Energy Use in South Carolina's Public Facilities, FY 2000

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EXECUTIVE SUMMARY

This report summarizes fiscal year 2000 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 below indicates that the reporting public entities spent $157.7 million on energy in 2000, 85 percent of which was spent on electricity. Natural gas accounted for 13 percent of energy expenditures.

Table 1. Energy Expenditures (in millions of dollars) by Fuel Source - FY 2000

Fuel Source	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	TOTALS
Electricity	$72.996	$25.625	$28.353	$6.913	$133.888
Natural Gas	$6.225	$5.762	$8.182	$0.853	$21.024
Fuel Oil	$0.333	$0.222	$0.043	$0.001	$0.600
Propane	$0.520	$1.090	$0.011	$0.004	$1.637
Coal	$0	$0.000	$0.632	$0.000	$0.632
Kerosene	$0.000	$0.004	$0.000	$0.000	$0.004
Total Expenditures	**$80.075**	**$32.705**	**$37.223**	**$7.773**	**$157.778**

Table 2 shows that four-year colleges and universities benefited from the lowest unit prices for electricity ($0.047 cost/kWh) and natural gas ($0.461 cost/therm). School districts paid the highest average unit energy prices ($0.019), with state agencies and two-year colleges falling in between.

Table 2. Average Unit Energy Costs - FY 2000

Cost- per- Unit	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	Overall Average
Electricity ($/kBtu)	$0.022	$0.016	$0.014	$0.017	**$0.018**
Electricity ($/kwh)	$0.074	$0.055	$0.047	$0.058	**$0.062**
Natural Gas ($/kBtu)	$0.008	$0.006	$0.005	$0.008	**$0.006**
Natural Gas ($/therm)	$0.774	$0.617	$0.461	$0.801	**$0.577**
Fuel Oil ($/kBtu)	$0.006	$0.006	$0.007	$0.007	**$0.006**
Fuel Oil ($/gallon)	$0.861	$0.793	$0.906	$0.998	**$0.842**
Propane ($/kBtu)	$0.011	$0.007	$0.008	$0.015	**$0.008**
Propane ($/gallon)	$0.999	$0.683	$0.746	$1.331	**$0.765**
Average for All Energy Sources ($/kBtu)	**$0.019**	**$0.012**	**$0.009**	**$0.015**	**$0.014**

As indicated in Table 3 below, the 86 school districts included in this report spent $80.0 million to provide energy for 94.3 million square feet of building space. The cost per square foot ranged mostly from $0.60 to $1.00. South Carolina school districts averaged $0.85 per square foot, compared to a national median of $0.91 per square foot and a regional median of $0.91 per square foot. Most school districts used from 30 to 50 kBtu per square foot, with an overall average of 45.33 kBtu per square foot.

Table 3. Fiscal Year 2000 Summary Data

Institutions	Total Sq.Ft. (in millions)	Total Energy Cost (in millions)	Avg. $/Sq.ft.	Avg. kBtu/Sq.ft.
School Districts (86)	94.3	$80.00	$0.85	45.33
State Agencies (33)	24.3	$32.7	$1.41	117.15
Colleges with Housing (12)	28.3	$37.2	$1.32	144.88
Colleges without Housing (21)	6.6	$7.8	$1.16	75.82
Totals*	**153.4**	**157.8**	**$1.03**	**75.51**

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

Twelve four-year colleges and universities spent $37.2 million to provide energy for 28.3 million square feet of building space. The majority spent between $0.90 and $1.50 per square foot for energy, averaging $1.32 per square foot. The national median for four-year colleges is $1.04 per square foot. Energy use was mostly in the range of 60 to 150 kBtu per square foot, with an overall average of 144.88 kBtu per square foot.

The four-year colleges are a relatively disparate group. Three of the twelve institutions, Clemson University, the Medical University of South Carolina and the University of South Carolina (Columbia campus), comprise 65.0 percent of the total square footage and 67.2 percent of the total energy expenditure for this category. Consequently, 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-one public colleges without housing, a group composed of technical colleges and two-year campuses of the University of South Carolina, spent $7.7 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 $1.12 per square foot. Energy consumption for these institutions generally was 50 to 100 kBtu per square foot, averaging 75.82 kBtu per square foot for their 6.6 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 $32.7 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 $1.41 per square foot. Average

energy use ranged mainly from 40 to 120 kBtu per square foot, with an average use per square foot of 117.15 kBtu.

Three state agencies are responsible for 51.6 percent of total state building space, and pay 57.0 percent of state agency energy bills. The largest of these three state agencies, the Department of Corrections, had energy expenditures of $10.3 million for 6.4 million square feet. The Office of General Services, Facilities Management spent $5.3 million for 4.2 million square feet, and the Department of Mental Health spent $3.0 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 157 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 ConserFund 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 assistance in order to finance energy saving programs, the Energy Office has the ConserFund loan program that can offer funds for implementation 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.

Because of the growing need for accountability in state government, it is increasingly important 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 potential cost savings can be extremely valuable in the hands of decision-makers, as it presents alternatives which may not only save jobs, but will also lead to an increase in energy efficiency.

This report is intended to summarize the energy consumption and cost data submitted to the South Carolina Energy Office for fiscal year 2000. This data helps convey to the

public, agency leaders, school administrators 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 performance. 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 ninth 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 2000 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 (including outdoor lighting) of the reporting entity. Transportation energy use and costs were not included. Estimates were used for three public entities that failed to report their energy use data.

This report is required by Section 48-52-620 (E) of 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.

Therefore, in order to better meet the intended purpose of this report, specific objectives are needed. These objectives serve as intermediate milestones and provide a narrower focus of attention in evaluating the information. Accomplishing these objectives will meet the purpose of this report. Specifically, the objectives are:

- To encourage meaningful, consistent, and methodical collection of energy data on a periodic basis;
- To define a collective baseline of energy conservation data for facilities;
- To encourage the establishment of effective, practical energy conservation goals;
- To assist in establishing optimal standards for energy efficiency and building performance; and
- To ultimately define goals and offer guidance as energy plans are established.

Review of Responses

This report includes information about South Carolina's 86 public school districts, which, overall, reported $80.0 million in energy costs (up 6.2% from FY 99) for 94.3 million square feet (up 2.6% from FY 99) of space. For the two non-reporting school districts (Richland School District 1 and Calhoun School District), historical information was used to estimate FY 2000 figures for use with aggregate data. Florence School District 4 submitted incomplete data due to the closing of some schools, and the opening of others during fiscal year 2000. Its data was included in the overall school district average.

All of South Carolina's state agencies which own facilities (a total of 33) responded. Thirty agencies lease facilities and are unable to provide separate energy consumption data. 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 the 33 state agencies comprises over 24.3 million square feet of building space and $32.7 million in energy costs (up 0.6% from FY 99).

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 12; and colleges without housing (mainly technical colleges), numbering 21. The public colleges submitted data totaling $45.0 million in energy costs (up 9.5% from FY 99) and representing 34.9 million square feet of space (up 3.0% from FY 99). These increases can be attributed to changes in reported square footage, as well as cost adjustments from year-to-year. Finally, historical data was used to estimate energy cost and consumption figures for Denmark Technical College, which has failed to report its energy data for two consecutive years.

The State Energy Office will continue to request and gather energy consumption data from those entities which did not respond within the required timeframe. Although the State Energy Office is not a regulatory body, we will encourage those institutions that were not able to respond to submit their reports as soon as they are available. This will allow the establishment of a more comprehensive and meaningful baseline of information.

Appendix B provides complete lists of responding and non-responding entities.

FINDINGS

Performance Indicators

Two performance measures 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 entities 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 buildings 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. In addition, there are cases where more than one building is metered to one meter. This, too, can alter the 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.

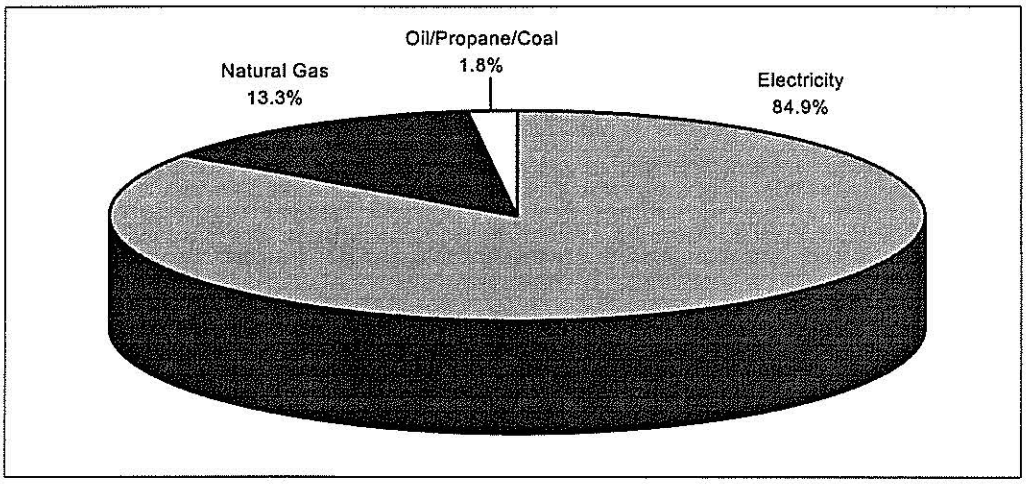
Climate

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 87 percent of the total public sector energy costs and natural gas accounts for 11 percent of the total cost for FY 2000. Figure 1 shows the energy expenditure breakdown by fuel source for South Carolina's public entities.

Figure 1. Energy Expenditures - FY 2000



As noted previously, 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 $80.0 million for public school districts (up 6.2% from FY 99), $32.7 million for state agencies (up 0.6% from FY 99), $37.2 million for colleges with housing (up 9.7% from FY 99), and $7.7 million for colleges without housing (up 8.3% from FY 99), totaling $157.8 million in FY 2000 (up 5.9% from FY 99).

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 2000

Fuel Source	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	TOTALS
Electricity	$72.996	$25.625	$28.353	$6.913	$133.888
Natural Gas	$6.225	$5.762	$8.182	$0.853	$21.024
Fuel Oil	$0.333	$0.222	$0.043	$0.001	$0.600
Propane	$0.520	$1.090	$0.011	$0.004	$1.637
Coal	$0.000	$0.000	$0.632	$0.000	$0.632
Kerosene	$0.000	$0.004	$0.000	$0.000	$0.004
Total Expenditures	**$80.075**	**$32.705**	**$37.223**	**$7.773**	**$157.778**

As illustrated in Table 1, the primary energy expense in each category is for electricity. Public school districts and colleges without housing spend a larger proportion (91.2% and 88.9%, respectively) of their energy budgets on electricity than do colleges with housing and state agencies (76.2% and 78.4%, respectively). Fuel oil and propane expenditures comprise a small percentage for all categories.

Table 2 below indicates that public institutions in South Carolina face a wide range of energy costs, with school districts paying the highest prices. It also indicates that school districts have unit energy costs that are twice as much as that of colleges with housing, most likely due to the school districts' lack of rate schedules for electricity costs.

Table 2. Average Unit Energy Costs - FY 2000[1]

Cost per Unit	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	Overall Average
Electricity ($/kBtu)	$0.022	$0.016	$0.014	$0.017	$0.018
Electricity ($/kwh)	$0.074	$0.055	$0.047	$0.058	$0.062
Natural Gas ($/kBtu)	$0.008	$0.006	$0.005	$0.008	$0.006
Natural Gas ($/therm)	$0.774	$0.617	$0.461	$0.801	$0.577
Fuel Oil ($/kBtu)	$0.006	$0.006	$0.007	$0.007	$0.006
Fuel Oil ($/gallon)	$0.861	$0.793	$0.906	$0.998	$0.842
Propane ($/kBtu)	$0.011	$0.007	$0.008	$0.015	$0.008
Propane ($/gallon)	$0.999	$0.683	$0.746	$1.331	$0.765
Average for All Energy Sources ($/kBtu)	**$0.019**	**$0.012**	**$0.009**	**$0.015**	**$0.014**

[1] Coal was excluded from this particular comparison table because Clemson University is the only entity currently reporting the use of this fuel type. Clemson paid $60.20 per ton of coal and $0.002 per kBtu of coal in FY 2000. Also, kerosene is not included here because it is used only by one DOT maintenance shop.

School District Findings

A. Five-year Historical Trend

Table 3. Energy Statistics for South Carolina School Districts, 1996-2000

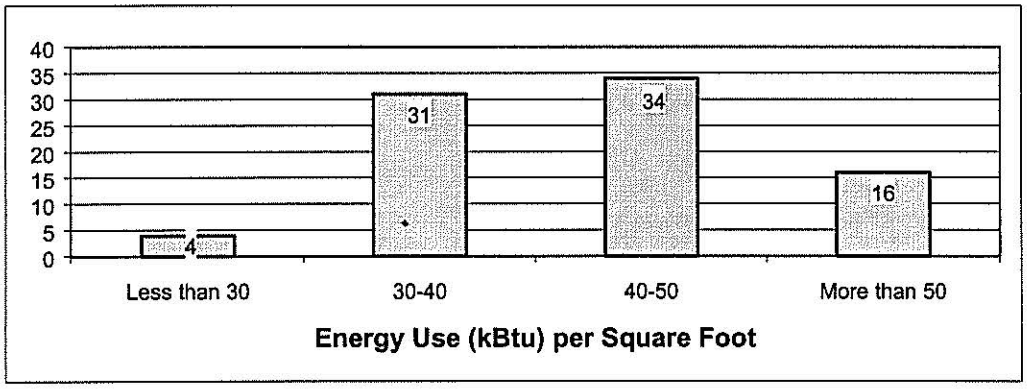
Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
1996	83.0	$69.9	$0.84	4,005.7	48.28
1997	87.1	$68.4	$0.79	3,697.2	42.58
1998	89.7	$73.7	$0.83	4,031.0	45.02
1999	91.9	$75.2	$0.82	4,085.9	45.07
2000	94.3	$80.0	$0.85	4,271.3	45.33

As Table 3 above illustrates, a comparison of the energy performance measures of the school districts in South Carolina indicates there was an increase of 13.6 percent in the amount of square footage reported to the South Carolina Energy Office during the five-year period 1996 to 2000. It also shows an increase of 14.4 percent in the total energy cost and an increase of 6.6 percent in the total amount of energy used (kBtu) by the school districts for the same period. The school districts experienced an increase in the energy cost per square foot (1.2%) and a decrease (6.2%) in the kBtu per square foot, the two most relevant measures of energy cost and usage.

B. Energy Use per Square Foot, FY 2000

Figure 2 below shows that the annual energy use per square foot ranges from 30 to 50 kBtu for most public school districts in South Carolina for FY 2000. The reported average annual kBtu (1,000 Btu) per square foot for public school districts is 45.33 kBtu per square foot (up 0.6% from FY 99).

Figure 2. School Districts, Energy Use per Square Foot, FY 2000[2]



[2] Eighty-four (84) of the 86 school districts responded; historical data was used for Richland School District 1 and Calhoun School District. Florence School District 4 submitted incomplete data due to the closing of old schools and the opening of new schools.

Table 4 below represents the ten school districts with the lowest energy use per square foot averages for FY 2000.

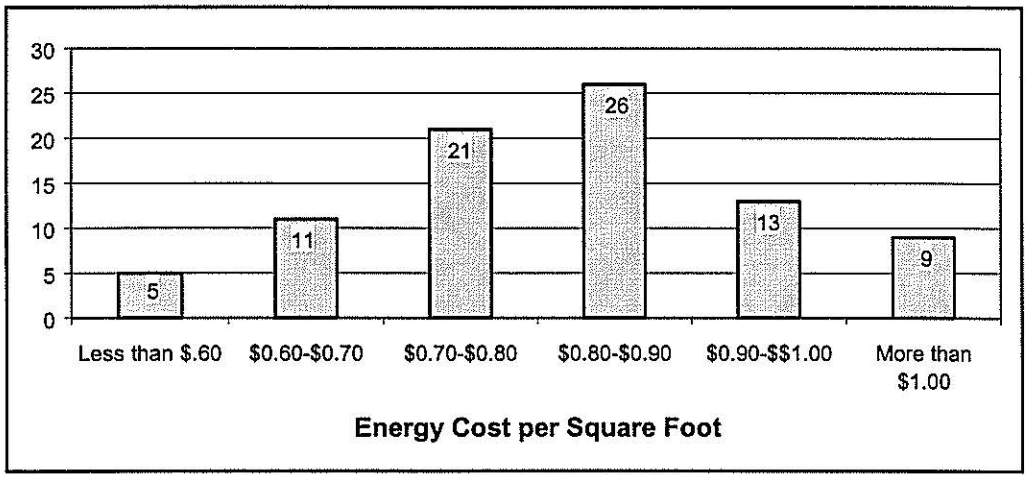
Table 4. School Districts, Lowest Energy Use per Square Foot, FY 2000

School District	Square Feet	kBtu/sf
Marion SD3	**104,752**	**23.29**
Dillon SD1	**143,802**	**28.50**
Lexington SD3	**566,548**	**28.89**
Williamsburg SD	**1,127,285**	**30.05**
Dillon SD3	**213,243**	**30.18**
Marion SD2	**321,950**	**30.77**
Lexington SD1	**2,174,425**	**30.86**
Dillon SD2	**455,661**	**31.37**
Florence SD3	**583,480**	**31.49**
Barnwell SD19	**164,150**	**32.36**

C. Cost per Square Foot

Figure 3 below illustrates that the cost per square foot ranges from $0.60 to $1.00 for most public school districts. Both the national and regional medians are $0.91 per square foot.[3] The reported average cost per square foot for South Carolina public school districts is $0.85 per square foot (up 3.7% from FY 99), which is $0.06 per square foot lower than both the national and regional medians.

Figure 3. School Districts, Energy Cost per Square Foot, FY 2000[4]



[3] *American School & University.* "M&O Cost Study," April 2000, pages 22-30.

[4] Eighty-four (84) of the 86 school districts responded; historical data was used for Richland School District 1 and Calhoun School District. Florence School District 4 submitted incomplete data due to the closing of old schools and the opening of new schools.

Table 5 below shows the ten school districts with the lowest cost per square foot averages for FY 2000.

Table 5. School Districts, Lowest Energy Cost per Square Foot, FY 2000

School District	Square Feet	$/sf
Marion SD2	**321,950**	**$0.45**
Bamberg SD1	**240,318**	**$0.51**
Barnwell SD19	**164,150**	**$0.51**
Florence SD5	**238,568**	**$0.56**
Lexington SD3	**566,548**	**$0.58**
Lexington SD1	**2,174,425**	**$0.60**
Orangeburg SD5	**1,117,634**	**$0.60**
Anderson SD5	**1,872,429**	**$0.61**
Anderson SD1	**785,049**	**$0.66**
Marion SD3	**104,752**	**$0.67**

State Agency Findings

A. Five-year Historical Trend

Table 6 below indicates that from 1996 to 2000, the total amount of square footage for South Carolina state agencies, as reported to the Energy Office, increased by 17.9 percent. During this same time period, the total energy cost for state agencies increased by 17.6 percent and the total kBtu increased by 9.6 percent. There was a slight increase in the energy cost per square foot, 3.7 percent, while the kBtu per square foot was reduced by 3.1 percent during the five-year comparison study.

Table 6. Energy Statistics for South Carolina State Agencies, 1996-2000

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
1996	20.7	$27.8	$1.36	2,499.3	120.92
1997	22.7	$30.3	$1.38	2,648.2	119.74
1998	24.2	$31.3	$1.36	2,886.7	127.44
1999	24.6	$32.5	$1.38	2,844.2	119.14
2000	24.3	$32.7	$1.41	2,739.8	117.15

B. Fiscal Year 2000 Findings

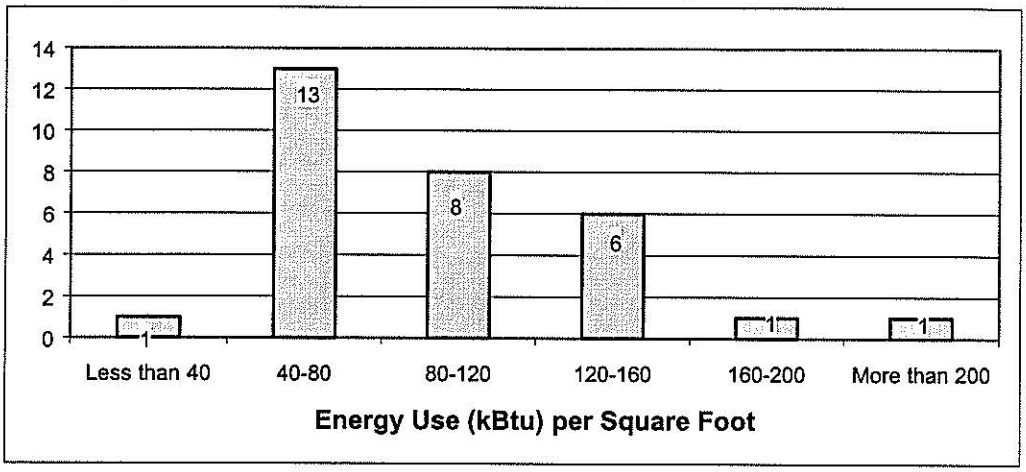
Due to the diverse nature and use of state agency facilities, comparison of their energy usage and expenditure patterns can be difficult. One important indicator that should be considered when evaluating the performance of state agencies is that a handful of state agencies manage the greatest amount of building space and pay a majority of the energy bills. The largest energy bills for state agencies were $10.3 million for 6.4 million square feet operated by the Department of Corrections, $5.3 million for 4.2 million square feet managed by the Office of General Services Facilities Management and $3.0 million for 2.0 million square feet maintained by the Department of Mental Health. These three agencies account for 51.6 percent of the total square footage for all reporting state agencies and pay 57.0 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. Such a facility is the State Park Health Center, which is operated by DHEC, the Department of Corrections, and the Department of Mental Health.

C. Energy Use per Square Foot, FY 2000

Figure 4 below indicates that for most state agencies, annual energy use ranges from 40 to 120 kBtu per square foot, with the overall average being 117.15 kBtu per square foot (down 1.7% from FY 99). The three agencies that use the most energy have averages ranging from 138.14 to 158.04 kBtu per square foot, which skews the overall average upwards. SLED's energy use per square foot exceeds 200 kBtu due to its diverse facility makeup.

Figure 4. State Agencies, Energy Use per Square Foot, FY 2000[5]



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.

In addition, agencies vary greatly in size. Table 7 on the next page, which shows the state agencies with the lowest average annual energy use per square foot, also reflects the variability in agency size.

[5] This chart includes 30 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 and therefore were not included in this survey. A third agency, Santee Cooper, was not included in the unit energy use analysis due to its status as a power provider.

Table 7. State Agencies, Lowest Energy Use per Square Foot, FY 2000

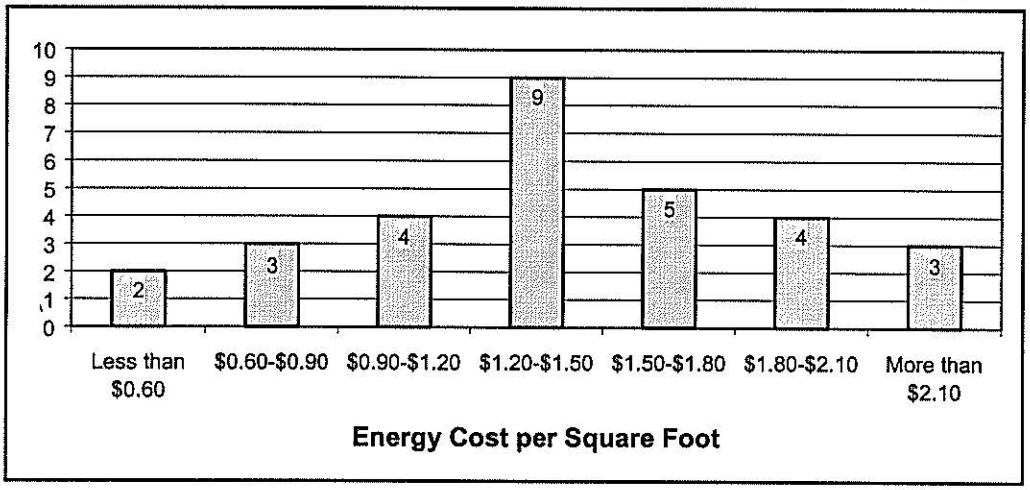
State Agency	Square Feet	kBtu/sf
SC Department of Education	362,392	35.94
SC Sea Grant Consortium	5,400	40.43
SC Forestry Commission	104,634	43.81
SC School for the Deaf & Blind	382,226	47.29
SC Military Department	2,095,911	52.97
SC Vocational Rehabilitation	709,339	54.94
Wil Lou Gray Opportunity School	275,000	56.16
John De La Howe School*	165,991	57.14
SC Dept. of Commerce/Div. of Public Railways	16,090	60.05
SC Dept. of Labor, Licensing & Regulation	106,877	67.92

*Indicates this entity submitted total energy use only, not building-by-building data.

D. Cost per Square Foot, FY 2000

For South Carolina state agencies, average annual energy cost is $1.41 per square foot (up 2.2% from FY 99). Most results fall between $0.90 and $1.80 per square foot.

Figure 5. State Agencies, Energy Cost per Square Foot, FY 2000[6]



[6] Includes 30 agencies; Patriots Point Development Authority and the State Board for Tech/Comp Education's data were excluded since it was 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 as a power provider. Because Santee Cooper is a provider, it does not pay for energy; including them at $0/sf would skew the overall averages.

Table 8 below lists the ten South Carolina state agencies with the lowest average energy cost per square foot for fiscal year 2000.

Table 8. State Agencies, Lowest Energy Cost per Square Foot, FY 2000

Agency	Square Feet	$/sf
Wil Lou Gray Opportunity School*	275,000	$0.53
SC Department of Education	362,392	$0.55
SC School for the Deaf & Blind	382,226	$0.66
SC Dept. of Health & Environmental Control	52,160	$0.77
SC Military Department	2,095,911	$0.89
SC Sea Grant Consortium	5,400	$1.02
SC Vocational Rehabilitation	709,339	$1.04
SC Forestry Commission	104,634	$1.09
John de la Howe School	165,991	$1.15
SC Educational Television	314,073	$1.24

*Indicates this entity submitted total energy use only, not building-by-building data.

Colleges with Housing Findings

A. Five-year Historical Trend

As shown in Table 9 below, the total square footage of colleges with housing in South Carolina increased by 12.3 percent during the period 1996 to 2000. The total energy cost during this period rose by 17.7 percent, and the total kBtu increased by 37.5 percent. The average cost per square foot during this period increased by 4.8 percent, while the average kBtu per square foot rose by 23.9 percent.

Table 9. Energy Use Statistics for South Carolina Colleges with Housing, 1996-2000

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	KBtu per Square Foot
1996	25.2	$31.6	$1.26	2,948.5	116.95
1997	26.0	$33.0	$1.30	3,493.0	137.67
1998	27.2	$33.2	$1.25	3,326.4	140.06
1999	27.6	$33.9	$1.23	3,792.7	138.46
2000	28.3	$37.2	$1.32	4,053.8	144.88

B. Fiscal Year 2000 Findings

Colleges with housing, like state agencies, are a relatively disparate group. Three of the 12 institutions, Clemson University, the Medical University of South Carolina and the University of South Carolina (Columbia campus), comprise 65.0 percent of the total square footage and 67.2 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. Also of note is that USC-Spartanburg was switched from the colleges without housing category to the colleges with housing category during FY 99.

C. Energy Use (kBtu) per Square Foot, FY 2000

The colleges with housing category consists of four-year colleges with on-campus dormitories (one exception, Denmark Technical College, is a two-year institution with dormitories, which has not reported its energy consumption data for the last two years). As shown in Figure 6, the majority of these colleges fall between 60 and 150 kBtu per square foot. Average energy use for colleges with housing is 144.88 kBtu per square foot (up 4.6% from FY 99).

Figure 6. Colleges with Housing, Energy Use per Square Foot, FY 2000

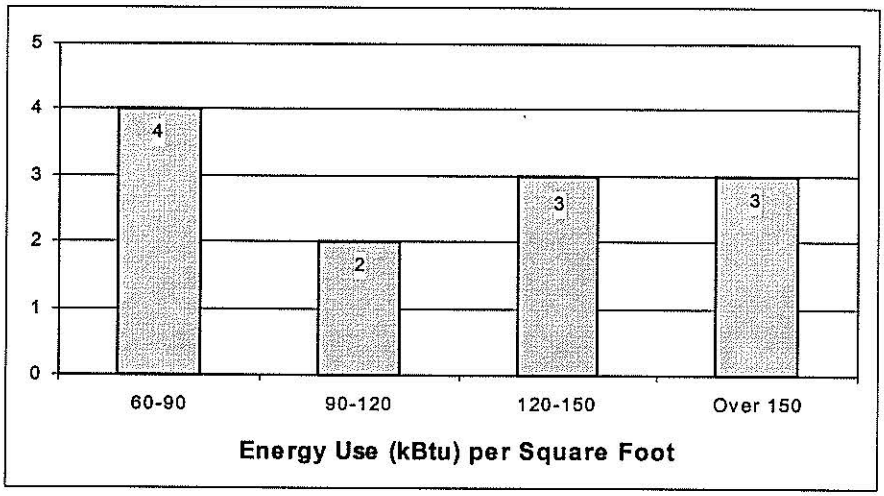


Table 7 below shows the five colleges with housing that have the lowest energy use (kBtu) per square foot.

Table 10. Top Five Colleges with Housing, Lowest Energy Use per Square Foot, FY 2000

College/University	kBtu/sf
Coastal Carolina University	**67.08**
Lander University	**69.37**
USC-Spartanburg	**78.93**
Francis Marion University	**108.40**
The Citadel*	**110.91**

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

D. Energy Cost per Square Foot

Annual cost per square foot ranges widely for colleges with housing in South Carolina, but most such institutions fall between $0.80 and $1.20, as indicated in Figure 7. Average cost per square foot for colleges with housing is $1.32 per square foot (up 7.3% from FY 99). This is substantially higher than the national median energy expenditures for four-year colleges of $1.04 per square foot.[7]

Figure 7. Colleges with Housing, Energy Cost per Square Foot, FY 2000

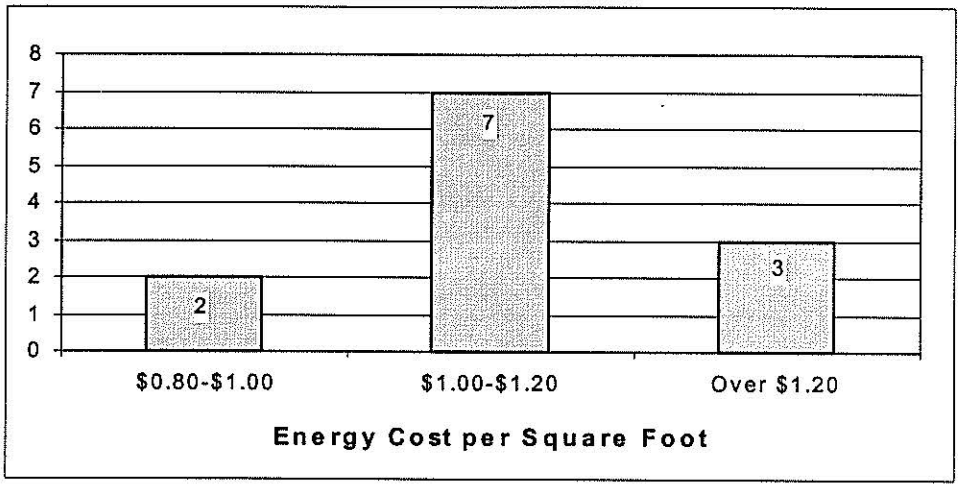


Table 11 below highlights the five colleges with housing that have the lowest energy costs per square foot.

Table 11. Top Five Colleges with Housing, Lowest Energy Cost per Square Foot, FY 2000

College/University	$/sf
Lander University	**$0.83**
South Carolina State University*	**$0.93**
Clemson University*	**$1.02**
USC-Spartanburg	**$1.09**
Winthrop University*	**$1.11**

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

[7] *American School & University.* "M&O Costs," April 2000, p. 22.

Colleges without Housing Findings

A. Five-year Historical Trend

Colleges without housing in South Carolina reported an increase of 1.5 percent in the amount of total square footage from 1996 to 2000. Table 12 below also indicates that during the same period, total energy cost increased by 4.1 percent, and total kBtu rose by 5.6 percent. The average energy cost per square foot increased by 1.8 percent and average kBtu per square foot dropped by 1.9 percent.

Table 12. Energy Use Statistics for South Carolina Colleges Without Housing, 1996-2000

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
1996	6.5	$7.4	$1.14	495.9	76.47
1997	6.5	$7.4	$1.13	487.2	75.07
1998	6.1	$7.1	$1.12	541.4	82.74
1999	6.3	$7.2	$1.11	478.2	71.30
2000	6.6	$7.7	$1.16	523.7	75.82

B. Energy Use (kBtu) per Square Foot, FY 2000

The annual energy use per square foot for most colleges without housing generally ranges from 50 to 100 kBtu. Average energy use for these 21 institutions is 75.82 kBtu per square foot (up 6.3% from FY 99). As illustrated in Figure 8 below, four colleges without housing averaged less than 50 kBtu per square foot, three averaged between 50-60 kBtu, four averaged between 60-70 kBtu, three averaged between 70-80 kBtu, three averaged between 80-90 kBtu, one averaged between 90-100 kBtu, and three averaged more than 100 kBtu per square foot.

Figure 8. Colleges without Housing, Energy Use per Square Foot, 2000

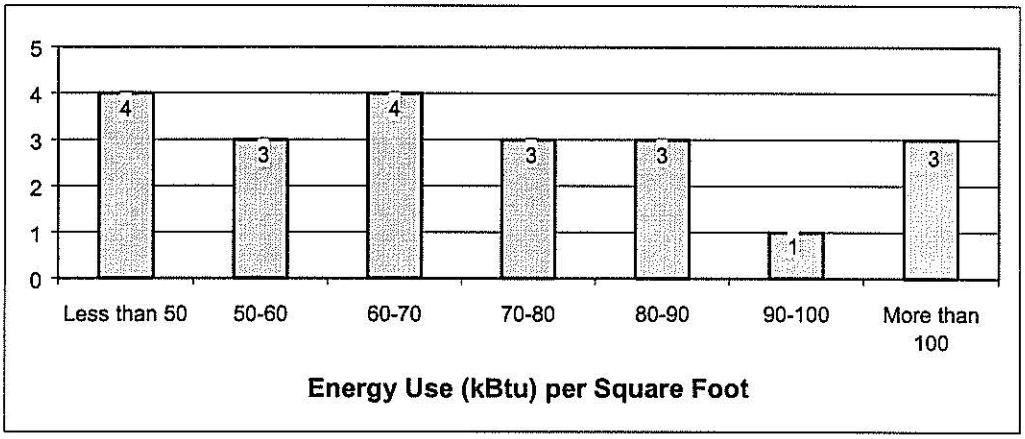


Table 13 below shows the five colleges without housing that have the lowest energy use (kBtu) per square foot.

Table 13. Top Five Colleges without Housing, Lowest Energy Use per Square Foot, FY 2000

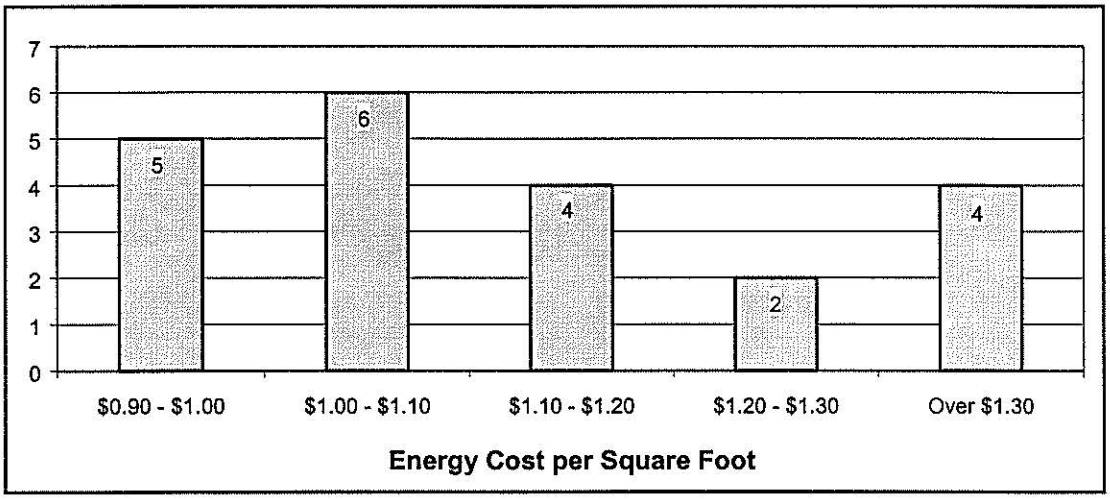
College	kBtu/sf
USC-Salkehatchie	**38.73**
Williamsburg Technical College*	**42.24**
Technical College of the Lowcountry	**48.94**
USC-Union	**49.57**
Central Carolina Technical College	**53.94**

*Indicates this entity submitted total energy use only, not building-by-building data.

C. Energy Cost per Square Foot, FY 2000

Energy cost per square foot ranges from $0.80 to $1.40 for most colleges without housing. The average cost per square foot is $1.16 (up 4.5% from FY 99). This compares to a national median energy cost per square foot for two-year colleges of $1.12.[8] As demonstrated in Figure 9, five colleges without housing averaged between $0.90-$1.00 per square foot, six averaged between $1.00-$1.10, four averaged between $1.10-$1.20, two averaged between $1.20-$1.30, and four averaged over $1.30 per square foot.

Figure 9. Colleges without Housing, Energy Cost per Square Foot, FY 2000



[8] *American School and University.* "M&O Costs," April 2000, p. 24.

Table 14 below shows the five colleges without housing that have the lowest energy cost per square foot for fiscal year 2000.

Table 14. Top Five Colleges without Housing, Lowest Energy Cost per Square Foot, FY 2000

College	$/sf
Technical College of the Lowcountry	**$0.93**
Horry-Georgetown Technical College*	**$0.93**
Williamsburg Technical College*	**$0.94**
USC-Salkehatchie	**$0.94**
Spartanburg Technical College	**$0.94**

*Indicates this entity submitted total energy cost only, not building-by-building data.

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 assistance through our Rebuild South Carolina program.

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 assistance in order to finance such energy saving procedures, the Energy Office has the ConserFund loan program that can offer low-interest loans for the implementation 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.

Because of the need for accountability in government, it is increasingly important to be able to pinpoint the sources 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 potential cost savings can be extremely valuable in the hands of decision-makers, as it presents alternatives which will not only save jobs, but may also lead to increased energy efficiency.

This report summarizes the energy consumption and cost data submitted to the South Carolina Energy Office each fiscal 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 has been the 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

Note: Institutions in shaded fields indicate they utilized the FASER energy accounting software program, which provides an extremely detailed breakdown of energy cost and usage.

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
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 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

*Indicates this entity submitted incomplete or insufficient data.

Not Responding

Calhoun SD
Richland SD1

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. of
Military Dept. (Adjutant General)
Natural Resources, Dept. of
--Division of Wildlife and Fisheries
--Division of Marine Resources
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
Vocational Rehabilitation Dept.
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, State
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, State
Ethics Commission, State
Health and Human Services, Dept. of
Higher Education Tuition Grants Comm.
Housing Finance & Development Authority, State
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
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
Francis Marion University
Lander University
Medical University of South Carolina
South Carolina State University
University of South Carolina
USC-Spartanburg
Winthrop University

Not Responding

Denmark Technical College

Colleges without Housing:

Responding

Aiken Technical College
Central Carolina Technical College
Florence-Darlington Technical College
Greenville Technical College
Horry-Georgetown Technical College
Midlands Technical College
Northeastern 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-Beaufort
USC-Lancaster
USC-Salkehatchie
USC-Sumter
USC-Aiken
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]					
Category	FASER	Form	Contractor	Totals Only	Not Reporting	TOTAL
School Districts	24	48	11	1	2	86
State Agencies	12	26	0	3	0	41*
Colleges with Housing	4	5	0	2	1	12
Colleges without Housing	5	14	0	2	0	21
TOTAL	45	93	11	8	3	160

[9] Building-by-building detail is the preferred method of reporting. Ninety-three percent of all entities reported in this manner.

* 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.