

Energy Use in South Carolina's Public Facilities, FY 2001

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EXECUTIVE SUMMARY

This report summarizes fiscal year 2001 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 public entities that submitted energy data reports spent \$174.8 million on energy in FY 2001, 79.5 percent of which was spent on electricity. Natural gas accounted for 18.1 percent of energy expenditures.

Table 1. Energy Expenditures (in millions of dollars) by Fuel Source - FY 2001

Fuel Source	School Districts	State Agencies	Colleges With Housing	Colleges without Housing	Totals
Electricity	\$78.668	\$25.890	\$27.384	\$7.056	\$138.998
Natural Gas	\$10.597	\$9.088	\$10.384	\$1.545	\$31.614
Fuel Oil	\$0.329	\$0.229	\$0.494	\$0.000	\$1.053
Propane	\$0.824	\$1.587	\$0.036	\$0.006	\$2.455
Coal	\$0.000	\$0.000	\$0.768	\$0.000	\$0.468
Kerosene	\$0.000	\$0.002	\$0.000	\$0.000	\$0.002
Total Expenditures	\$90.419	\$36.797	\$39.068	\$8.608	\$174.892

Table 2 shows that four-year colleges and universities benefited from the lowest unit costs for electricity (\$0.045 cost/kWh) and natural gas (\$0.731 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 2001

Cost- per- Unit	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	Overall Average
Electricity (\$/kBtu)	\$0.022	\$0.016	\$0.013	\$0.017	\$0.018
Electricity (\$/kwh)	\$0.074	\$0.056	\$0.045	\$0.059	\$0.062
Natural Gas (\$/kBtu)	\$0.011	\$0.009	\$0.007	\$0.011	\$0.009
Natural Gas (\$/therm)	\$1.090	\$0.911	\$0.731	\$1.110	\$0.895
Fuel Oil (\$/kBtu)	\$0.008	\$0.007	\$0.007	\$0.000	\$0.007
Fuel Oil (\$/gallon)	\$1.060	\$0.954	\$0.956	\$0.000	\$0.987
Propane (\$/kBtu)	\$0.013	\$0.010	\$0.012	\$0.022	\$0.011
Propane (\$/gallon)	\$1.180	\$0.935	\$0.113	\$1.986	\$1.010
Average for All Energy Sources (\$/kBtu)	\$0.019	\$0.013	\$0.010	\$0.016	\$0.015

As indicated in Table 3 below, the 86 school districts included in this report spent \$90.4 million to provide energy for 98.0 million square feet of building space. The cost per square foot ranged mostly from \$0.60 to \$1.00. South Carolina school districts averaged \$0.92 per square foot, compared to a national median of \$0.99 per square foot and a regional median of \$1.16 per square foot. Most school districts used from 30 to 50 kBtu per square foot, with an overall average of 48.13 kBtu per square foot.

Table 3. Fiscal Year 2001 Summary Data

Institutions	Total Sq.Ft. (in millions)	Total Energy Cost (in millions)	Avg. \$/Sq.ft.	Avg. kBtu/Sq.ft.
School Districts (86)	98.0	\$90.4	\$0.92	48.13
State Agencies (33)	24.4	\$36.8	\$1.61	121.66
Colleges with Housing (12)	28.0	\$39.0	\$1.23	127.15
Colleges without Housing (21)	6.9	\$8.6	\$1.24	79.03
Totals*	157.3	\$174.9	\$1.09	73.53

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

Twelve four-year colleges and universities spent \$39.0 million to provide energy for 28.0 million square feet of building space. The majority spent between \$0.90 and \$1.50 per square foot for energy, averaging \$1.23 per square foot. The national median for four-year colleges is \$0.95 per square foot. Energy use was mostly in the range of 60 to 150 kBtu per square foot, with an overall average of 127.15 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 64.3 percent of the total square footage and 67.7 percent of the total energy expenditures for this category. Consequently, this allows for 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 \$8.6 million on energy, mostly ranging from \$0.90 to \$1.30 per square foot and averaging \$1.24 per square foot. This compares to the national median for two-year colleges of \$1.18 per square foot. Energy consumption for these institutions generally was 50 to 100 kBtu per square foot, averaging 79.03 kBtu per square foot for their 6.9 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 \$36.8 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 24.4 million

square feet of building space owned by 32 agencies was \$1.61 per square foot. Average energy use ranged mainly from 40 to 120 kBtu per square foot, with an average use per square foot of 121.66 kBtu.

Three state agencies are responsible for 51.6 percent of total state building space, and pay 57.6 percent of state agency energy bills. The largest of these three state agencies, the Department of Corrections, had energy expenditures of \$11.9 million for 6.4 million square feet. The Office of General Services, Facilities Management spent \$5.7 million for 4.3 million square feet, and the Department of Mental Health spent \$3.5 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 156 responding entities. 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. 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.

This report is intended to summarize the energy consumption and cost data submitted to the South Carolina Energy Office for fiscal year 2001. 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. Using standard measures of energy consumption, it is possible to render an analysis of a given agency's performance in comparison with other agencies as well as establishing a historical trend of 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 tenth 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 2001 data for 86 public school districts, 32 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 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, and for one institution which submitted incomplete 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.

The specific objectives of energy use reporting 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 \$90.4 million in energy costs (up 8.4% from FY 00) for 98.0 million square feet (up 3.2% from FY 00) of space. For three school districts (Clarendon School District 3, Georgetown School District and Berkeley School District), historical information was used to estimate FY 2001 figures for use with aggregate data.

All of South Carolina's state agencies which own facilities (a total of 32) responded. Thirty-one 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 32 state agencies comprises over 24.4 million square feet of building space and \$36.8 million in energy costs (up 12.5% from FY 00).

Because dormitories have unique energy use characteristics, public colleges 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 \$47.6 million in energy costs (up 5.8% from FY 00) and representing 34.9 million square feet of space. Historical data was used to estimate energy cost and consumption figures for Denmark Technical College, which has not reported its energy data for three 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 unable to respond to submit their energy data 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, usage 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. These factors account for the variance that sometimes occurs in the energy expenditures reflected in the customized reports sent to each reporting entity.

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 energy efficiency. Deterioration over the years and limited technology compound 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.

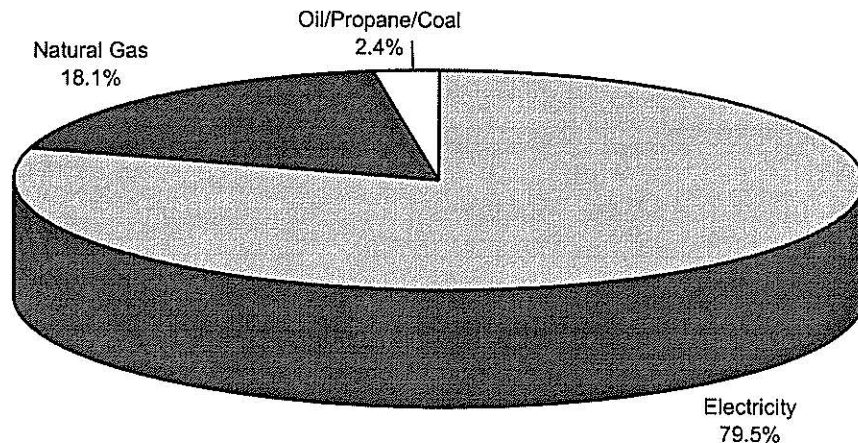
Climate

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 79.5 percent of the total public sector energy costs and natural gas accounts for 18.1 percent of the total cost for FY 2001. Figure 1 shows the energy expenditure breakdown by fuel source for South Carolina's public entities.

Figure 1. Energy Expenditures - FY 2001



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 00), \$32.7 million for state agencies (up 0.6% from FY 00), \$37.2 million for colleges with housing (up 9.7% from FY 00), and \$7.7 million for colleges without housing (up 8.3% from FY 00), totaling \$157.8 million in FY 2001 (up 5.9% from FY 00).

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 2001

Fuel Source	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	TOTALS
Electricity	\$78.668	\$25.890	\$27.384	\$7.056	\$138.998
Natural Gas	\$10.597	\$9.088	\$10.384	\$1.545	\$31.614
Fuel Oil	\$0.329	\$0.229	\$0.494	\$0.000	\$1.053
Propane	\$0.824	\$1.587	\$0.036	\$0.006	\$2.455
Coal	\$0.000	\$0.000	\$0.768	\$0.000	\$0.468
Kerosene	\$0.000	\$0.002	\$0.000	\$0.000	\$0.002
Total Expenditures	\$90.419	\$36.797	\$39.068	\$8.608	\$174.892

As illustrated in Table 1 on the previous page, the primary energy expense in each category is for electricity. Public school districts and colleges without housing spend a larger proportion (86.9% and 81.4%, respectively) of their energy budgets on electricity than do colleges with housing and state agencies (70.1% and 70.3%, 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 uniform rate schedules for electricity costs. Of particular importance is the fact that the natural gas rates were increased during the FY 2001 period, which resulted in a 70.2 percent increase for school districts, a 57.8 percent increase for state agencies, a 26.9 percent increase for colleges with housing, and an 80.9 percent increase for colleges without housing.

Table 2. Average Unit Energy Costs - FY 2001¹

Cost per Unit	School Districts	State Agencies	Colleges with Housing	Colleges without Housing	Overall Average
Electricity (\$/kBtu)	\$0.022	\$0.016	\$0.013	\$0.017	\$0.018
Electricity (\$/kwh)	\$0.074	\$0.056	\$0.045	\$0.059	\$0.062
Natural Gas (\$/kBtu)	\$0.011	\$0.009	\$0.007	\$0.011	\$0.009
Natural Gas (\$/therm)	\$1.090	\$0.911	\$0.731	\$1.110	\$0.895
Fuel Oil (\$/kBtu)	\$0.008	\$0.007	\$0.007	\$0.000	\$0.007
Fuel Oil (\$/gallon)	\$1.060	\$0.954	\$0.956	\$0.000	\$0.987
Propane (\$/kBtu)	\$0.013	\$0.010	\$0.012	\$0.022	\$0.011
Propane (\$/gallon)	\$1.180	\$0.935	\$0.113	\$1.986	\$1.010
Average for All Energy Sources (\$/kBtu)	\$0.019	\$0.013	\$0.010	\$0.016	\$0.015

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 \$49.81 per ton of coal and \$0.002 per kBtu of coal in FY 2001. 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, 1997-2001

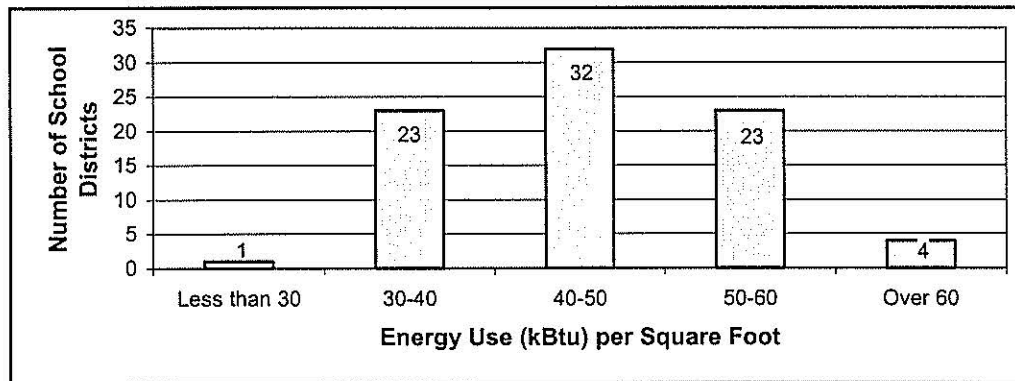
Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
1997	87.1	\$68.4	\$0.79	3,697.2	42.58
1998	89.7	\$73.7	\$0.83	4,031.0	45.02
1999	91.9	\$75.2	\$0.82	4,085.9	45.07
2000	94.4	\$80.1	\$0.85	4,276.3	45.30
2001	98.0	\$90.4	\$0.92	4,675.9	48.13

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 12.5 percent in the amount of square footage reported to the South Carolina Energy Office during the five-year period 1997 to 2001. It also shows an increase of 32.2 percent in the total energy cost and an increase of 26.5 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 (16.5%) and an increase (13.0%) in the kBtu per square foot, the two most relevant measures of energy cost and usage.

B. Energy Use per Square Foot, FY 2001

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 2001. The reported average annual kBtu (1,000 Btu) per square foot for public school districts is 48.13 kBtu per square foot (up 6.2% from FY 00).

Figure 2. School Districts, Energy Use per Square Foot, FY 2001²



² Historical data was used for Clarendon School District 3, Georgetown School District, and Berkeley School District.

Table 4 below represents the ten school districts with the lowest energy use per square foot averages for FY 2001.

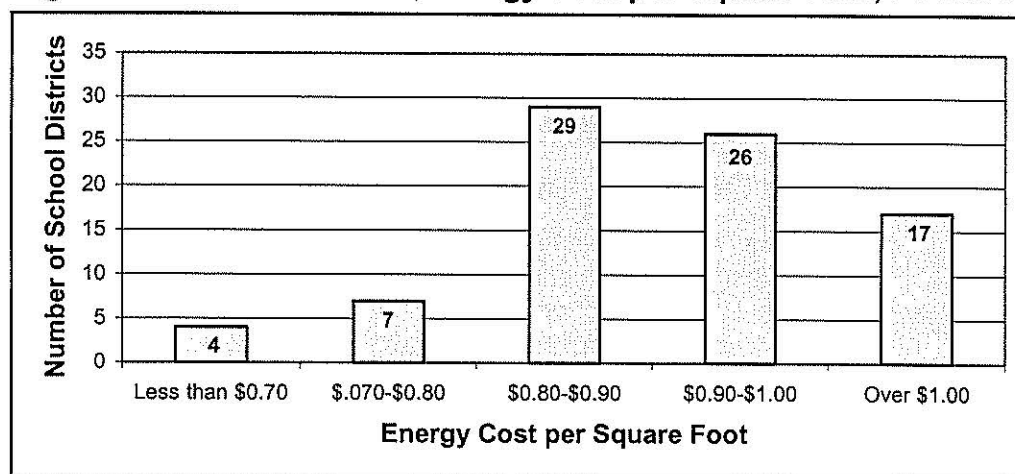
Table 4. School Districts, Lowest Energy Use per Square Foot, FY 2001

School District	Square Feet	kBtu/sf
Dillon SD1	143,802	29.42
Marlboro SD	800,016	30.21
Lexington SD1	2,551,736	31.19
Florence SD3	603,974	32.91
Dillon SD3	195,534	33.03
Williamsburg SD	931,281	33.24
Lee SD	470,333	33.64
Marion SD3	104,742	33.70
Clarendon SD1	239,704	34.18
Lexington SD3	468,719	34.60

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. The national median is \$0.99 per square foot and the regional median is \$1.16 per square foot.³ The reported average cost per square foot for South Carolina public school districts is \$0.92 per square foot (up 8.2% from FY 00), which is \$0.07 per square foot lower than the national median and \$0.24 less than the regional median.

Figure 3. School Districts, Energy Cost per Square Foot, FY 2001⁴



³ American School & University. "M&O Cost Study," April 2001, pages 24-32.

⁴ Historical data was used for Clarendon School District 3, Georgetown School District and Berkeley School District.

Table 5 below shows the ten school districts with the lowest cost per square foot averages for FY 2001. The natural gas rate increases implemented during 2001 accounted for a 70.2 percent increase in natural gas expenditures from FY 2000. As such, this is reflected in the higher energy cost per square foot for FY 2001.

Table 5. School Districts, Lowest Energy Cost per Square Foot, FY 2001

School District	Square Feet	\$/sf
Lexington SD1	2,551,736	\$0.65
Bamberg SD1	279,845	\$0.67
Greenwood SD51	271,339	\$0.69
Anderson SD5	1,885,917	\$0.69
Lexington SD3	468,719	\$0.71
Hampton SD1	402,558	\$0.74
Lexington SD2	1,373,501	\$0.74
Orangeburg SD5	1,127,295	\$0.75
Barnwell SD19	202,279	\$0.76
Florence SD4	191,000	\$0.79

State Agency Findings

A. Five-year Historical Trend

Table 6 below indicates that from 1997 to 2001, the total amount of square footage for South Carolina state agencies, as reported to the Energy Office, increased by 7.5 percent. During this same time period, the total energy cost for state agencies increased by 21.5 percent and the total kBtu increased by 5.3 percent. There was an increase in the energy cost per square foot, 16.7 percent, while the kBtu per square foot slightly increased by 1.6 percent during the five-year comparison study.

Table 6. Energy Statistics for South Carolina State Agencies, 1997-2001

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
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	2,739.4	117.19
2001	24.4	\$36.8	\$1.61	2,787.9	121.66

B. Fiscal Year 2001 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 \$11.9 million for 6.4 million square feet operated by the Department of Corrections, \$5.7 million for 4.3 million square feet managed by the Office of General Services Facilities Management and \$3.5 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 57.6 percent of all state energy bills.

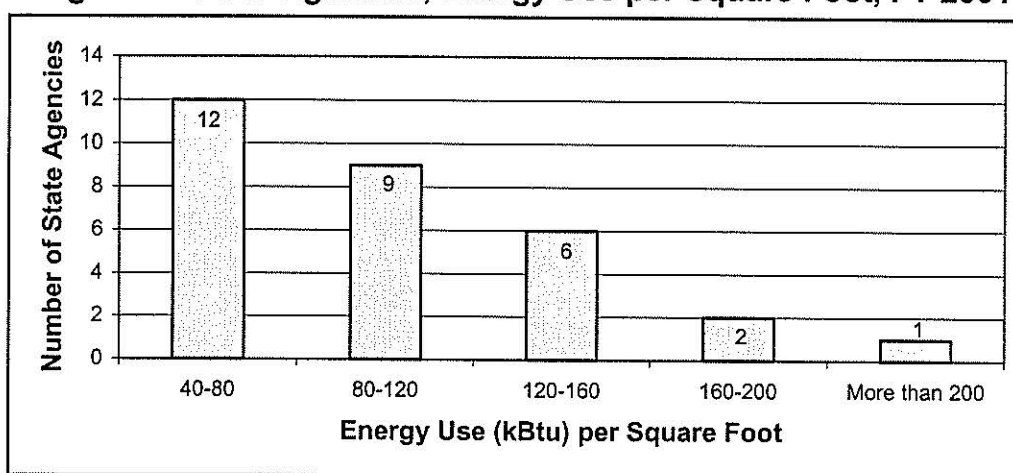
An additional consideration is that many buildings are reported not by the individual agencies using them, but by the State Budget and Control Board's Office of General Services, which manages them. Furthermore, some of those agencies also have additional facilities which they manage themselves, and 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 2001

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 121.66 kBtu per square foot (up 1.6% from FY 00). The three agencies that use the most energy have averages ranging from 156.64 to 166.91 kBtu per square foot, which skews the overall average upwards. SLED's energy use per square foot exceeds 300 kBtu due to its diverse facility makeup.

Figure 4. State Agencies, Energy Use per Square Foot, FY 2001⁵



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. The Department of Mental Health, the Department of Juvenile Justice and the Department of Corrections represent state agencies with facilities that operate on a 24-hour basis. This presents a challenge to comparing them with the other state agencies which operate on normal business hours. The Energy Office will be studying this situation to determine if they should be included in a separate reporting category.

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 2001

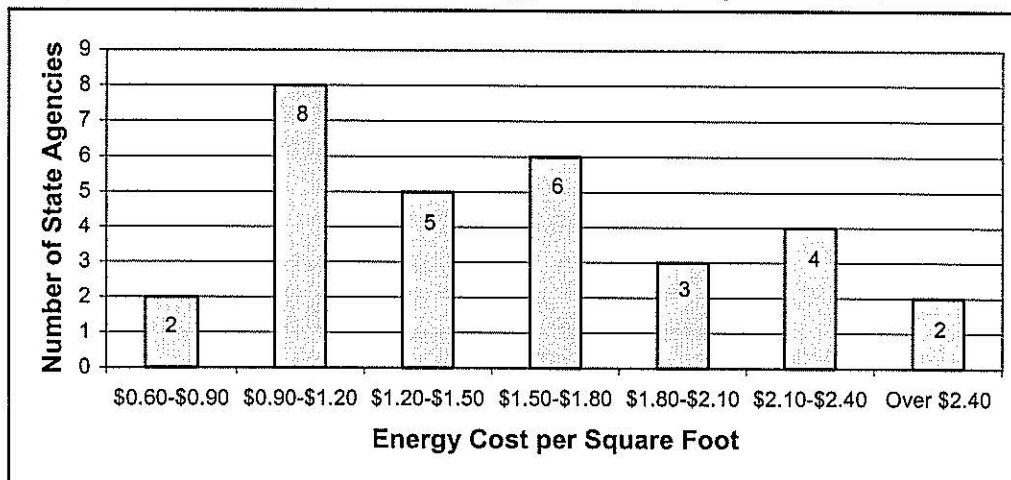
State Agency	Square Feet	kBtu/sf
SC Forestry Commission	96,483	45.89
SC Sea Grant Consortium	5,200	47.94
SC Division of Public Railways	16,090	50.27
SC Department of Public Safety	181,202	54.00
SC Department of Education	362,392	35.94
SC School for the Deaf & Blind	321,025	55.53
SC Vocational Rehabilitation	731,343	55.94
Wil Lou Gray Opportunity School*	275,000	58.87
SC Military Department	1,850,421	64.05
SC Department of Education	213,206	64.16
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 2001

For South Carolina state agencies, average annual energy cost is \$1.61 per square foot (up 14.2% from FY 00). Most results fall between \$0.90 and \$1.80 per square foot. The increase in the natural gas rates in 2001 led to a 57.8 percent increase in expenditures over the FY 2000 amount. This accounts for the steep increase in the energy cost per square foot from FY 2000 to FY 2001.

Figure 5. State Agencies, Energy Cost per Square Foot, FY 2001⁶



⁶ Includes 30 agencies; Patriots Point Development Authority and the State Board for Tech/Comp Education were excluded since their data 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 2001.

Table 8. State Agencies, Lowest Energy Cost per Square Foot, FY 2001

Agency	Square Feet	\$/sf
Wil Lou Gray Opportunity School*	275,000	\$0.67
SC School for the Deaf & Blind	321,025	\$0.78
SC Dept. of Health & Environmental Control	52,431	\$0.93
SC Department of Education	213,206	\$0.95
SC Forestry Commission	96,483	\$1.03
SC Department of Public Safety	181,020	\$1.08
SC Vocational Rehabilitation	731,343	\$1.09
SC Military Department	1,850,421	\$1.12
SC Sea Grant Consortium	5,200	\$1.19
SC Educational Television	301,496	\$1.20

*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 7.7 percent during the period 1997 to 2001. The total energy cost during this period rose by 9.1 percent, and the total kBtu increased by 11.7 percent. The average cost per square foot during this period decreased by 5.4 percent, while the average kBtu per square foot fell by 7.6 percent.

Table 9. Energy Use Statistics for South Carolina Colleges with Housing, 1997-2001

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
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	28.2	\$37.2	\$1.16	4,053.8	134.56
2001	28.0	\$36.0	\$1.23	3,901.7	127.15

B. Fiscal Year 2001 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 64.3 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 mostly reflect the average for these three institutions. The colleges with housing category experienced a 26.9 percent increase in natural gas expenditures in FY 2001 due to the natural gas rate hikes, which is a much lower percentage than the other state entities.

C. Energy Use (kBtu) per Square Foot, FY 2001

The colleges with housing category consists of four-year colleges and one two-year institution with on-campus housing. As shown in Figure 6, the majority of these colleges fall between 50 and 140 kBtu per square foot. Average energy use for colleges with housing is 127.15 kBtu per square foot (down 5.5% from FY 00).

Figure 6. Colleges with Housing, Energy Use per Square Foot, FY 2001

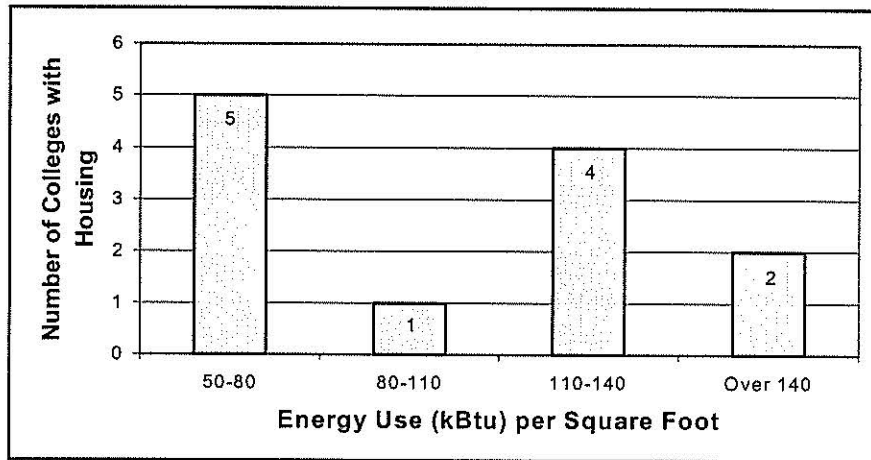


Table 7 below shows the five colleges with housing that experienced the lowest energy use (kBtu) per square foot.

Table 10. Top Five Colleges with Housing, Lowest Energy Use per Square Foot, FY 2001*

College/University	kBtu/sf
Francis Marion University	54.44
Coastal Carolina University	65.21
Lander University	76.61
USC-Spartanburg	77.76
Winthrop University	105.55

*Denmark Technical College averaged 75.43 kBtu per square foot. However, since it has not reported its energy use data for the past three years, this figure is based on historical projections and is not eligible to be listed as an institution in the lowest energy use per square foot category.

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 \$0.90 and \$1.30, as indicated in Figure 7. Average cost per square foot for colleges with housing is \$1.23 per square foot (up 6.0% from FY 00). This is substantially higher than the national median energy expenditures for four-year colleges of \$0.95 per square foot.⁷

Figure 7. Colleges with Housing, Energy Cost per Square Foot, FY 2001

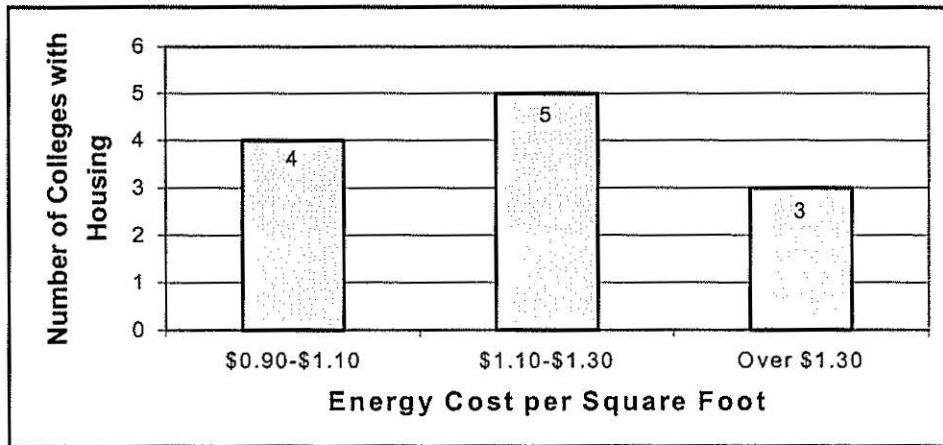


Table 11 below highlights the five colleges with housing that have the lowest energy costs per square foot.

Table 11. Top Five Colleges with Housing, Lowest Energy Cost per Square Foot, FY 2001

College/University	\$/sf
Francis Marion University	\$0.91
Clemson University	\$0.96
Winthrop University	\$1.00
Lander University	\$1.07
USC-Spartanburg	\$1.14

⁷ American School & University. "College M&O Cost Study," April 2001, p. 50b-50h.

Colleges without Housing Findings

A. Five-year Historical Trend

Colleges without housing in South Carolina reported an increase of 6.2 percent in the amount of total square footage from 1997 to 2001. Table 12 below also indicates that during the same period, total energy cost increased by 16.2 percent, and total kBtu rose by 12.4 percent. The average energy cost per square foot increased by 9.7 percent and the average kBtu per square foot rose by 5.3 percent.

Table 12. Energy Use Statistics for South Carolina Colleges Without Housing, 1997-2001

Year	Square Feet (in millions)	Total Energy Cost (in millions)	Cost per Square Foot	Total kBtu (in millions)	kBtu per Square Foot
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	\$7.8	\$1.16	523.7	75.83
2001	6.9	\$8.6	\$1.24	547.7	79.03

B. Energy Use (kBtu) per Square Foot, FY 2001

The annual energy use per square foot for most colleges without housing generally ranges from 50 to 100 kBtu. Average energy use for the 21 institutions is 79.03 kBtu per square foot (up 4.2% from FY 00).

Figure 8. Colleges without Housing, Energy Use per Square Foot, 2001

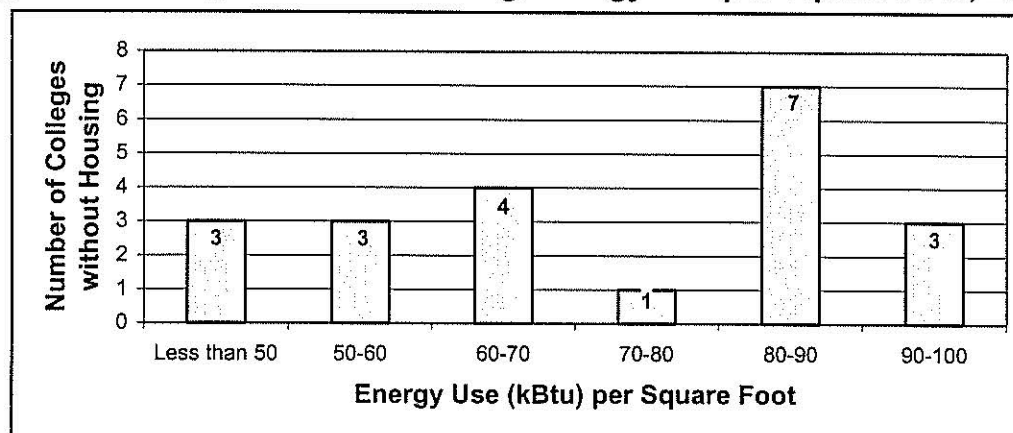


Table 13 below shows the five colleges without housing that have the lowest energy use (kBtu) per square foot.

Table 13. Top Five Colleges without Housing, Lowest Energy Use per Square Foot, FY 2001

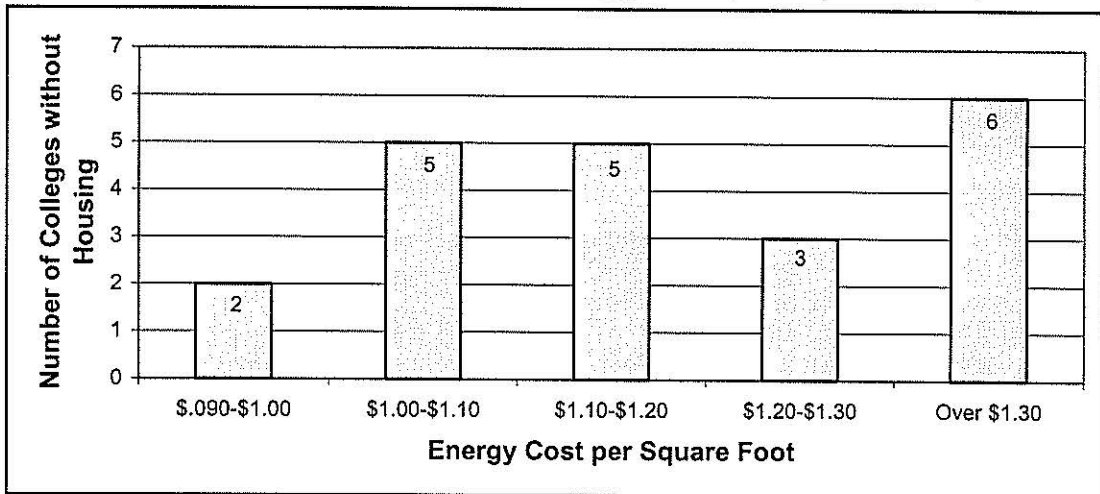
College	kBtu/sf
USC-Salkehatchie	43.93
USC-Union	46.44
Williamsburg Technical College*	49.09
Central Carolina Technical College	50.20
Technical College of the Lowcountry	52.76

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

C. Energy Cost per Square Foot, FY 2001

Energy cost per square foot ranges from \$0.90 to \$1.30 for most colleges without housing. The average cost per square foot is \$1.24 (up 6.8% from FY 00). This compares to a national median energy cost per square foot for two-year colleges of \$1.18.⁸ Due to the natural gas rate increases in FY 2001, natural gas expenditures were 80.9 percent higher than FY 2000.

Figure 9. Colleges without Housing, Energy Cost per Square Foot, FY 2001



⁸ American School and University. "College M&O Cost Study," April 2001, p.50b-50h.

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 2001

College	\$/sf
Spartanburg Technical College	\$0.95
Technical College of the Lowcountry	\$0.99
USC-Salkehatchie	\$1.01
USC-Union	\$1.06
York Technical College	\$1.07

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 cross-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 can be 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, as it presents alternatives which will not only increase energy efficiency, but may also enhance program sources.

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. As we have seen in this report, external factors such as the natural gas rate hikes levied in FY 2001, can have a profound effect on the amount of energy expenditures for nearly all state entities. It is impossible to evaluate performance in energy efficiency without using standard measures. Presentation of these measures in an accurate and systematic manner has been, and will continue to be 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. Thirty-one percent of institutions reported their energy data on FASER.

School Districts (33.7% reported on FASER):

Responding

Abbeville SD60	Florence SD1	Orangeburg Consolidated SD3
Aiken SD	Florence SD2	Orangeburg Consolidated SD4
Allendale SD	Florence SD3	Orangeburg Consolidated SD5
Anderson SD1	Florence SD4	Pickens SD
Anderson SD2	Florence SD5	Richland SD1
Anderson SD3	Greenville SD	Richland SD2
Anderson SD4	Greenwood SD50	Saluda SD
Anderson SD5	Greenwood SD51	Spartanburg SD1
Bamberg SD1	Greenwood SD52	Spartanburg SD2
Bamberg SD2	Hampton SD1	Spartanburg SD3
Barnwell SD19	Hampton SD2	Spartanburg SD4
Barnwell SD29	Horry SD	Spartanburg SD5
Barnwell SD45	Jasper SD	Spartanburg SD6
Beaufort SD	Kershaw SD	Spartanburg SD7
Berkeley SD*	Lancaster SD	Sumter SD2
Calhoun SD	Laurens SD55	Sumter SD17
Charleston SD	Laurens SD56	Union SD
Cherokee SD	Lee SD	Williamsburg SD
Chester SD	Lexington SD1	York SD1
Chesterfield SD	Lexington SD2	York SD2
Clarendon SD1	Lexington SD3	York/Rock Hill SD3
Clarendon SD2	Lexington SD4	York SD4
Colleton SD	Lexington SD5	
Darlington SD	Marion SD1	
Dillon SD1	Marion SD2	
Dillon SD2	Marion SD3**	
Dillon SD3	Marion SD4**	
Dorchester SD2	Marlboro SD	
Dorchester SD4	McCormick SD	
Edgefield SD	Newberry SD	
Fairfield SD	Oconee SD	

*Indicates this entity submitted incomplete or insufficient data.

**Marion SD3 and Marion SD4 were consolidated to form Marion School District 7 in July 2001. This will be reflected in the 2002 Report.

Not Responding

Clarendon SD3
Georgetown SD

State Agencies (30.0% reported on FASER):

Responding

Aeronautics Div., Dept. of Commerce	Natural Resources, Dept. of
Agriculture, Dept. of	--Division of Wildlife and Fisheries
Arts Commission	--Division of Marine Resources
Corrections, Dept. of	Old Exchange Building Commission
Disabilities & Special Needs, Dept. of	Parks, Recreation and Tourism, Dept. of
Education, Dept. of	Patriots Point Development Authority
Educational Television, South Carolina	Public Railways Div., Dept. of Commerce
Employment Security Commission	Public Safety, Dept. of
Forestry Commission	Public Service Authority (Santee Cooper)
General Services, Facilities Management	School for the Deaf & Blind
General Services, Statewide Building Services	Sea Grant Consortium
Health and Environmental Control, Dept. of	State Fleet Management
John de la Howe School	State Law Enforcement Division
Juvenile Justice, Dept. of	State Ports Authority
Labor, Licensing and Regulation, Dept. of	Transportation, Dept. of
Mental Health, Dept. of	--7 DOT Districts (DOT District 1 FASER User)
Military Dept. (Adjutant General)	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	Insurance, Dept. of
Administrative Law Judge Division	Legislative Audit Council
Alcohol and Other Drug Abuse Services, Dept. of	Legislative Council of the Gen. Assembly
Archives and History, Dept. of	Legislative Information Systems
Attorney General's Office	Natural Resources--Land, Water & Conservation
Board of Economic Advisors	Office of Appellate Defense
Board of Financial Institutions	Office of the State Archaeologist
Commission on Higher Education	Probation, Parole and Pardon, Dept. of
Confederate Relic Room & Museum	Procurement Review Panel
Consumer Affairs, Dept. of	Public Service Commission
Election Commission, State	Revenue, Dept. of
Ethics Commission, State	Second Injury Fund
Health and Human Services, Dept. of	Social Services, Dept. of
Higher Education Tuition Grants Comm.	State Library
Housing Finance & Development Authority, State	State Museum Commission
Human Affairs Commission	

Colleges with Housing (33.3% reported on FASER):

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 (23.8% reported on FASER):

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. The FASER energy accounting software used by many schools and agencies provides detailed building-by-building reports. For those using the energy data consumption form provided by the Energy Office, building-by-building details are solicited and provided in most cases. Some entities procure the services of performance contractors and auditors, which provide a somewhat less detailed building-by-building report.

Table 11. Data Received by Reporting Method and by Degree of Detail, FY 2001

Category	Building-by-building Detail ⁹			Totals Only	Other/Not Reporting	TOTAL
	FASER	Form	Contractor			
School Districts	29	44	10	1	2	86
State Agencies	12	25	0	3	0	40*
Colleges with Housing	4	2	0	5	1	12
Colleges without Housing	5	13	1	2	0	21
TOTAL	50	84	11	11	3	159

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

* State agencies number 40 instead of 32 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.