.495 | \$145.377 |

Table 2. Average Unit Energy Costs - FY 1998

| Cost- per- Unit | School Districts | State Agencies | Colleges with Housing | Colleges without Housing | Overall Average |
|---|-------------------------|-----------------------|------------------------------|---------------------------------|------------------------|
| Electricity (\$/kBtu) | \$0.022 | \$0.014 | \$0.014 | \$0.015 | \$0.018 |
| Electricity (\$/kwh) | \$0.076 | \$0.049 | \$0.047 | \$0.051 | \$0.061 |
| Natural Gas (\$/kBtu) | \$0.007 | \$0.006 | \$0.004 | \$0.007 | \$0.006 |
| Natural Gas (\$/therm) | \$0.693 | \$0.574 | \$0.431 | \$0.745 | \$0.553 |
| Fuel Oil (\$/kBtu) | \$0.005 | \$0.004 | \$0.005 | \$0.007 | \$0.005 |
| Fuel Oil (\$/gallon) | \$0.731 | \$0.616 | \$0.679 | \$0.997 | \$0.680 |
| Propane (\$/kBtu) | \$0.008 | \$0.006 | \$0.007 | \$0.010 | \$0.007 |
| Propane (\$/gallon) | \$0.775 | \$0.504 | \$0.643 | \$0.917 | \$0.597 |
| Average for All Energy Sources (\$/kBtu) | \$0.018 | \$0.011 | \$0.010 | \$0.013 | \$0.013 |

The reporting public entities spent \$145.4 million on energy in 1998, 84 percent of which was spent on electricity. Natural gas accounted for 13 percent of energy expenditures. Four-year colleges and universities benefited from the lowest unit prices for electricity and natural gas. School districts paid the highest average unit energy prices, with state agencies and two-year colleges falling in between.

Table 3. Fiscal Year 1998 Summary Data

| Institutions | Total Energy \$ (in millions) | Total Sq.ft. (in millions) | Avg. \$/Sq.ft. | Avg. kBtu/Sq.ft. |
|-------------------------------|--|---------------------------------------|---------------------------|-----------------------------|
| School Districts (86) | \$73.7 | 89.6 | \$0.83 | 45.00 |
| State Agencies (33) | \$31.5 | 24.3 | \$1.37 | 129.13 |
| Colleges with Housing (11) | \$32.6 | 26.7 | \$1.26 | 126.16 |
| Colleges without Housing (22) | \$7.5 | 6.5 | \$1.16 | 88.27 |
| Totals* | \$145.4 | 147.1 | \$1.01 | 74.71 |

*Figures do not necessarily sum to totals due to independent rounding.

The 86 reporting school districts spent \$73.7 million to provide energy for 89.6 million square feet of building space. The average cost per square foot ranged mostly from \$0.60 to \$1.00. South Carolina school districts averaged \$0.83 per square foot, compared to a national median of \$0.95 per square foot and a regional median of \$0.86 per square foot. Most school districts used from 30 to 50 kBtu per square foot, with an overall average of 45.00 kBtu per square foot.

Eleven four-year colleges and universities spent \$32.6 million to provide energy for 26.7 million square feet of building space. The majority spent between \$0.90 and \$1.50 per square foot for energy, averaging \$1.26 per square foot. The national median for four-year colleges is \$0.83 per square foot. Energy use was mostly in the range of 70 to 130 kBtu per square foot, with an overall average of 126.16 kBtu per square foot.

The four-year colleges are a relatively disparate group. Three of the eleven institutions, Clemson University, the Medical University of South Carolina and the University of South Carolina (Columbia campus), comprise 63.2 percent of the total square footage and 67.7 percent of the total energy expenditure for this category. This causes the average cost per square foot and the average use per square foot figures to basically reflect the average for these three institutions.

Twenty-two public colleges without housing, a group composed of technical colleges and two-year campuses of the University of South Carolina, spent \$7.5 million on energy, mostly ranging from \$0.80 to \$1.40 per square foot and averaging \$1.16 per square foot. This compares to the national median for two-year colleges of \$1.10 per square foot. These institutions generally consumed 50 to 100 kBtu per square foot, averaging 88.27 kBtu per square foot over their 6.5 million square feet of building space.

State agencies vary enormously in types of energy requirements, building types, non-building energy use, size and other factors relating to energy use. Altogether, agencies spent \$31.5 million in identifiable energy costs. Because a number of agencies have utility costs included in their rent payments to private sector landlords, the actual energy costs for state government are somewhat larger, but not quantifiable. State agencies generally spent between \$0.90 and \$1.80 per square foot. Average cost for 24.3 million square feet of building space owned by 33 agencies was \$1.37 per square foot. Average

energy use ranged mainly from 40 to 120 kBtu per square foot, with an average use per square foot of 129.13 kBtu.

Three state agencies are responsible for 44.9 percent of total state building space, and pay 52 percent of state agency energy bills. The largest of these three state agencies, the Department of Corrections, had energy expenditures of \$9.2 million for 6.0 million square feet. The Office of General Services, Facilities Management spent \$4.0 million for 2.8 million square feet, and the Department of Mental Health spent \$3.2 million for 2.0 million square feet.

Many factors influence the high variability in energy use by public facilities, including age of buildings, energy conservation measures, energy efficiency of building design, hours of operation, building uses, outdoor lighting, high technology equipment, fuel types, fuel costs, and climatic differences.

This report is an aggregate summary of information provided by 152 responding entities. Institution-specific information is used both by the institutions themselves and by the South Carolina Energy Office, in order to provide assistance in reducing the energy costs of these public entities. An important result of the energy consumption reporting process is that it provides necessary information for institutions to use in helping themselves save energy and develop energy conservation plans and goals.

When high energy use patterns are identified, the Energy Office works with these institutions to address problems and provide technical assistance through our Rebuild South Carolina and Enerfund loan programs.

Through the Rebuild South Carolina program, energy technicians perform energy audits of the facilities to locate problems and propose solutions. If the institution needs financial assistance in order to finance energy saving programs, the Energy Office has the Enerfund loan program that can offer funds in support of energy efficiency measures. Institutions are then able to repay the loans from the cost savings achieved as a result of their implementation of these energy efficiency measures.

In the emerging era of accountability in government, it is increasingly necessary to be able to pinpoint the source of all expenditures incurred within an institution. As reports such as this one reach the hands of our public officials, they have an effective tool to identify potential dollar savings. As public needs necessitate government expenditure cutbacks, the alternative has frequently been to downsize, thereby eliminating jobs and services in many cases. The volume of potential dollar savings that can be realized through energy conservation within public institutions is tremendous. Information on cost saving potential can be extremely valuable in the hands of decision-makers, as it presents alternatives to downsizing which will not only save jobs, but will also lead to increased energy efficiency.

This published report is intended to summarize the energy consumption and cost data submitted to the South Carolina Energy Office for fiscal year 1998. This data helps

convey to the public, agency leaders, and public facility managers the manner in which public facilities are consuming energy, and can serve as a tool which will help them improve their performance. It is impossible to improve performance in energy efficiency without some measure of achievement. Moreover, it is difficult to say how a given agency is performing without being able to make comparisons with other agencies and with previous energy use. Presentation of these measures in an accurate and systematic manner is the primary purpose of this report.

INTRODUCTION

PURPOSES

The information contained in this report represents the South Carolina Energy Office's seventh compilation of energy cost and energy consumption data submitted by South Carolina's public school districts, state agencies, universities and public colleges. This report summarizes fiscal year 1998 data for 86 public school districts, 33 state agencies and 33 universities and public colleges. Also included is an analysis of information obtained from each school district, agency and college on energy costs and energy consumption. For the purposes of this study, the energy use and cost figures were based solely on that used by buildings and other fixed facilities on the grounds of the reporting entity; transportation energy use and costs were not included.

This report is required by the South Carolina Energy Conservation and Efficiency Act of 1992 (see Appendix A). It provides aggregate energy use numbers so the Energy Office can determine state public sector baselines and goals and measure results over time. The data enables identification of success stories that can be used as models, and also allows identification of institutions and buildings that are likely candidates for help in reducing energy costs. A very significant benefit of the reporting process is that it provides necessary information for individual institutions to use in helping them save energy. By utilizing this quantifiable data, institutions can develop energy conservation plans and goals. Most importantly, the reporting process provides accurate information to the general public and to public officials about energy use involving taxpayer dollars.

REVIEW OF RESPONSES

This report includes information from all 86 public school districts, which, overall, reported \$73.7 million in energy costs (up 7.75% from FY97) for 89.6 million square feet of space.

All of South Carolina's state agencies (a total of 63) responded, including 30 agencies that only lease facilities and are unable to provide separate energy consumption data, and 33 that own facilities. Energy data for some of the leased facilities are included with information from the Office of General Services, which operates many of the state

buildings in Columbia. Energy data for leased facilities outside of the Office of General Services are not included in this report. The data for state agencies comprises over 24.3 million square feet of building space and \$31.5 million in energy costs (up 3.47% since FY97).

Because dormitories have unique energy use characteristics, public colleges and other state-run schools are divided into two groups depending upon whether or not they offer housing: colleges with housing (mainly four-year colleges), numbering 11; and colleges without housing (mainly technical colleges), numbering 22. All of the public colleges and state-run schools submitted data, totaling \$40.1 million in energy costs (down 0.69% from FY97) and representing 33.2 million square feet of space.

Appendix B provides complete lists of responding entities.

FINDINGS

PERFORMANCE INDICATORS

Two performance indicators are used in this report: energy cost per square foot and energy use per square foot.

The first indicator, annual energy cost per square foot, is widely used for comparison. The advantage of this measure is that energy costs can be readily identified and compared. However, this indicator does not account for differences due to energy prices rather than energy use.

The second performance indicator is annual energy use per square foot. By converting energy use to a standard measurement of British thermal units (Btu), a building owner may compare the energy efficiency of buildings using different energy sources. (A Btu is equal to the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.) This method also provides a comparative measure of performance that allows valid comparisons of energy use from year to year regardless of variations in energy costs and reductions or increases in building space.

Aggregate energy cost figures represent the sum of the energy expenditures from all facilities reported to the South Carolina Energy Office. However, some facilities are not comparable to others. For purposes of comparing per-square-foot measures (cost per square foot, use per square foot), some facilities are not included. For example, buildings for which no square footage was reported are excluded because their inclusion would skew the average energy cost per square foot and average energy use per square foot figures for all other buildings. In addition, an effort was made to confine the per square foot analysis to buildings that are heated and/or cooled, and to exclude buildings for which the primary energy expense is for outdoor lighting.

There is great variation among reporting entities. Some of the reasons for this variation include the following:

Age of buildings

Older buildings were often built with less concern for and availability of energy efficiency. Deterioration over the years compounds this effect.

Energy conservation measures

Many entities have implemented energy conservation plans, which include low-cost and no-cost methods of energy use reduction. Some have carried out extensive energy conservation retrofits.

Energy efficient design

Great strides have been made in recent decades to incorporate energy efficiency into building design. Many South Carolina public facilities reflect these advances.

Hours of operation

Some buildings are lightly used, while some are in use 24 hours a day. Some facilities, such as schools, are in use only nine or ten months of the year.

Building uses

Although many state-owned buildings are primarily office buildings, uses for state facilities vary greatly. Libraries, cafeterias, warehouses, laboratories, meeting facilities, prisons, maintenance garages and security buildings, for example, have widely varying energy needs.

Metering issues

Sometimes outside lights are metered to buildings. If the building is small and the outdoor lighting is extensive (e.g., parking areas), this can skew the per square foot figures for cost and use.

High technology

Facilities housing large amounts of electronic equipment (including computers) will show high cost and usage results.

Fuel types

Different fuel sources entail different levels of expense. It may cost more to heat with electricity than with natural gas, for example, but natural gas use will yield higher Btu per square foot numbers. In some areas, electricity is the only choice available.

Fuel prices

Fuel prices can vary regionally, from utility to utility and from small purchaser to large purchaser.

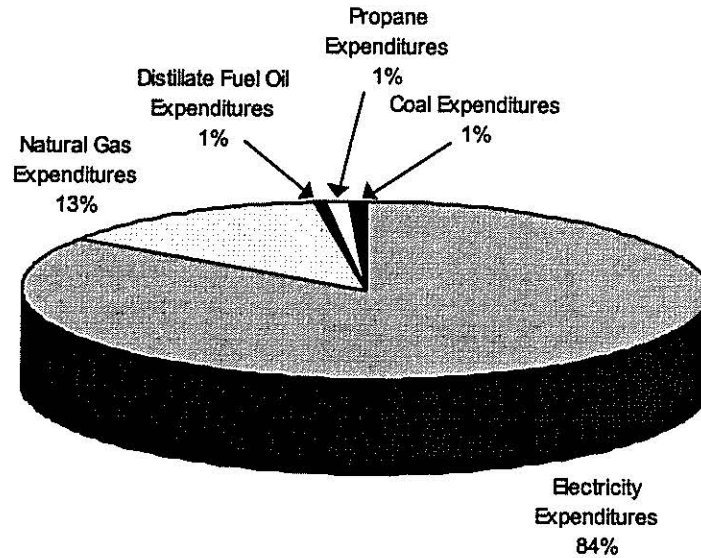
Climate

In the upper part of the state, air conditioning is needed considerably less than in the rest of the state. Conversely, this region is likely to need more winter heating.

COST OVERVIEW

Electricity costs comprise 84 percent of the total public sector energy costs and natural gas accounts for 13 percent of the total. Figure 1 shows the energy expenditure mix for public entities.

Figure 1. Energy Expenditures - FY 1998



Respondents fall into several categories, which are reported and evaluated separately. The categories are as follows: public school districts; state agencies; colleges with housing; and colleges without housing.

Reported energy costs were \$73.7 million for public school districts (up 7.75% from FY97), \$31.5 million for state agencies (up 3.47% from FY97), \$32.6 million for colleges with housing (down 1.21% from FY97), and \$7.5 million for colleges without housing (up 1.61% from FY97), totaling \$145.4 million in FY 1998 (up 4.38% from FY97).

The expenditures by all categories of respondents on each energy source are shown below in Table 1.

Table 1. Energy Expenditures (in millions of dollars) by Fuel Source - FY 1998

| Fuel Source | School Districts | State Agencies | Colleges with Housing | Colleges without Housing | TOTALS |
|---------------------------|------------------|-----------------|-----------------------|--------------------------|------------------|
| Electricity | \$66.336 | \$24.534 | \$25.541 | \$6.501 | \$122.914 |
| Natural Gas | \$6.643 | \$6.112 | \$6.153 | \$0.987 | \$19.887 |
| Fuel Oil | \$0.211 | \$0.147 | \$0.034 | \$0.001 | \$0.394 |
| Propane | \$0.529 | \$0.732 | \$0.018 | \$0.005 | \$1.286 |
| Coal | 0 | 0 | \$0.886 | 0 | \$0.886 |
| Total Expenditures | \$73.720 | \$31.526 | \$32.635 | \$7.495 | \$145.377 |

The primary energy expense in each category is for electricity. Public school districts and colleges without housing spend a larger proportion (90.0 and 86.7 percent, respectively) of their energy budgets on electricity than do colleges with housing and state agencies (78.3 and 77.8 percent, respectively). Fuel oil and propane expenditures comprise a small percentage for all categories.

Table 2 indicates that public institutions in South Carolina face a wide range of energy costs, with school districts paying the highest prices. School districts have unit energy costs almost twice the costs of colleges with housing.

Table 2. Average Unit Energy Costs - FY 1998¹

| Cost per Unit | School Districts | State Agencies | Colleges with Housing | Colleges without Housing | Overall Average |
|---|------------------|----------------|-----------------------|--------------------------|-----------------|
| Electricity (\$/kBtu) | \$0.022 | \$0.014 | \$0.014 | \$0.015 | \$0.018 |
| Electricity (\$/kwh) | \$0.076 | \$0.049 | \$0.047 | \$0.051 | \$0.061 |
| Natural Gas (\$/kBtu) | \$0.007 | \$0.006 | \$0.004 | \$0.007 | \$0.006 |
| Natural Gas (\$/therm) | \$0.693 | \$0.574 | \$0.431 | \$0.745 | \$0.553 |
| Fuel Oil (\$/kBtu) | \$0.005 | \$0.004 | \$0.005 | \$0.007 | \$0.005 |
| Fuel Oil (\$/gallon) | \$0.731 | \$0.616 | \$0.679 | \$0.997 | \$0.680 |
| Propane (\$/kBtu) | \$0.008 | \$0.006 | \$0.007 | \$0.010 | \$0.007 |
| Propane (\$/gallon) | \$0.775 | \$0.504 | \$0.643 | \$0.917 | \$0.597 |
| Average for All Energy Sources (\$/kBtu) | \$0.018 | \$0.011 | \$0.010 | \$0.013 | \$0.013 |

¹ Coal was excluded from this particular comparison table because Clemson University is the only institution currently reporting the use of this fuel type. Clemson paid \$52.11 per ton of coal and \$0.002 per kBtu of coal in FY98.

SCHOOL DISTRICT FINDINGS

Use per Square Foot

Figure 2 illustrates that the annual use per square foot ranges from 30 to 50 kBtu for most public school districts. The reported average annual kBtu (1,000 Btu) per square foot for public school districts is 45.00 kBtu per square foot (up 5.7% from FY97).

Figure 2. School Districts, Energy Use per Square Foot, FY98²

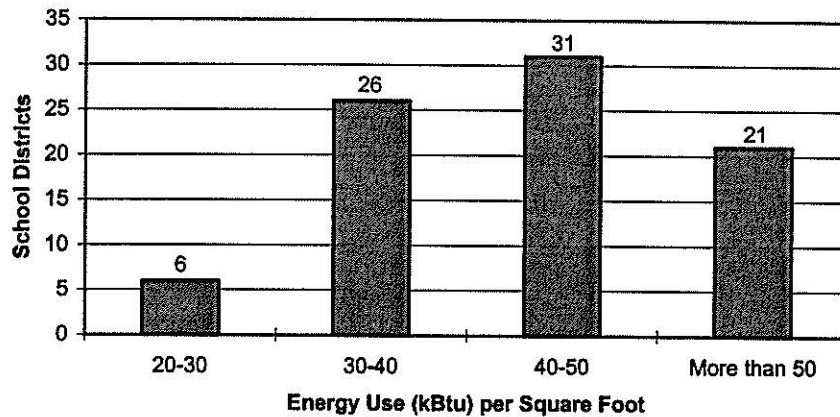


Table 3 represents the ten school districts with the lowest energy use per square foot averages.

Table 3. School Districts, Lowest Energy Use per Square Foot, FY98

| School District | kBtu/sf |
|-----------------|---------|
| Dillon SD1 | 21.03 |
| Jasper SD* | 24.98 |
| Marion SD3 | 25.76 |
| Marlboro SD | 27.45 |
| Marion SD2 | 29.24 |
| Lexington SD1 | 29.76 |
| Williamsburg | 30.25 |
| Florence SD1 | 31.07 |
| Florence SD3 | 31.68 |
| Barnwell SD19 | 32.07 |

*Indicates that entity submitted totals only, not building-by-building data.

² All 86 school districts responded, but two school districts (Berkeley SD and Dillon SD3) were omitted due to incomplete data submissions.

Cost per Square Foot

Figure 3 illustrates that the cost per square foot ranges from \$0.60 to \$1.00 for most public school districts. The national median is \$0.95 per square foot, and the regional median is somewhat lower at \$0.86 per square foot.³ The reported average cost per square foot for South Carolina public school districts is \$0.83 per square foot (up 5.06% from FY97), which is lower than both the national and regional medians.

Figure 3. School Districts, Energy Cost per Square Foot, FY98⁴

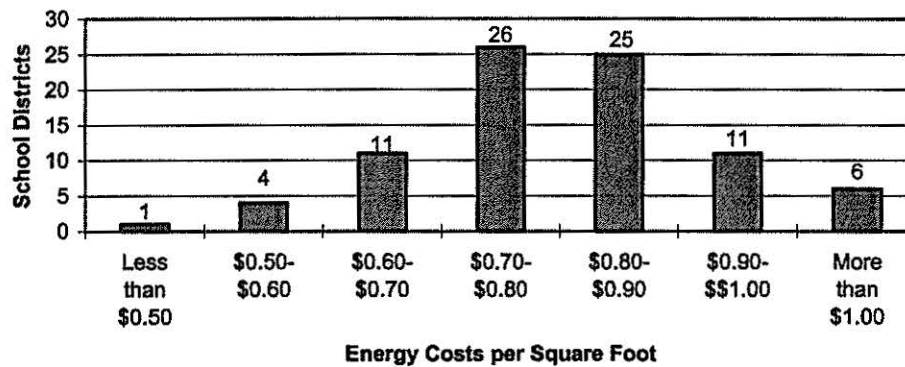


Table 4 shows the ten school districts with the lowest cost per square foot averages.

Table 4. School Districts, Lowest Energy Cost per Square Foot

| School District | \$/sf |
|-----------------------------|--------|
| Greenwood SD51 | \$0.48 |
| Barnwell SD19 | \$0.50 |
| Lexington SD1 | \$0.57 |
| Anderson SD3 | \$0.60 |
| Dillon SD1 | \$0.60 |
| Anderson SD5 | \$0.62 |
| Bamberg SD1 | \$0.64 |
| Orangeburg Consolidated SD5 | \$0.65 |
| Orangeburg Consolidated SD4 | \$0.66 |
| Hampton SD1 | \$0.67 |
| York SD1 | \$0.67 |

³ *American School & University*, April 1998, pp. 30-31.

⁴ Two school districts were omitted due to incomplete data submissions.

STATE AGENCY FINDINGS

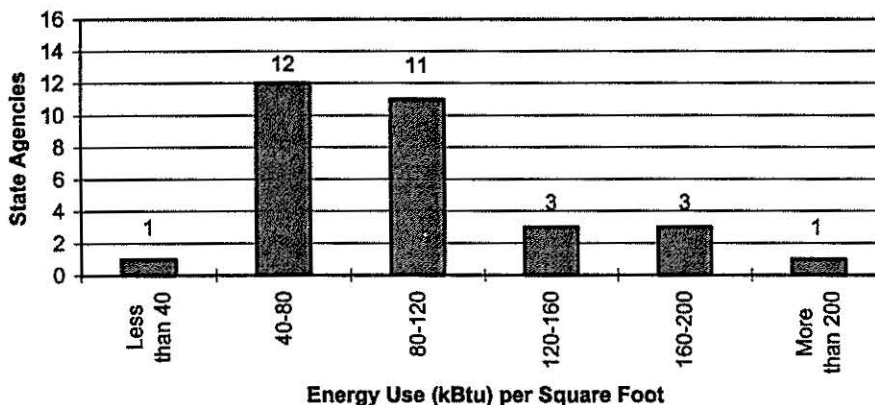
Due to the diverse nature and use of state agency facilities, comparison of their energy usage and expenditure patterns can be difficult. One important indicator that should be considered when evaluating the performance of state agencies is that a handful of state agencies manage the greatest amount of building space and pay a majority of the energy bills. The largest energy bills for state agencies were \$9.2 million for 6.0 million square feet operated by the Department of Corrections, \$4.0 million for 2.8 million square feet managed by the Office of General Services Facilities Management and \$3.2 million for 2.0 million square feet maintained by the Department of Mental Health. These three agencies account for 44.9 percent of the total square footage for all reporting state agencies and pay 52 percent of all state energy bills.

An additional consideration is that many buildings are reported not by the individual agencies using them, but by the State Budget and Control Board's Office of General Services, which manages them. Furthermore, some of those agencies also have additional facilities which they manage themselves, and these are reported by the agency instead of General Services. As a result, it can be difficult to discern an individual agency's actual energy expenditures and use, and this problem is compounded by the existence of several joint-use facilities.

Use per Square Foot

Although for most state agencies, annual energy use ranges from 40 to 120 kBtu per square foot, the overall average is 129.13 kBtu per square foot (up 7.84% from FY97). This is because the three agencies that use the most energy have averages ranging from 129.5 to 181.9 kBtu per square foot, which skews the average upwards. Also, SLED had a very high energy use of over 300 kBtu, which adds to the higher average over FY1997.

Figure 4. State Agencies, Energy Use per Square Foot, FY98⁵



⁵ This chart includes 31 agencies; the data from Patriots Point Development Authority and the State Board for Tech/Comp Education were not compatible with this study's measurement index methodology.

There are a variety of reasons for high usage among some state agencies; most often it is due to heavy concentrations of electrical equipment, high water heating needs, and long hours of facility operation.

Moreover, agencies vary greatly in size. Table 5, which shows the state agencies with the lowest average annual energy use per square foot, also reflects the variability in agency size. Agencies with the lowest energy use per square foot are among the smallest reporting agencies.

Table 5. State Agencies, Lowest Energy Use per Square Foot, FY97

| Agency | kBtu/sf |
|----------------------------------|----------------|
| Sea Grant Consortium | 36.41 |
| Forestry Commission | 40.28 |
| Department of Education | 45.44 |
| Department of Natural Resources | 48.18 |
| Vocational Rehabilitation | 51.81 |
| Military Department | 52.37 |
| Old Exchange Building Commission | 63.93 |
| Dept. of Labor, Licensing & Reg. | 70.26 |
| John de la Howe School | 70.28 |
| Employment Security Commission | 77.30 |

Cost per Square Foot

For state agencies, average annual energy cost is \$1.37 per square foot (down 0.72% from FY97). Most results fall between \$0.90 and \$1.80 per square foot.

Figure 5. State Agencies, Energy Cost per Square Foot, FY98⁶

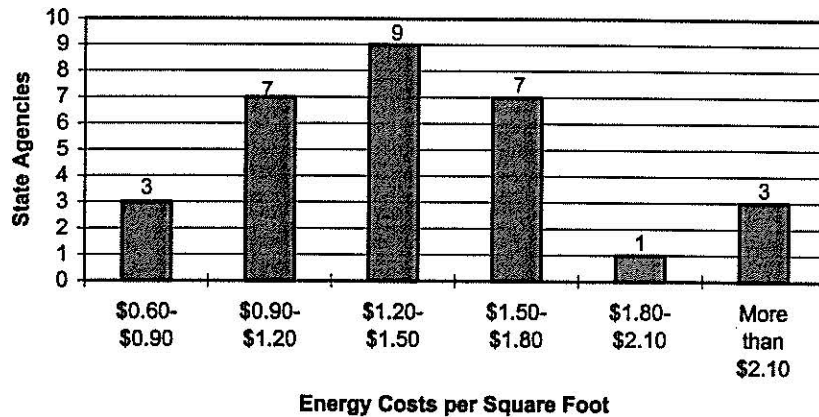


Table 6 illustrates the ten state agencies with the lowest average energy cost per square foot.

Table 6. State Agencies, Lowest Energy Cost per Square Foot, FY 98

| Agency | \$/sf |
|---------------------------------|--------|
| Department of Education | \$0.67 |
| Military Department | \$0.74 |
| Wil Lou Gray Opportunity School | \$0.82 |
| Forestry Commission | \$0.91 |
| Sea Grant Consortium | \$0.93 |
| Dept. of Juvenile Justice | \$1.00 |
| School for the Deaf & Blind | \$1.00 |
| Vocational Rehabilitation | \$1.03 |
| Dept. of Natural Resources | \$1.05 |
| SC Educational Television | \$1.20 |

⁶ Includes 30 agencies; Patriots Point Development Authority and the State Board for Tech/Comp Education's data were incompatible with this study's measurement index methodology. A third agency, Santee Cooper, was not included in the unit energy cost analysis due to its status. Since it is a power provider, they do not pay for energy; including them at \$0/sf would have skewed the averages.

COLLEGES WITH HOUSING FINDINGS

Use per Square Foot

Colleges with housing consist of four-year colleges with on-campus dormitories (one exception is Denmark Technical College, a two-year institution with dormitories). The majority of schools fall between 70 and 130 kBtu per square foot. Average energy use for colleges with housing is 126.16 kBtu per square foot (down 8.36% from FY97).

Colleges with housing, like state agencies, are a relatively disparate group. Three of the 11 institutions, Clemson University, Medical University of South Carolina and the University of South Carolina (Columbia campus), comprise 63.2 percent of the total square footage and 67.7 percent of the total energy expenditure for this category. As a result, the average cost per square foot and the average use per square foot figures reflect the average for these three institutions.

Figure 6. Colleges with Housing, Energy Use per Square Foot, FY98

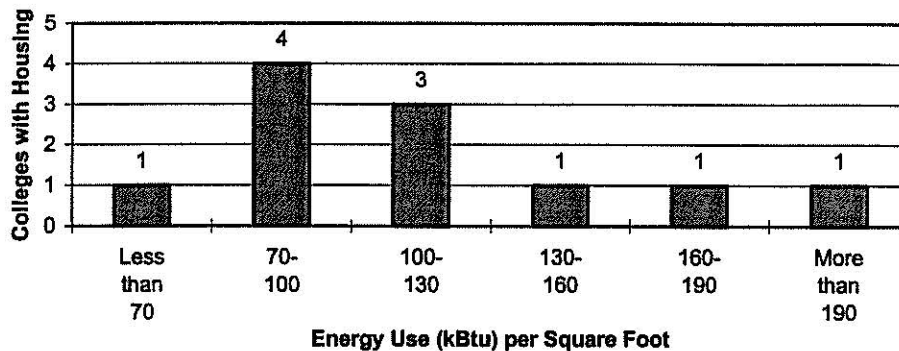


Table 7 shows the five colleges with housing having the lowest energy use per square foot.

Table 7. Colleges with Housing, Lowest Energy Use per Square Foot, FY98

| College/School | kBtu/sf |
|-----------------------------|---------|
| Denmark Technical College | 69.20 |
| Lander University | 76.83 |
| Francis Marion University | 78.50 |
| Clemson University | 81.03 |
| Coastal Carolina University | 93.74 |

Cost per Square Foot

Annual cost per square foot ranges widely for colleges with housing, but most such institutions fall between \$0.90 and \$1.50. Average cost per square foot for colleges with housing is \$1.26 per square foot (down 3.08% from FY97). This is substantially higher than the national median energy expenditures for four-year colleges of \$0.83 per square foot.⁷

Figure 7. Colleges with Housing, Energy Cost per Square Foot, FY98

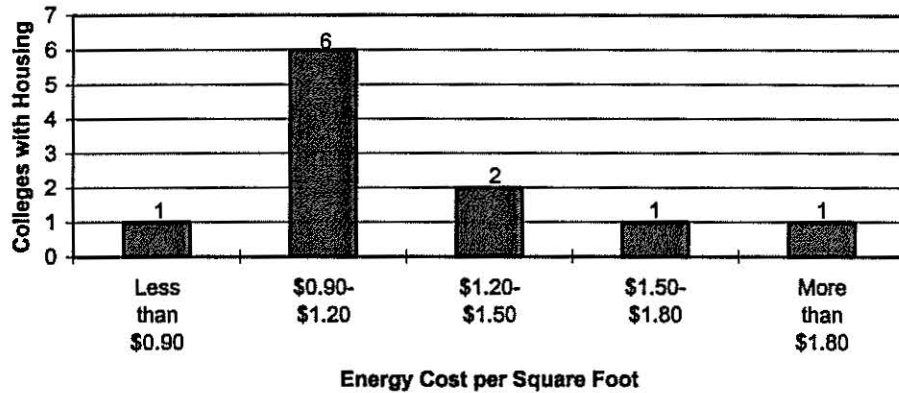


Table 8 highlights the five colleges with housing having the lowest energy costs per square foot.

Table 8. Colleges with Housing, Lowest Energy Cost per Square Foot, FY98

| College/School | \$/sf |
|---------------------------------|--------|
| Winthrop University* | \$0.87 |
| Clemson University | \$0.91 |
| Lander University | \$1.04 |
| Denmark Technical College | \$1.10 |
| South Carolina State University | \$1.11 |

*Indicates that entity submitted totals only, not building-by-building data.

⁷ *American School & University*, April 1998, p. 20c.

COLLEGES WITHOUT HOUSING FINDINGS

Use per Square Foot

Annual energy use per square foot for most colleges without housing ranges from 50 to 100 kBtu. Average energy use for these 22 institutions is 88.27 kBtu per square foot (up 17.58% from FY97).

Figure 8. Colleges without Housing, Energy Use per Square Foot, FY98

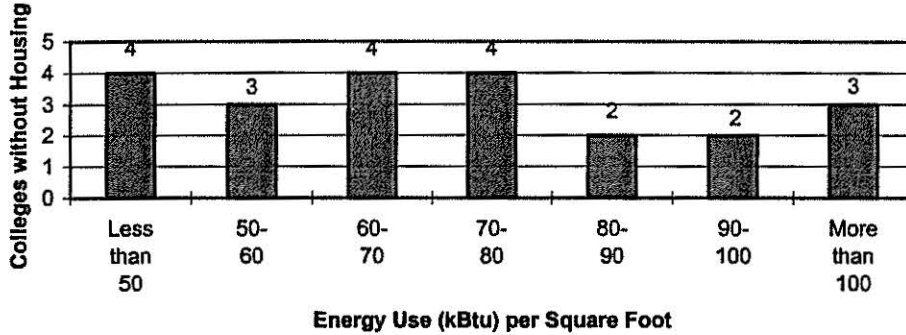


Table 9 shows the five colleges without housing having the lowest energy use per square foot.

Table 9. Colleges without Housing, Lowest Energy Use per Square Foot, FY98

| College | kBtu/sf |
|-------------------------------------|---------|
| USC-Salkehatchie | 40.47 |
| Williamsburg Technical College* | 44.13 |
| Piedmont Technical College | 46.02 |
| USC-Union | 48.33 |
| Technical College of the Lowcountry | 53.85 |

*Indicates that entity submitted totals only, not building-by-building data.

Cost per Square Foot

Cost per square foot ranges from \$0.80 to \$1.40 for most colleges without housing. Average cost per square foot is \$1.16 (up 2.65% from FY97). This compares to a national median energy cost per square foot for two-year colleges of \$1.10.⁸

Figure 9. Colleges without Housing, Energy Cost per Square Foot, FY98

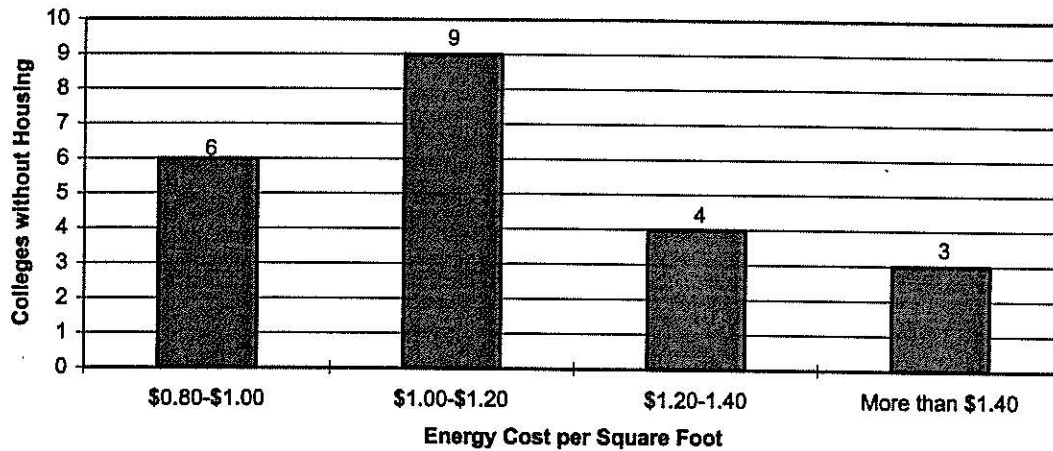


Table 10 shows the five colleges without housing having the lowest energy cost per square foot.

Table 10. Colleges without Housing, Lowest Energy Cost per Square Foot, FY98

| College | \$/sf |
|---------------------------------|--------|
| Piedmont Technical College | \$0.80 |
| Horry-Georgetown Tech. College | \$0.83 |
| USC-Salkehatchie | \$0.86 |
| Spartanburg Technical College | \$0.89 |
| Williamsburg Technical College* | \$0.93 |

*Indicates that entity submitted totals only, not building-by-building data.

⁸ American School and University, April 1998, 20c.

CONCLUSION

In developing a report such as this, accuracy and detail of data are always critical issues. As data is received each fiscal year, comparisons are made to the data from previous years to identify inconsistencies, and correct any past or current data problems. With this increasingly accurate historical database, the South Carolina Energy Office is able to make detailed year-to-year comparisons among entire facilities as well as among individual buildings.

As an increasing number of state institutions assist us in our goal to obtain detailed, building-by-building energy data for every public facility in the state, our ability to analyze this data increases significantly. It is now possible to compare middle schools, high schools, portables, offices, classroom buildings, labs, etc. The ability to make more "apples-to-apples" comparisons increases the validity of the data and helps us identify patterns of high energy use within certain types of facilities. When such patterns are identified, the Energy Office works with institutions to address problems and propose solutions.

Each public institution that participates in this study receives a customized written report that details its cost and use per square foot data and provides comparisons to the average for facilities in the same category. These comparisons are extremely effective in identifying institutions with unusually high energy usage and/or expenditures, which can then be referenced against the detailed, building-by-building data (provided by most public entities) to locate specific problems. Once these problems are identified, the Energy Office can provide technical and financial assistance through our Rebuild South Carolina and Enerfund loan programs.

Through the Rebuild South Carolina program, energy technicians perform energy audits of the facilities to locate problems. Once identified, the auditors can propose solutions to these problems, such as lighting retrofits and improving the efficiency of HVAC systems. If institutions need financial assistance in order to finance such energy saving procedures, the Energy Office has the Enerfund loan program that can offer funds in support of energy efficiency measures. Institutions are able to repay the loans from the cost savings achieved as a result of their implementation of prescribed energy efficiency measures.

In the emerging era of accountability in government, it is increasingly necessary to be able to pinpoint the source of all expenditures incurred within an institution. As reports such as this one reach the hands of our public officials, they have an effective tool to identify potential dollar savings. As public needs necessitate government expenditure cutbacks, the alternative has frequently been to downsize, thereby eliminating jobs and services in many cases. The volume of potential dollar savings that can be realized through energy conservation within public institutions is tremendous. Information on cost saving potential can be extremely valuable in the hands of decision-makers, as it presents alternatives to downsizing which will not only save jobs, but will also lead to increased energy efficiency.

This published report is intended to summarize the energy consumption and cost data submitted to the South Carolina Energy Office each year. This data helps convey to the public, to agency leaders, and to public facility managers the manner in which public facilities are consuming energy, and can serve as a methodological tool which will help them improve their performance. It is impossible to improve performance in energy efficiency without some kind of measure of achievement. Moreover, it is difficult to say how a given agency is performing without being able to make comparisons with other agencies and with previous energy use. Presentation of these measures in an accurate and systematic manner is a primary purpose of this report.

APPENDIX A: LEGAL REQUIREMENTS

This report is mandated by the South Carolina Energy Conservation and Efficiency Act, Section 48-52-620 (E). The principal purposes of this report are twofold:

- (1) To compile factual information on the current use and cost of energy for state agencies and public school districts; and
- (2) To ensure that state government agencies establish comprehensive energy efficiency plans and become models for energy efficiency in South Carolina, and assist the Department of Education in achieving energy efficiency in public schools [Section 48-52-420 (9)].

The preparation of this report assists in accomplishing several other purposes important to energy conservation, namely:

- (3) To ensure that internal governmental energy use patterns are consistent with the State's long range interests [Section 48-52-210 (B) (9)];
- (4) To ensure that short-term energy decisions do not conflict with long range energy needs [Section 48-52-210 (B) (8)];
- (5) To define baseline energy use measurements; and
- (6) To assist in establishing standards for energy efficiency and building performance.

APPENDIX B: RESPONDING AND NON-RESPONDING ENTITIES

School Districts:

Responding

Abbeville SD60
Aiken SD
Allendale SD
Anderson SD1
Anderson SD2
Anderson SD3
Anderson SD4
Anderson SD5
Bamberg SD1
Bamberg SD2
Barnwell SD19
Barnwell SD29
Barnwell SD45
Beaufort SD
Berkeley SD
Calhoun SD
Charleston SD
Cherokee SD
Chester SD
Chesterfield SD
Clarendon SD1
Clarendon SD2
Clarendon SD3
Colleton SD
Darlington SD
Dillon SD1
Dillon SD2
Dillon SD3
Dorchester SD2

Dorchester SD4
Edgefield SD
Fairfield SD
Florence SD1
Florence SD2
Florence SD3
Florence SD4
Florence SD5
Georgetown SD
Greenville SD
Greenwood SD50
Greenwood SD51
Greenwood SD52
Hampton SD1
Hampton SD2
Horry SD
Jasper SD
Kershaw SD
Lancaster SD
Laurens SD55
Laurens SD56
Lee SD
Lexington SD1
Lexington SD2
Lexington SD3
Lexington SD4
Lexington SD5
Marion SD1
Marion SD2

Marion SD3
Marion SD4
Marlboro SD
McCormick SD
Newberry SD
Oconee SD
Orangeburg Consolidated SD3
Orangeburg Consolidated SD4
Orangeburg Consolidated SD5
Pickens SD
Richland SD1
Richland SD2
Saluda SD
Spartanburg SD1
Spartanburg SD2
Spartanburg SD3
Spartanburg SD4
Spartanburg SD5
Spartanburg SD6
Spartanburg SD7
Sumter SD2
Sumter SD17
Union SD
Williamsburg SD
York SD1
York SD2
York/Rock Hill SD3
York SD4

State Agencies:

Responding

Aeronautics Div., Dept. of Commerce
Agriculture, Dept. of
Arts Commission
Corrections, Dept. of
Disabilities & Special Needs, Dept. of
Education, Dept. of
Educational Television, South Carolina
Employment Security Commission
Forestry Commission
General Services, Facilities Management
General Services, Statewide Building Services
Health and Environmental Control, Dept. of
John de la Howe School
Juvenile Justice, Dept. of
Labor, Licensing and Regulation, Dept. of
Mental Health, Dept.
Military Dept.

Natural Resources, Dept. of
Office of the State Archaeologist
Old Exchange Building Commission
Parks, Recreation and Tourism, Dept. of
Patriots Point Development Authority
Public Railways Div., Dept. of Commerce
Public Safety, Dept. of
Public Service Authority (Santee Cooper)
School for the Deaf & Blind
Sea Grant Consortium
State Board for Tech/Comprehensive Ed.
State Law Enforcement Division
State Ports Authority
Transportation, Dept. of
Vocation Rehabilitation
Wil Lou Gray Opportunity School

Agencies listed below either lease space through the Office of General Services (and their energy use is therefore reported under General Services—Facilities Management or General Services—Statewide Building Services), or their utility bills are included in their lease payments to other entities (usually private landlords or local government), and they are thus unable to identify energy use.

(Leased State Agency Facilities):

Accident Fund
Administrative Law Judge Division
Alcohol and Other Drug Abuse Services, Dept. of
Archives and History, Dept. of
Attorney General's Office
Board of Economic Advisors
Board of Financial Institutions
Commission on Higher Education
Confederate Relic Room & Museum
Consumer Affairs, Dept. of
Election Commission
Ethics Commission
Health and Human Services, Dept. of
Higher Education Tuition Grants Comm.
Housing Finance & Development Authority
Human Affairs Commission

Insurance, Dept. of
Legislative Audit Council
Legislative Council of the Gen. Assembly
Legislative Information Systems
Natural Resources--Land, Water & Conservation
Office of Appellate Defense
Probation, Parole and Pardon, Dept. of
Procurement Review Panel
Public Service Commission
Reorganization Commission
Revenue, Dept. of
Second Injury Fund
Social Services, Dept. of
State Library
State Museum Commission

Colleges with Housing:

Responding

The Citadel
Clemson University
Coastal Carolina University
College of Charleston
Denmark Technical College
Francis Marion University

Lander University
Medical University of SC
South Carolina State University
University of South Carolina
Winthrop University

Colleges without Housing:

Responding

Aiken Technical College
Central Carolina Technical College
Chesterfield-Marlboro Technical College
Florence-Darlington Technical College
Greenville Technical College
Horry-Georgetown Technical College
Midlands Technical College
Orangeburg-Calhoun Technical College
Piedmont Technical College
Spartanburg Technical College
Technical College of the Lowcountry

Tri-County Technical College
Trident Technical College
USC-Aiken
USC-Beaufort
USC-Lancaster
USC-Salkehatchie
USC-Spartanburg
USC-Sumter
USC-Union
Williamsburg Technical College
York Technical College

APPENDIX C: INFORMATION RECEIVED FROM RESPONDENTS

Energy Use/Type

Energy is needed for various purposes, including heating, cooling, ventilating, lighting (both interior and outdoor security lighting), water heating, and support equipment.

Information was requested on expenditures for, and consumption of, electricity, natural gas, propane, fuel oil, and coal. Monthly data was requested to allow analysis of trends and encourage state agencies and public school districts to review their consumption patterns on a monthly basis.

Building Size/Type

The South Carolina Energy Office is flexible in allowing respondents to submit the information in a format that is convenient to them. Submissions to the Energy Office are summarized in Table 11.

For most respondents, information is gathered on a building-by-building basis. For respondents set up to submit energy data on FASER software, available from the Energy Office, building by building detail is assured. For those not submitting on FASER, information on number, size and use of buildings at each facility is solicited, and provided in most cases.

Table 11. Data Received by Reporting Method and by Degree of Detail

| Building by building detail ⁹ | | | Totals only | Not Reporting | TOTAL |
|--|---------------|---------------------|-------------|---------------|-------|
| FASER | By Contractor | Forms, Spreadsheets | | | |
| <i>School Districts</i> | | | | | |
| 24 | 12 | 46 | 4 | 0 | 86 |
| <i>State Agencies</i> | | | | | |
| 12 | 0 | 26 | 3 | 0 | 41* |
| <i>Colleges with Housing</i> | | | | | |
| 4 | 0 | 3 | 4 | 0 | 11 |
| <i>Colleges without Housing</i> | | | | | |
| 8 | 0 | 9 | 5 | 0 | 22 |
| 48 | 12 | 84 | 16 | 0 | 160 |

⁹ Building by building detail is the preferred method of reporting. 86 percent of all entities reported in this way.

* State agencies number 41 instead of 33 because two agencies are broken down into their constituent parts due to different reporting methods among the divisions. The Department of Transportation is treated in this table as eight separate agencies: a headquarters and seven regional offices. The Department of Natural Resources is treated as two agencies: the Wildlife Division and DNR-Charleston.