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Barriers to Implementation of Energy Conservation Opportunities in Food Service Facilities

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To the Graduate Council:

I am submitting herewith a dissertation written by Dorothy Susan Mitchell entitled "Barriers to Implementation of Energy Conservation Opportunities in Food Service Facilities." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

Mary Jo Hitchcock, Major Professor

We have read this dissertation and recommend its acceptance:

William T. Snyder, Robert Bohm, John Ray, Roy Beauchene

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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and recommend its acceptance:

Accepted for the Council:

Vice Chancellor
Graduate Studies and Research

BARRIERS TO IMPLEMENTATION OF ENERGY CONSERVATION OPPORTUNITIES IN FOOD SERVICE FACILITIES

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Dorothy Susan Mitchell

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ABSTRACT

In 1978, expenditures for energy resources represented approximately 8% of the total operating budget in food service facilities (Barclay, 1979; Skaggs, 1980). Due to increasing energy costs, erratic availability of energy supply, environmental restrictions, federal and state regulations, energy management programs take on special significance. Energy management programs, which can include energy audits, frequently lead to a 10-30% reduction of energy consumption and subsequent cost reductions (Snyder and Symonds, 1977; Shirley and Turner, 1978). The audit permits an opportunity to determine potential energy conservation opportunities (ECO's). The purposes of this study were to determine the extent of exposure to energy audits in selected hospital dietary departments and college/university food services; to identify major barriers to implementation of ECO's in these facilities which have been exposed to audits; to establish the reasons why barriers exist which prevent directors of these facilities from implementing ECO's; and to establish reasons why energy audits have not been conducted in these facilities. The above objectives were intended to assist federal, state, and local energy policy makers in understanding and overcoming these barriers to implementation of ECO's.

Three hundred and seven energy conservation questionnaires were sent to 212 hospitals and 95 colleges/universities which were randomly selected from North Carolina, Tennessee, and Virginia. A followup letter and questionnaire were sent to the facilities not responding within a designated period of time.

Thirty-four percent of the facilities responded to the questionnaire. Approximately 23% of these respondents had conducted an energy audit. Respondents from the nonaudited facilities were not familiar with an energy audit or did not have someone on staff qualified to carry out an audit. The replies seem to indicate that energy information and training need to be made available by government organizations and trade and industry associations.

The results indicated that 69.8% of the recommended ECO's had been implemented. The major barriers to implementation of these ECO's were cost of equipment, expense of borrowing money, lengthy payback period, and production schedule interruption. This survey provides data that could be utilized by energy policy makers to understand and overcome these barriers to implementation of ECO's.

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GLOSSARY

Payback Period: The length of time required for the net revenues of an investment to return the cost of the investment.

Mandatory Cutback in Energy Allocation: A reduction in a form of energy used by a facility which is required by an authority such as the government.

Return on Investment (ROI): Also known as the return on total assets. ROI is the ratio of net profit to total assets.

Energy Conservation Opportunity (ECO): An opportunity to save energy identified by an energy audit which projects the anticipated annual energy savings and annual cost savings.

Energy Audit: Involves an analysis of a facility to determine the forms of energy used, the quantities and costs of various forms of energy used, the purposes for which the energy is being used, and the identification of energy conservation opportunities.

British Thermal Unit (Btu): The quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Food Processing Facility: A commercial facility which processes, prepares, packages, and/or distributes food to consumers for consumption in the home or food service operation.

Food Service Facility: A facility where large quantities of food, completely prepared, are routinely provided for individual service and consumption.

CHAPTER I

INTRODUCTION

Energy conservation is a means of utilizing energy more efficiently (Snyder and Symonds, 1977; Shirley and Turner, 1978; and DOE, 1978). Energy conservation and management are based on the premise that to save energy, one must make an energy system as efficient as possible. Thus, the smallest amount of energy will be consumed to perform the functions required. The efficient use of energy can be achieved by two types of procedures; adopting simple energy conservation practices such as insulation, repair of leaks, setting back thermostats, reducing lighting, and adopting energy efficient technologies such as a heat pump and waste heat recovery devices to eliminate waste and increase productivity.

Energy prices in the United States have risen drastically since 1975, and the outlook for the future indicates continuing increases. Although the United States comprises only 6% of the world's population, it uses approximately 33% of the world's energy (Dorf, 1978). The total food system which covers production to consumption consumes about 17% of the national energy requirement (FEA, 1976). Although food service facilities use only 2.8% of the U.S. energy, increased energy costs, decreased availability of energy resources, federal and state regulations, and environmental restrictions make it important to operate energy efficient facilities.

The energy management programs can result in 10-30% savings in energy consumption and cost. Energy audits are considered a major part of energy conservation programs and permit an opportunity to observe potential energy conservation opportunities (ECO's).

At the present time, very little research on energy conservation has been conducted in hospital and college/university food service facilities. Some data is available from the food processing industry in which similar energy conservation activities are assumed to exist. A study by the University City Science Center in Pennsylvania (Kirsch, 1979) indicated that 74% of survey respondents from industry had conducted an energy audit. Approximatey 50% of the recommended ECO's had been implemented. The cost of equipment, return on investment required by the corporation, and the lack of flexibility when considered with possible plant shutdown were the major barriers to implementation of ECO's. Another study by Kirsch (1980) concluded that the implementation rate of ECO's was 39.7%.

Due to the lack of energy conservation data in hospital and college/university food service facilities, this research was conducted to collect data that could be used by federal, state, and local energy policy makers in understanding and overcoming the barriers to implementation of ECO's. The purposes of this research were:

1. To determine the extent of exposure to energy audits in selected hospital dietary departments and college/university food services.

2. To identify major barriers to implementation of ECO's for those hospital dietary departments and college/university food services which have been exposed to audits.

3. To establish the reasons why barriers exist which prevent directors of these facilities from implementing ECO's.

4. To establish reasons why energy audits have not been conducted in hospital dietary departments and college/university food services.

CHAPTER II

REVIEW OF LITERATURE

During the past decade, a combination of increased domestic consumption of energy, reduced domestic supply, international economic and political uncertainty, and regulatory complexity have resulted in what has been called the energy crisis (Gough and McLarney, 1980). The problem of the energy shortage has become more complex because imports of foreign oil to the United States have increased at an average rate of 15% a year between 1970 and 1977 (Hsu, 1979).

In 1948, the United States produced more energy than it consumed. In 1950, the country crossed that boundary. By 1972, the need for regulation and conservation was critical, but there was little incentive to conserve energy since costs were still low. However, between 1972 and 1976 the cost increase for natural gas, coal, and fuel oil has averaged (unweighted) 340%. In addition, the price of imported oil has risen from about two dollars per barrel in 1972 to eleven dollars per barrel in 1976 (Shirley and Turner, 1978). Further dependence on imported oil could mean even higher prices. Today, the United States uses approximately 33% of the world's energy supply even though it composes only 6% of the world's population (Dorf, 1978).

Through energy conservation, estimates of 10-30% reduction in overall energy consumption have been proposed as achievable over the next decade (Dorf, 1978; Hsu, 1979). There are essentially four methods for energy conservation: elimination of waste, changing to less energy intensive processes, reduction of energy consuming activities, and

improved efficiency of energy consuming activities (Dorf, 1978; Hsu, 1979). Some of these actions can be implemented in a facility without major alterations of the original equipment and without a great deal of expense.

The food system is a complex organization of production and consumption activities whose end result is providing food to the consumer. Approximately 17% of all United States energy requirements are related to the food system (FEA, 1976). This percentage is obtained by summing available estimates for each food system component including production, manufacturing, wholesale and retail trade, out-of-home preparation, in-home preparation, and transportation. The food service industry and the food and kindred product industry (which includes food processing) make up part of the total food system (FEA, 1976). In addition, the food and kindred product industry, Standard Industrial Classification (SIC) group 20, is the sixth most energy intensive industry in the United States consuming approximately 8% of the total U.S. energy (DOE, 1978).

The food service and food processing industries are interdependent and coordinate their functions. A schematic diagram of the interface between the food processing and food service industries is shown in Figure 1. Within the food processing industry, the food processing continuum represents the amount of processing which food items receive. At the far left side of this continuum, food items receive little or no processing; at the far right side, the food products have undergone complete processing operations. Figure 1 represents a food service operation which purchases food items with a limited amount of processing or no processing (Dwyer et al., 1977).

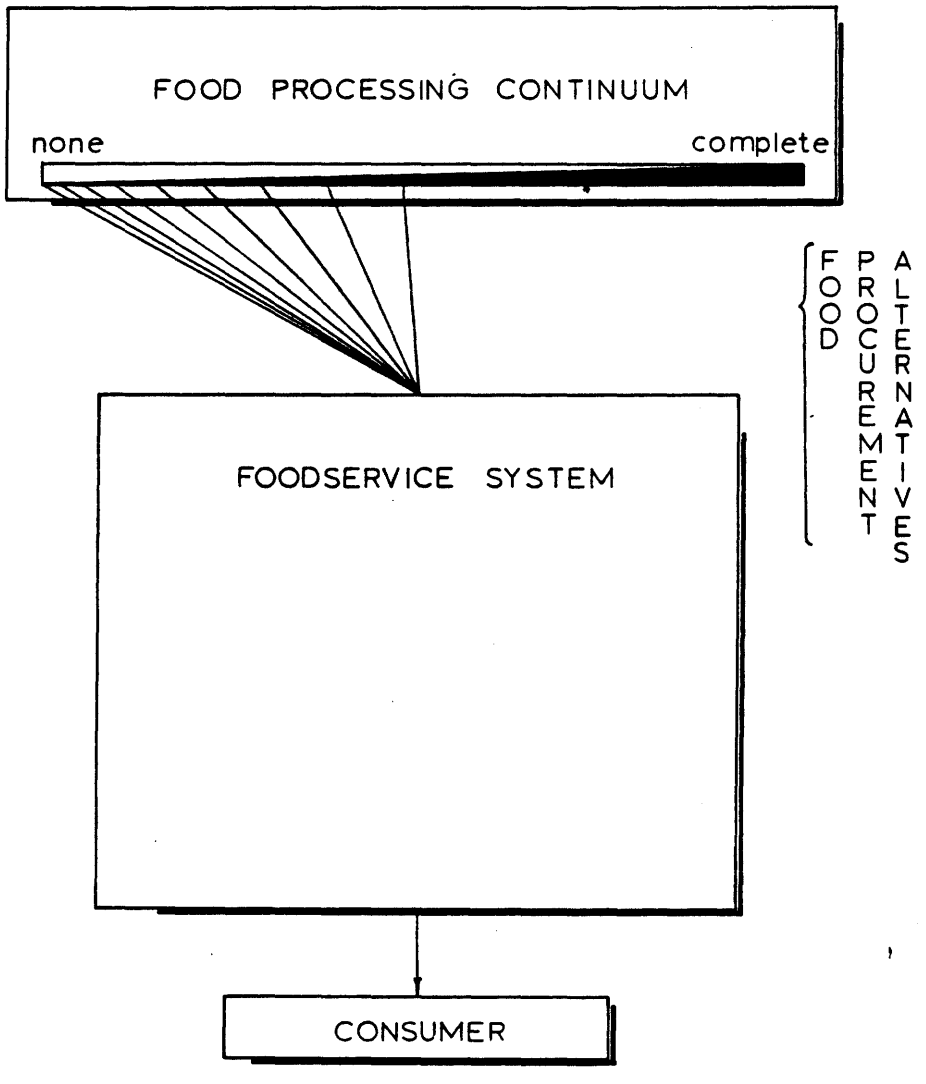

Figure 1. Food Processing/Food Service Interface (Dwyer et al., 1977)

In food service facilities, expenditures for energy resources represented approximately 2% of the total operating budget in 1970 (Stokes, 1979). In 1978, this amount had increased to 8% (Barclay, 1979). This figure varies in direct proportion to differences in energy costs throughout the country. As energy costs continue to increase, expenditures for energy resources are predicted to demand an increasing amount of the operating budget. The majority of energy in food service facilities is used for food preparation and storage, lighting, heating, ventilating, air conditioning, and sanitation (Dwyer et al., 1977).

Today, increasing energy costs, limited availability of energy resources, environmental restrictions, and federal and state regulations play a significant role in pressuring the food service industry to accurately measure and control its energy consumption (Barclay, 1979; Garbedian, 1980). Therefore, energy has been recognized as a resource necessary for continual operation of any food service facility. As a result, effective energy management programs take on special significance. Energy management programs which can include energy audits, frequently lead to a 10-30% conservation of energy and subsequent cost reductions (Snyder and Symonds, 1977; Shirley and Turner, 1978; and Skaggs, 1980). From the audit, feasible energy conservation opportunities (ECO's) can be identified.

Energy data is also necessary for construction and design projects that include expansion, remodeling, retrofit, kitchen planning, and energy efficient food service equipment (Krause, 1978; Stokes, 1979; and Garbedian, 1980). Since most food service facilities were designed and built during a time of inexpensive and plentiful energy, many attempts

are being made to modify facilities to achieve improved energy efficiency.

Energy management is a cost effective strategy to reduce both energy cost and demand. The concept of energy management has evolved in recent years as a response for dealing effectively with a variety of energy related problems such as increased costs, availability, and fuel substitution needs. Energy management includes five components as follows (Snyder and Symonds, 1977; Stokes, 1979).

1. Commitment of management.
2. Availability of reliable energy information.
3. Conduct of an energy audit.
4. Identification of potential ECO's.
5. Implementation and advancement of a prolonged energy management program.

Most facilities have more to gain economically from an energy audit than any other single action they can take (Sarnoff, 1980; Snyder and Symonds, 1977).

The basic purpose of an energy audit involves an analysis of a facility to determine the forms of energy used, the quantities and costs of these various forms, the purposes for which the energy is used, and the identification of ECO's. The audit process includes two phases (Snyder and Symonds, 1977):

1. The billing audit.
2. The field audit.

The first phase of the audit or the billing audit is data collection and analysis based on available energy consumption and cost records.

In fields where production is a function, these production records are incorporated. The field audit involves gathering information about energy consuming devices in the facility. The operating schedule and rate of energy consumption for each device are the most relevant data to gather. The field audit permits an opportunity to identify potential ECO's. These ECO's are analyzed for energy savings and energy cost savings potential.

A majority of the energy conservation measures that an energy audit would recommend in most facilities are either low cost maintenance items or equipment modifications which require capital expenditures. ECO's can usually be found in energy intensive facilities and facilities which use large volumes of energy (Hsu, 1979).

Because energy conservation is a very specialized technical subject, managers tend to procrastinate in getting started. An energy management program that is given high priority by management can result in significant cost savings to a facility. Energy conservation should not detrimentally affect a facility's economic position but should improve it.

ECO's, identified by an energy audit, project the anticipated annual energy savings and annual cost savings. Snyder (1978) indicated that the escalating unit cost of energy should be considered when calculating payback period for recovering capital investment to implement an ECO. Therefore, the effective interest rate is reduced due to energy unit cost escalation resulting in a shorter payback period.

The traditional view of the capital budgeting processes of the facilities prevents implementation of many energy technologies.

Facilities invest in those projects which have a payback period of less than five years (Hsu, 1979). In terms of energy technologies, these projects are mainly in the area of cost reductions instead of generating profits. A large number of facilities set the expected rate of return from energy saving investments about twice as high as that for other business investments. As a result, capital expenditures are concentrated on the latter while higher energy costs are passed on to the consumers (Hatsopoulos et al., 1978). According to Hatsopoulos et al., (1978), cost effective investments (in which the total cost of the energy saved is equal to or less than the replacement cost of the fuel) could offset high energy costs. In addition, investment tax credits may be an incentive for energy expenditures.

There are ample opportunities for conserving energy. This conservation information concerning the methodology for implementing ECO's has to reach the potential users. To date, very little research has included studies of energy consumption or conservation activities within college/university or hospital food service operations. However, some data has been gathered in the food processing industry in which similar energy consumption activities are assumed to exist.

The University City Science Center in Philadelphia, Pennsylvania, designed and carried out a one-year program of fact gathering, analysis, and assessment for the Governnor's Energy Office (Kirsch, 1979). Results were obtained through comprehensive surveys of industries throughout Pennsylvania. A mail survey of 1,006 industries produced 242 responses, 170 of which had completed a four-page questionnaire. The results indicated that 74% of the respondents had conducted an energy

audit, and 82% had a person responsible for energy management. Overall, the energy analyses had resulted in about 10% energy conservation and 18% cost savings. The major barriers to implementation of ECO's were cost of equipment, the return on investment required by the corporation, and the lack of flexibility when considered with possible plant shutdown. In 1979, approximately 50% of the recommended ECO's had been implemented (Kirsch, 1979).

Another study done by the Energy Analysis and Diagnostic Centers (Kirsch, 1980) indicated that energy audits had identified potential energy consumption reduction of 21.9% and potential energy cost reductions of 16.7%. The implemented ECO's added up to 39.7% of all the potential ECO's identified.

Hsu (1979) conducted field interviews and analyses on the data obtained from 32 firms in New York and Pennsylvania. His results indicated that the implementers of energy efficient technologies are firms which are willing to allow a longer payback period for more efficient technologies and which have a person responsible for energy conservation. The implementation of ECO's is technologically feasible and economically justifiable; however, the question remains as how to encourage adoptions by facilities. Hsu suggested that the federal government develop energy technology policy options to influence the facilities' capital budgeting process, thus urging substantial investments in energy conservation measures. By overcoming barriers to implementation of ECO's, more efficient use of the total energy supply would be possible through reduced energy consumption and costs. More data is needed as to what these barriers to implementation of ECO's are, reasons why they exist,

and ways to overcome them if progress is to be made in energy conservation. Changes toward more efficient use of energy in the food service industry could affect 2% of the total energy usage in the United States.

CHAPTER III

PROCEDURE

Selected hospital dietary departments and college/university food services which were exposed to an energy audit were studied to identify major barriers to implementation of energy conservation opportunities (ECO's), and to establish the reasons why barriers exist which prevent directors of these facilities from implementing the ECO's. In addition, reasons why energy audits have not been conducted in hospital dietary departments and college/university food services were identified. This research was undertaken to assist federal, state, and local energy policy makers in understanding major barriers to the implementation of energy conservation opportunities in food service facilities and to assist in overcoming these barriers.

Both food processing and food service facilities are part of the total food system. It is assumed that each of these branches is faced with similar energy conservation concerns. Both food processing plants and food service facilities produce food in volume using a processing continuum and have similar areas such as food preparation, storage, lighting, heating, ventilation, and air conditioning. Energy audits conducted at five food processing plants in Tennessee during fall of 1979 suggested several discernible factors that may act as energy conservation barriers. These audits were used as stepping stones toward the development of a questionnaire concerning the barriers faced by hospital dietary departments and college/university food services. Three hundred and seven energy conservation surveys were sent to 212 hospitals and 95

colleges/universities which were randomly selected from North Carolina, Tenessee, and Virginia.

A preliminary investigation involved five food processing plants located in Knoxville, Tennessee, and surrounding areas which were selected for auditing from the Federal Standard Industrial Classification (SIC) group 20, food and kindred products. Data from this investigation was not included in the appendices. Available past energy consumption data from these plants was reviewed before auditing to determine total energy consumption patterns. Billing and field audits were conducted in the food processing plants to determine total energy consumption and energy intensive areas. The audits were analyzed through discussion with the auditing team* as well as through the study of past energy consumption to determine ECO's for each plant. Based on the analyses of the audits, possible implementation methods were determined for each ECO through discussion with the auditing team. Total energy conservation potential was determined in BTU's and dollar values based on the individual ECO's identified. Summary reports with analyses of promising ECO's and specific recommendations were sent to the management of each plant. Information from the investigation was used to design the energy conservation questionnaire.

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*The auditing team was composed of two engineering professors, one graduate research assistant (the author), and one senior engineering student.

I. QUESTIONNAIRE DEVELOPMENT AND PILOT TEST

A questionnaire for determining barriers to implementation of ECO's in selected hospital dietary departments and college/university food services was developed based on the preliminary investigation. Copies of the cover letters and questionnaire are shown in Appendix A. The questionnaire was pilot tested for clarity and feasibilty by interviewing two directors of hospital dietary departments and two directors of college/university food services in the Knoxville, Tennessee, area. Remarks from the pilot test are exhibited in Appendix B. The energy conservation survey was refined based on responses and comments from the directors of the test facilities.

II. SAMPLE SELECTION

Identification of the hospitals and colleges/universities in the states of North Carolina, Tennessee, and Virginia was obtained from the Clark's Directory of Southern Hospitals (1980) and the Education Directory, Colleges and Universities (1979-80). Hospitals with less than 25 beds and two-year colleges were considered too small to include in the sample. The total number of both hospitals and colleges/universities meeting these criteria was determined and then sample sizes were obtained from Krejcie and Morgan (1970). A random sample of 212 hospitals with 25 or more beds and 95 four-year colleges/universities was chosen from the states.

III. DATA COLLECTION

The cover letters and energy conservation questionnaires were mailed to the food service directors of the hospitals and colleges/universities (see Appendix A). Approximately two weeks were allowed to receive the replies. According to Babbie (1973), the followup letter and questionnaire should be mailed approximately seven working days from the arrival of the first questionnaire and three working days after it should have been received back by the researcher. Therefore, a followup letter and an additional questionnaire were sent after a two-week period to those facilities not responding. A consecutive number different from the ones used during the random sampling was assigned to each food service facility on the first mailing list. This number was also put on the back side of the questionnaire to identify respondents for the sole purpose of deleting the facility from the mailing list prior to the followup distribution. The deadline for return of the surveys was extended approximately three weeks beyond the two week date to allow for a maximum return rate.

IV. ANALYSIS OF DATA

The total number of returned surveys was compared against the number originally mailed to determine a return rate. The surveys which were returned unanswered were subtracted from the total responses before figuring the percentage of replies.

The University of Tennessee computer services were utilized to run a modified program from the SPSS batch system (Nie et al., 1975). This computer program was designed to cross-tabulate question XV

(including parts A and B) from the questionnaire with every other survey question. This step divided the data not only by type of facility but also by size. The output included responses by frequencies, percentages, and priorities. The priorities were ranked in order with "1" indicating the highest value of importance (see questionnaire, Appendix A). A coding system for the surveys was designed to yield the above information.

A comparison of each response from question eight, section A, with each response on question nine, section A, by means of the chi square statistical test proved valueless. The data was invalid due to small cell sizes. Further statistical tests were deemed unnecessary. Therefore, the data is presented in terms of ranking by frequency of responses, percentages, and priorities.

Through this methodology, major barriers to implementation of ECO's were established, and reasons why these barriers existed were identified. In addition, explanations for facilities not having an energy audit were identified.

CHAPTER IV

RESULTS, DISCUSSION, AND RECOMMENDATIONS

This energy conservation survey was developed based upon preliminary information gathered from five industrial energy audits. These audits were conducted by The University of Tennessee Energy Analysis and Diagnostic Center (EADC) auditing team in and around the Knoxville, Tennessee, area. Funds were provided through a grant from the Department of Energy. The auditing team was composed of two engineering professors, one graduate research assistant (the author), and one senior engineering student. The extent of exposure to energy audits was determined in randomly selected hospital food services (dietary departments) and college/university food services in North Carolina, Tennessee, and Virginia. Three hundred and seven energy conservation surveys were sent to 212 hospitals and 95 colleges/universities. These facilities were divided into two categories, small and large. For hospitals, 25 to 100 beds were considered small and greater than 100 beds constituted large. The enrollment of a college/university determined its size with less than 1,000 students being small and more than 1,000 considered large.

For those facilities which have been exposed to audits, major barriers to implementation of energy conservation opportunities (ECO's) were identified. In addition, reasons for not conducting energy audits were designated by the directors of the nonaudited facilities. The survey was also used to project reasons for existing barriers which

could prevent directors of these dietary departments and food services from implementing ECO's.

Of 307 surveys, 103 facilities replied resulting in a 34% return. Seventy-five of the 103 facilities responding were hospitals. Thirty-three of the hospitals were small in size and 42 were large. The remaining 28 respondents were colleges/universities, four of which were small and 22 large. Two facilities did not specify size. Dietary departments in the small hospitals had an average of four part-time employees, 11 full-time employees, and served approximately 62,500 meals a year while dietary departments in the large hospitals had an average of 14 part-time and 59 full-time employees and served approximately 487,000 meals a year. The food service facilities in colleges/universities tended to utilize more part-time workers. The food service facilities in small colleges/universities had an average of 35 part-time employees, 17 full-time employees, and served 344,000 meals a year. The food service facilities in the large colleges/universities averaged 111 part-time and 73 full-time employees serving approximately 1,000,000 meals a year (see Appendix C).

The majority of people answering the questionnaire had the title of food service director (64%) or chief dietitian (22%) (see Appendix D, Table 6). Responses from hospitals indicated that an authority outside the food service facility, such as the hospital administrator, made decisions concerning money expenditures for energy conservation. In the colleges/universities, the administrator or food service director made the decisions (see Appendix D, Table 7). Approximately 13.6% of the hospitals indicated the required payback period for energy conservation expenditures to be from one to three years. Sixty-four percent of the

hospitals reported the required payback period was unknown. One reason for the payback period being unknown to the majority of hospital food service directors could have been that they usually did not make the decisions concerning money expenditures for energy conservation. However, 20% of the food service directors did make these decisions in college/universities. Thirty-three percent of the college/university food service directors reported the required payback period to be one to five years (see Appendix D, Tables 8-10). These findings agree with the payback period of less than five years estimated by Hsu (1979). Fifty-seven percent of the food service directors were not informed of the payback period. This seems logical as the majority of decisions concerning energy conservation were made by a college/university administrator. Again, it seems likely that the decision makers were the persons aware of the variables, such as the payback period, affecting these decisions. It is also possible that these directors and administrators utilized a financial ratio other than payback period for making their energy conservation decisions such as return on investment (ROI).

Sixty-eight percent of the hospitals responding did not know the percent of their annual operating budget that went toward energy costs. Seventeen percent indicated that the amount spent for energy was 1-5% of the budget, and 12.3% of the hospitals responded 1-10%. Of the colleges/universities, 42.3% reported that 1-5% of the annual operating budget went toward energy cost, 19.2% of the colleges/universities indicated 6-10% was allocated, and 30.8% did not know as is shown in Appendix D, Tables 11-13. These results agreed with the estimates for budgeted energy costs of 2.5% (Stokes, 1979) and 8% (Barclay, 1979).

The principle types of energy in order of priority of usage consumed in hospitals were: electricity, fuel oil, natural gas, propane, and coal; while the types used in colleges/universities were: electricity, natural gas, fuel oil, and coal (see Appendix D, Table 14). Approximately 22.1% of the hospitals and 15.4% of the colleges/universities had experienced a mandatory cutback in energy allocation within the past five years. For both groups, the sources of cutback were electricity followed by natural gas. The responses indicated that the duration of the cutback was greater than four months (see Appendix D, Tables 15-19). Studies by the EADC (Kirsch, 1979; Kirsch, 1980) which looked at energy audits conducted in the industrial sector indicated that 81% of the respondents had experienced a mandatory cutback in energy allocation. Electricity and natural gas were the most commonly used types of energy with the mandatory cutbacks being in natural gas. It seems that hospitals and colleges/universities would be less likely to face a mandatory cutback in energy allocation since their services would be used by the public. One could assume that hospitals would be among the last facilities to have a mandatory curtailment as it would directly affect patient care. However, it seems that many types of facilities have considered or installed alternate fuels to deal with the uncertainties in energy supplies (Sarnoff, 1980). One might also assume that hospitals and colleges/universities could pass increasing energy costs associated with alternate fuels on to their clientele by charging higher rates.

I. FACILITIES AUDITED

Of the 103 respondents, 24 or 23.5% of all food service facilities had an energy audit conducted. Of the 24, 13 or 54.2% were hospitals

and 11 or 45.8% were colleges/universities (Table 20). Three or 23.1% of the total hospitals audited were small in size while 10 or 76.9% were large (Table 21). The audited colleges/universities were composed of three small (30%) and seven large (70%) facilities (Table 22). The results indicated that a greater number of large food service facilities had energy audits conducted than small facilities. This was logical since large facilities are likely to have more specialized personnel and discretionary funds. These findings corresponded with those by the EADC (Kirsch, 1979) that indicated 88.6% of the large industries studied had been audited compared to 50.8% of the small industries.

Seventeen or 70.8% of the audited facilities replied that their energy audit had been conducted within the last year. Six or 25% answered that the audit had been done longer than a year ago. Responses denoted that nine of the hospital audits were carried out within the last year as were eight of the college/university audits (see Appendix E, Table 23). The hospital administrator was the person who most often granted approval for the hospital audits to be performed, while a college/university administrator most frequently gave permission in colleges/universities. Food service directors were also responsible for granting approval 20% of the time in colleges/universities as shown in Appendix E, Tables 24-27. Answers from both hospitals and colleges/universities indicated that the major reasons for having an energy audit were: to find ways of conserving energy and, secondly, because of rising energy costs. Small hospitals responded that rising energy costs was the major reason for having an audit while all other facilities pointed to finding ways to conserve energy (see Appendix E, Tables 28-30). These responses can be compared to the EADC study (Kirsch, 1979) where the ultimate decision to perform

an energy audit was made by a vice president or plant manager. The major reason (87%) for having an energy audit was the rising cost of energy. From these responses one could conclude that rising energy prices are directly related to the number of energy audits being performed. Again, it can be observed that it is top management such as the hospital or college/university administrators who make decisions concerning money expenditures for energy conservation as well as give approval for audits to be performed. One could assume that the directors of these hospital dietary departments and college/university food services have some input into the management decisions since these directors may have available information regarding the energy related activities in their food services.

The energy audits were conducted by different groups of people depending on the facility. Small hospitals had their audits carried out mainly by engineering firms, while large hospitals first chose their in-house staff, followed by an engineering firm. Small colleges/universities had their audits conducted by in-house staff or a government agency, while large colleges/universities used an engineering firm succeeded by in-house staff or a college/university group (see Appendix E, Tables 31-33). Results indicated that 13 or 54.1% of all the audits were conducted in one day or less. Eight or 33.3% of the audits took two or more days to be completed. Six (46.2%) of the 13 hospital audits (three small and three large facilities) were completed in a day or less as well as seven (70%) of the colleges/universities (three small and four large facilities). The previous data is shown in Appendix E, Tables 34-36. These responses can be related to the EADC study (Kirsch, 1979) which concluded

that 83% of the industrial plants replying to the survey depended upon in-house engineers to do the energy audit. Most of these plants were large in size and required more than two days to complete. Thirty percent of the small plants also utilized other types of specialists such as consultants, government agencies, and engineering firms. It would seem reasonable that large facilities would take advantage of convenient in-house staff to perform audits. Large facilities would tend to have more trained personnel on staff than small facilities. Small facilities with discretionary funds may tend to seek outside help such as that offered by government agencies or engineering and consulting firms. In addition, some college/university professional groups are providing energy audits and other technical support to various facilities who request assistance.

As a result of the audits, many food service facilities (56.5%) declared a decrease in their total energy bills. Eight or 66.7% of the audited hospitals and four or 40% of the colleges/universities reported a similar decrease. At the same time, four colleges/universities and one hospital did not know if their bills had changed, and four facilities including two colleges/universities and two hospitals reported their bills to be the same. The decrease in the total energy bills ranged from 1-40% with most decreases in hospitals ranging from 1-10% and 11-25% in colleges/universities. A large percentage of facilities (65.2%) also reported a decrease in total energy consumption since the audits were conducted. Ten of twelve (83.3%) hospitals responding indicated a decrease as did four of ten (40%) colleges/universities. Four facilities did not know if a change had occurred while four facilities replied that energy consumption had remained the same. The decrease

in total energy consumption ranged from 1-40% with both hospitals and colleges/universities reporting the majority of decreases between 1-10% (see Appendix E, Tables 37-40). The results indicated that total energy bills and total energy consumption had decreased in many food service facilities since the audits had been conducted. These findings correlate with the overall results from the EADC study (Kirsch, 1979) which found that energy analyses (audits) had resulted in 18% cost savings and about 10% energy conservation (decrease in consumption). One could conclude from the author's results that most facilities which have an energy audit would tend to find a decrease in their total energy bills and total energy consumption. This conclusion should take into consideration that some of the ECO's recommended by the auditing team have been implemented thus causing a decrease in energy bills and consumption.

In terms of highest frequence of response, the five recommended ECO's for all audited facilities were as follows:

1. Change thermostat settings.
2. Reduce temperature of hot water.
3. Reduce excess lighting.
4. Stop steam leaks.
5. Improve boiler efficiency.

For audited hospitals, the ranking of recommended ECO's was:

1. Reduce temperature of hot water.
2. Change thermostat settings.
3. Stop steam leaks.
4. Reschedule equipment usage.
5. Replace old equipment with new energy efficient equipment.

The ranking by frequency of recommended ECO's for audited colleges/ universities was as follows:

1. Change thermostat settings.
2. Improve boiler efficiency.
3. Reduce excess lighting.
4. Reduce temperature of hot water.
5. Stop steam leaks.

The tabulation of ECO's for hospitals and colleges/universities by frequency of recommendation and size can be found in Appendix E, Table 41.

The number of recommended energy conservation measures that were actually implemented varied from facility to facility. The recommended ECO's that were most frequently carried out in all audited facilities ranked as follows:

1. Reduce excess lighting.
2. Reduce temperature of hot water.
3. Stop steam leaks.
4. Reschedule equipment usage.
5. Change thermostat settings.

Recommended ECO's most frequently carried out in audited hospitals were:

1. Reduce excess lighting.
2. Stop steam leaks.
3. Reduce temperature of hot water.
4. Reschedule equipment usage.
5. Modify air conditioning system.

For audited colleges/universities:

1. Change thermostat settings.
2. Reduce excess lighting.
3. Improve boiler efficiency.
4. Reduce temperature of hot water.
5. Reduce steam leaks.

See Appendix E, Table 42, for more detailed tabulations.

The results seem to indicate that the majority of ECO's frequently recommended for change were also the ECO's actually carried out. An attempt to analyze each ECO in question eight, section A, against the same ECO in question nine, section A, by means of the chi square statistical test proved invalid due to small cell sizes. Further statistical tests did not seem appropriate. Therefore the data is presented in terms of ranking by frequency of responses. Both the ECO's recommended for change and actually changed seem to be items that require an insignificant amount of capital investment. It is likely that these ECO's could be carried out by the food service director or the maintenance staff with little cost to the facility. Hsu (1979) estimated that as much as 25-30% of the energy now used by industry could be saved by adopting simple conservation measures and energy efficient technologies. These measures included insulation, repair of leaks, setting back thermostats, and reducing lighting. Energy efficient technologies referred to heat pumps, waste heat recovery devices, and modification of air conditioning systems as examples. The EADC study (Kirsch, 1979) also revealed a list of eight items that were specified by at least 60% of the audited firms as possible ECO's. These included:

Boiler efficiency*

Building ventilation

Building insulation

Air conditioning*

Steam leaks and traps*

Air compressors

Elimination of excess lighting*

Closing doors to loading docks

Again it seems that many ECO's frequently recommended are easily implemented without a great deal of expense to the facility.

It has been noted that 39.7% of the recommended ECO's were carried out by the organizations audited (Kirsch, 1980). Approximately 27% of the ECO's were still being considered for implementation while the 33-35% balance of the ECO's were not to be implemented. The EADC study (Kirsch, 1979) revealed that about 50% of the recommendations made had been implemented. It is indicated from this study that the implementation rate was approximately 69.8% (see Appendix E, Table 43).

Barriers to Implementation

The study also revealed that various barriers exist which prevented directors of these food service facilities from implementing ECO's. Respondents studied a list of factors (see questionnnaire, Appendix A) and designated, by priority, the ones most likely to hinder the implementation of recommended conservation measures. Results

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*Fifty percent of the ECO's frequently recommended for implementation are included in the EADC study.

indicated the cost of equipment was the number one barrier which prevented change in all audited facilities. The following factors, listed by priority, were indicated by directors of all audited facilities as the major barriers to implementation of ECO's.

1. Cost of equipment.
2. Production schedule interrupted.
3. Expense of borrowing money.
4. Payback period too long.
5. Need second opinion of recommendations.

Other factors deemed as barriers to implementation of energy conservation measures included government regulations, requires facility shutdown, state regulations, and the risk of new technology. The barriers varied slightly between hospitals and colleges/universities. The priority listings and frequencies of these factors for all audited facilities can be found in Appendix E, Tables 44-55. The major barriers to implementation of ECO's in hospitals included:

1. Cost of equipment.
2. Expense of borrowing money.
3. Payback period too long.
4. Production schedule interrupted.
5. Need second opinion of recommendations.

Colleges/universities found the major barriers to be as follows:

1. Cost of equipment.
2. Production schedule interrupted.
3. Payback period too long.
4. Expense of borrowing money.
5. Other: no money available for changes.

The results seem to indicate that most of the barriers to implementation of ECO's dealt with the capital budgeting process of the facilities. The EADC study (Kirsch, 1979) also found the major barrier to implementation of ECO's to be the cost of equipment followed by the lack of flexibility in production especially when considered with a possible requirement to shut down. Another important barrier was the high return on investment (ROI) required by management for capital expenditures. According to Hatsopoulos et al. (1978), most companies set the expected rate of return from energy saving investments about twice as high as that for prevailing business investments. As a result, capital spending is focused on the latter while higher energy costs are passed on to the consumer. It is assumed that management's decision to implement ECO's is complex. Not only must management consider operational questions (i.e., interrupted production) but many other factors must be taken into account such as the state of the total economy and earning patterns, the availability of capital, future prices of various energy sources, and the ROI or payback period required for the implementation. It seems that management might invest in ECO's which have a payback period of less than five years. However, some energy efficient technologies have a longer payback period and may not be considered economically feasible by many facilities. Furthermore, many ECO's are considered to reduce costs instead of to generate profit. Perhaps this idea of cost reduction is a major reason for the financial barriers to implementation of ECO's.

To encourage more adoptions of ECO's, policy options at the national, state, and local level should be developed to influence the

facilities' capital budgeting processes by making ECO's more economically attractive. These policies could include tax credits or equipment modifications that could be depreciated over a shorter period of time.

To utilize the technologies and overcome the existing barriers, energy information concerning policies and ECO's needs to reach the potential energy user. These policies and ECO's should be reliable and economically feasible with incentives for their implementation. The information should be easily understandable and include the costs related to purchase and implementation, payback periods, maintenance procedures, and the potential savings in fuel consumption and bills. Perhaps the implementation of ECO's would then be considered more as an investment for generating profit, and the ROI and payback periods would be more acceptable to management.

Because energy conservation can be considered a very specialized technical subject, it is common for managers to procrastinate about implementing an energy program. The responses from all facilities indicated that 65.3% have an in-house person responsible for energy conservation. This person was usually the engineer or a member of the maintenance staff. Approximately 79% of these people accountable for energy conservation have started an energy conservation program as shown in Appendix E, Tables 56-58. These programs may not have a high priority with management since only 21% of the facilities had faced a mandatory cutback in energy allocation within the past five years. From this result, it appears that although energy prices have continued to increase, very few facilities have faced a fuel shortage. Furthermore, increasing costs can often be passed on to the consumer thus lessening the concern for energy

conservation. The responses also pointed out that energy costs accounted for approximately 1-10% of the annual operating budget. Until energy costs demand a larger portion of the operating budget, management may continue to place its priorities on other expense areas such as increasing labor costs.

It would seem that the facilities most likely to implement ECO's and overcome the barriers to implementation would be those which are highly energy intensive and consume a large volume of energy. They could be more willing to allow a longer payback period, different ROI, or facility shutdown for ECO's which are deemed feasible investments.

Another reason for these barriers to implementation of ECO's could be that there seems to be very little departmental incentive to save energy. It appears that most conservation efforts are not measurable per department but rather as an entire organization. Therefore, there has generally been little concern shown by each department as to their energy consumption and costs. If energy usage could be monitored in each dietary department or food service, perhaps the food service director would be aware of the energy consumption and costs. It would seem likely that they would determine the percentage of the annual operating budget going toward energy costs and would be interested in finding ways to reduce consumption and lower costs. Energy conservation could take on a higher priority as food service directors and administrators determine economically feasible measures. One could assume that the percentage of ECO's already implemented was associated with a relatively low dollar cost to the facility. It would be hoped that these financial barriers to implementation of ECO's would cease to be important as ECO's become recognized as viable business investments.

II. FACILITIES NOT AUDITED

Of the 103 respondents, 74 or 72.5% of all food service facilities have not had an energy audit. Of the 74, 58 or 78.4% were hospitals and 16 or 21.6% were colleges/universities. Twenty-eight or 48.3% of the nonaudited hospitals were small in size while 30 or 51.7% were large. The nonaudited colleges/universities were composed of one small (6.3%) and 15 large (93.7%) as is shown in Appendix D, Tables 20-22.

Respondents from the nonaudited facilities were asked to check, by priority, the major reasons for not having an energy audit. The number one reason indicated that respondents were not familiar with an energy audit. The top five reasons, tallied by priority, for not having an energy audit were as follows:

1. Not familiar with an energy audit.
2. No one on the staff qualified to do an energy audit.
3. Don't know.
4. Energy audit planned for the future.
5. Too expensive to hire an energy consultant.

Other important explanations included that respondents did not know of a qualified person or firm to conduct an energy audit, considered energy costs to be a small fraction of total operating cost, and believed that their facility was energy efficient. For nonaudited hospitals, the reasons for not having an audit were:

1. Not familiar with an energy audit.
2. Don't know.
3. No one on the staff qualified to do an energy audit.

4. Energy audit planned for the future.

5. Too expensive to hire an energy consultant.

The major reasons, listed by priority, for nonaudited colleges/universities included:

1. No one on the staff qualified to do an energy audit.

2. Energy audit planned for the future.

3. Don't know.

4. Not familiar with an energy audit.

5. Too expensive to hire an energy consultant.

The tabulation of reasons, by priority and frequency, for not having an energy audit can be found in Appendix E, Tables 59-66. The results seem to indicate that aside from the audits planned for the future, a great deal of energy conservation information and education needs to be provided to energy consumers. These responses can be compared to the EADC study (Kirsch, 1979) which indicated the most common reasons cited for not performing an energy audit were:

1. Plant is considered energy efficient.

2. No one on the staff is qualified to conduct an energy analysis.

However, of the 170 industrial plants responding to the EADC survey, 74.1% or 126 had energy audits conducted and only 25.9% or 44 have not had audits. One could deduce that this difference in audits performed between the two studies is due to the fact that the Department of Energy (DOE) provided funds for audits to be conducted in the industrial sector. Many of these industries had been informed of the audit services and accepted the assistance. Perhaps the commercial sector, which includes hospitals and colleges/universities, has not been aware of energy audit programs in their area. It could also be that the information has

not reached the appropriate persons in charge of in-house energy conservation programs or the decision maker who allocates resources for energy conservation measures.

Some respondents indicated that their energy costs were a small fraction of total operating costs. This would be a possible reason for the lack of incentive to save energy through means of an energy audit. Respondents also pointed out that they believed their facility to be energy efficient. Unless the facility was relatively new and equipped with the most current energy efficient devices, one could assume that ECO's could be recommended and implemented.

Results disclosed that 63.5% of the nonaudited facilities did not know how much of their annual energy bill they would spend on an energy audit. Approximately 16% of the facilities responded that they would spend 1-5% and 8.1% replied they would not allocate any funds (see Appendix E, Table 67). One could assume that the respondents not knowing a percentage of their annual energy bill that could be allocated to an energy audit were also the group that were not familiar with energy audit programs. Perhaps a percentage of the annual energy bill that could be allocated to an energy audit could not be estimated without further details as to what procedures an energy audit entailed. One could deduce that the 8.1% of respondents not willing to incur audit expenses could have also responded that their facility was energy efficient or that energy costs were a small fraction of operating expenses. Other respondents might not be able to justify the expense of hiring an energy consultant and would therefore not allocate funds for an audit. These results can be related to the EADC study (Kirsch, 1979) which found that approximately half of the nonaudited facilities would be willing to

spend 1-5% of their annual energy bill for an energy audit while the other half would not be willing to incur any cost.

Respondents were asked to reveal the organizations or people from which their food service facilities had requested energy conservation assistance. In terms of highest frequency of response, the organizations or people most requested for energy conservation aid were as follows:

1. Engineer.
2. Government agencies.
3. Utility company.

For nonaudited hospitals, the requests for assistance also went to:

1. Engineer.
2. Government agencies.
3. Utility company.

The most frequently requested organizations or people for energy conservation assistance to colleges/universities included:

1. University or college group.
2. Engineer.
3. Utility company.
4. Government agencies.

Many respondents also stated that assistance had not been requested while others did not know this information. The tabulation of requests for energy conservation assistance can be seen in Appendix E, Table 68. It would seem logical that either the nonaudited facilities had not requested energy conservation assistance or did not know if assistance had been requested. Until the food service facilities deem a need for energy conservation, it is unlikely that they will request assistance

or conduct an audit. This need may be hastened if energy prices continue to increase, mandatory fuel curtailments become more common, and alternate fuel sources become more expensive. The engineers, university or college groups, utility companies, and government agencies that were contacted for energy conservation assistance have most likely been utilized for energy information other than audits. However, audits may have been requested and scheduled for the future by some facilities.

The results indicated that 16.4% of the nonaudited facilities had been offered energy conservation assistance by a college or university group, government agency, or utility company. Approximately 48% of the facilities had not been contacted and 35.6% did not know whether assistance had been offered. Federal and state agencies most often offered assistance to food service facilities followed by utility companies and college or university groups. The services volunteered included:

Energy auditing services.

Conservation information and pamphlets.

Energy conservation training for employees.

Nine of 12 or 75% of the facilities offering assistance replied that the services were accepted (see Appendix E, Tables 69-72). It would seem that the facilities which accepted assistance would be included in those facilities which plan for an energy audit to be conducted in the future. One could also conclude that the nonaudited facilities use the available energy information to start their own conservation programs; train their employees and determine feasible ECO's for implementation.

Approximately 38% of all the food service facilities were members of a trade or industry association. Approximately 46% of the colleges/universities were members compared to 35.8% of the hospitals. Of the

facilities which belonged to trade or industry associations, 48.5% have been working with these associations in volunteer energy conservation efforts. Although a greater percentage of colleges/universities than hospitals were members of various associations, more hospitals (56.5%) were taking part in voluntary conservation efforts than college/universities (30%). These efforts included:

Attending meetings.

Monitoring energy use.

Filing reports.

The data is presented in more detail in Appendix E, Tables 73-75. It would seem that the facilities which had energy audits would also be the members of the associations who were involved in voluntary conservation endeavors. Perhaps one reason that respondents were not familiar with energy audits is that they were not members of trade or industry associations. It seems likely that these associations would keep up with current topics of interest such as energy conservation and have information readily available to its members. In addition, these associations would probably publicize energy conservation assistance being provided to their members by government agencies, utility companies, or other organizations. Possibly when association members are made aware of the energy conservation actions taken by other members, there would be greater incentive to start conservation programs which include an audit.

Replies from the survey also pointed out the main sources of information that the respondents used to cope with energy problems in their facilities. Listed by greatest frequency of response, the main sources of energy information for all facilities included:

1. Industry or trade journals.
2. Talking with coworkers.
3. Special energy related meetings.
4. Training sessions.
5. Talking with others outside work.

Approximately 90% of all facilities responded to the above question (see Appendix E, Table 76). This would seem to indicate that the topic of energy conservation was being discussed among and within food service facilities. It appears, however, that energy conservation has not become a top priority among facilities.

The energy conservation survey indicated that many energy audits were not conducted in food service facilities because respondents were not familiar with an energy audit, did not know of a qualified person or firm to conduct an audit, and had no one on staff qualified to perform an audit. It would seem that energy conservation assistance programs need to be made available to food service facilities since expenditures for energy resources represent approximately 8% of a facility's total operating budget. Projections indicate that this expenditure will continue to increase (Barclay, 1979). These programs and the services which are provided should be publicized and directed to energy users who could benefit from assistance. Energy conservation materials including audit procedures and potential ECO's should be made available through trade and industry associations, and public organizations such as utility companies. In addition, these associations and organizations should offer training to directors of facilities or the person responsible for energy conservation. This instruction could include how to initiate an energy conservation program incorporating an energy audit.

Recommendations

This study has pointed to a number of problems that need to be researched further. One investigation recommended is a longitudinal study to follow up measures taken in energy conservation since this survey. The same questionnaire or one of similar design could reveal if there has been an increase in the number of audits conducted in food service facilities and if the implementation rate for ECO's has increased. The barriers to implementation could also be reviewed to see if capital budgeting problems still remain as the major obstacle.

The capital budgeting processes of hospitals and colleges/universities in other geographic areas as well as other types of food service facilities need to be studied. The results of this survey indicated that the majority of the barriers to implementation of ECO's dealt with the capital budgeting aspects of a facility. If the same barriers were discovered in other facilities and sections of the country, it would seem that federal policy makers would be very interested in understanding and overcoming these obstacles through development of new energy policies.

Studies should be conducted investigating the energy conservation programs which are being initiated in other parts of the country. There is a need to see if the barriers to implementation faced by directors in the Southeast are the same barriers in other sections of the U.S. Surveys could also be carried out in other areas of the food service industry such as fast food facilities and restaurants. These responses could be compared with the results found in hospitals and colleges/universities to obtain an overall understanding of energy problems in the food service industry.

This study also revealed that the majority of decisions affecting capital investments and energy conservation were made by the administrators of the facilities. Energy conservation surveys could be sent to the administrator to determine if they perceive the same problems and barriers as those food service directors replying to this survey.

Energy conservation training programs need to be studied to find out what information is provided to the energy user and what further knowledge needs to be made available. The results indicated that many respondents were not familiar with energy audits. It is possible that this concept is not included in training programs or not discussed in enough detail.

Research could also be conducted to determine what role trade and industry associations play in energy conservation as it relates to the food service industry. It is possible that these associations would be a link to providing extensive information and training to food service facilities.

These recommendations for further research are just a few of the studies needed to determine the barriers to implementation of ECO's in food service facilities as well as the role of energy audits in energy conservation programs. Much more data is needed to assist federal, state, and local energy policy makers in understanding these barriers and to assist in overcoming them.

CHAPTER V

SUMMARY

The purposes of this research were to determine the extent of exposure to energy audits in selected hospital dietary departments and college/university food services; to identify major barriers to implementation of ECO's for these facilities with exposure to audits; to establish the reasons why these barriers exist which prevent directors of these facilities from implementing ECO's; and to establish reasons why energy audits have not been conducted.

Three hundred and seven energy conservation surveys were sent to 212 hospitals and 95 colleges/universities which were randomly selected from North Carolina, Tennessee, and Virginia. The survey included information pertaining to energy audits and energy conservation programs initiated within food service facilities. A followup letter and questionnaire were sent to facilities not responding within a designated period of time.

The results of this study indicated that approximately 23% of the facilities responding had conducted an energy audit and 73% had not carried out an audit. Many nonaudited facilities were not familiar with an energy audit or did not have someone on staff qualified to conduct an audit. The replys seem to indicate that energy information and training need to be made available not only from government organizations but also through trade and industry associations.

The results indicated that 69.8% of the ECO's recommended from energy audits had been implemented. Several barriers to implementation

of these ECO's were pointed out. These included cost of equipment, expense of borrowing money, lengthy payback period, and production schedule interruption. The major reasons for having an energy audit were to find ways of conserving energy and to combat rising energy costs. As a result of the audits, 56.5% of the food service facilities stated a decrease in their total energy bills. In addition, approximately 65% of the respondents reported a decrease in total energy consumption. These decreases ranged from 1-40%.

The results of this survey provide data that could be utilized by energy policy makers in developing strategies to overcome these barriers to implementation of ECO's. Research has only begun to determine these barriers in the food service industry.

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APPENDICES

APPENDIX A

COVER LETTERS AND QUESTIONNAIRE

FORM I - COVER LETTER

THE UNIVERSITY OF TENNESSEE
KNOXVILLE 37916
COLLEGE OF HOME ECONOMICS

DEPARTMENT OF FOOD SCIENCE, NUTRITION AND FOOD SYSTEMS ADMINISTRATION

FOOD SCIENCE (615) 974-5445
NUTRITION (615) 974-3491
FOOD SYSTEMS ADMINISTRATION (615) 974-5445

September 2, 1980

Will you help us?

We are conducting a survey among college/university food services and hospital dietary departments in the Southeast region of the United States. The purpose of this research is to identify major barriers to conserving energy in food service facilities. Your answers will enable federal, state, and local energy policy makers to become aware of the problems faced by college/university food services and hospital dietary departments. In addition, your answers will help them provide programs and funds in order to assist you.

Your name was selected on the basis of your position as director of your food service. Therefore, your answers are very important to the accuracy and completeness of our research.

It will take approximately fifteen minutes to answer the simple questions on the enclosed questionnaire. Please use the self-addressed, stamped envelope for your response.

The identity of the person completing the questionnaire and answers from individual food service facilities will be treated anonymously and will be used only in compiling group statistics.

Please return the completed questionnaire by September 16. Thank you for your help.

Sincerely,

Susan Mitchell, R.D.
Graduate Student
Food Systems Administration

Mary Jo Hitchcock, Ph.D., R.D.
Professor
Food Systems Administration

DSM/MJH/jgt

Enclosures: Questionnaire
Self-addressed envelope

FORM II - FOLLOWUP COVER LETTER

THE UNIVERSITY OF TENNESSEE
KNOXVILLE 37916
COLLEGE OF HOME ECONOMICS

DEPARTMENT OF FOOD SCIENCE, NUTRITION AND FOOD SYSTEMS ADMINISTRATION

FOOD SCIENCE (615) 974-5446
NUTRITION (615) 974-3491
FOOD SYSTEMS ADMINISTRATION (615) 974-5445

September 19, 1980

We know this is a busy time for you, but we are trying to finalize our research. Could you please take a few minutes to complete the enclosed questionnaire? We would like to include your valuable input in our results.

We are conducting a survey among college/university food services and hospital dietary departments in the Southeast region of the United States. The purpose of this research is to identify major barriers to conserving energy in food service facilities. Your answers will enable federal, state and local energy policy makers to become aware of the problems faced by college/university food services and hospital dietary departments. In addition, your answers will help them provide programs and funds in order to assist you.

Your name was selected on the basis of your position as director of food services. Therefore, your answers are very important to the accuracy and completeness of our research. If you cannot supply the needed information, please give the questionnaire to the appropriate person.

It will take approximately fifteen minutes to answer the simple questions on the enclosed questionnaire. Please use the self-addressed stamped envelope for your response.

The identity of the person completing the questionnaire and answers from individual food service facilities will be treated anonymously and will be used only in compiling group statistics.

Please return the completed questionnaire by October 6.

Thank you for your time and assistance.

Sincerely,

Susan Mitchell, R.D.
Graduate Student FSA

Mary Jo Hitchcock, Ph.D, R.D.
Professor FSA

DSM/MJH/bb

Enclosures

ENERGY CONSERVATION SURVEY - FORM III

I. Has an energy audit been conducted in your food service facility? (Check yes if an audit has been conducted in one or more units of a multi-unit facility)

____ yes ____ no ____ don't know

If yes, please complete Section A below; If no, please complete Section B page 2.

SECTION A (For food service facilities in which an energy audit has been conducted).

1. How long ago was this energy audit conducted?

____ 1-6 months ____ 7-12 months ____ more than one year ____ don't know

2. Who gave approval for the audit to be done? (you may check more than one answer, but please assign a priority to your answers with 1 as the highest).

____ food service director
____ chief dietitian
____ college or university administrator
____ hospital administrator
____ other, please specify: _____
____ don't know

3. What was the major reason for your food service facility having an audit?

____ rising energy costs
____ shortage in fuel supplies
____ to find ways to conserve energy
____ other, please specify: _____
____ don't know

4. Who conducted your food service facility's energy audit?

____ engineering firm
____ university or college group
____ government agency
____ in-house staff (specify position): _____
____ other, please specify: _____
____ don't know

5. How long did the audit take in your food service facility?

____ half day ____ one day ____ two days ____ more than two days ____ don't know

6. Since the audit, has your total energy bill increased, decreased or remained about the same?

____ increased ____ decreased ____ same ____ don't know

Increased or decreased, by how much?

____ 1-10% ____ 11-25% ____ 26-40% ____ 51-50% ____ more than 50% ____ don't know

7. Since the audit, has your total energy consumption increased, decreased or remained about the same?

____ increased ____ decreased ____ same ____ don't know

Increased or decreased, by how much?

____ 1-10% ____ 11-25% ____ 26-40% ____ 51-50% ____ more than 50% ____ don't know

8. Please check all of the following energy conservation measures that were recommended for change:

____ improve boiler efficiency
____ improve building insulation
____ stop steam leaks
____ reduce temperature of hot water
____ reduce heating of storage areas
____ waste heat recovery
____ change thermostat settings
____ reschedule equipment usage
____ reduce ventilation
____ modify air conditioning system
____ reduce excess lighting
____ replace old equipment with new energy efficient equipment
____ improve steam pipe insulation
____ don't know
____ other, please specify: _____

9. Which of the recommended changes has your facility made: (please check all answers that apply)

____ improve boiler efficiency
____ improve building insulation
____ stop steam leaks
____ reduce temperature of hot water
____ reduce heating of storage areas
____ waste heat recovery
____ change thermostat settings
____ reduce ventilation
____ reschedule equipment usage
____ modify air conditioning system
____ reduce excess lighting
____ replace old equipment with new energy efficient equipment
____ improve steam pipe insulation
____ none as yet
____ don't know
____ other, please specify: _____

10. Please study the list of factors below. Choose the five which you feel could prevent your food service facility from making the recommended energy conservation changes. Number these from one to five, with (1) as most important, (2) as next most important, (3) as third most important, (4) as fourth in importance, and (5) as least important.

____ cost of equipment
____ payback period too long
____ production schedule interrupted
____ requires facility shutdown
____ government regulations
____ state regulations
____ local regulations
____ risk of new technology
____ need second opinion of recommendations
____ expense of borrowing money
____ management not interested
____ lack of man power to do the work
____ don't know
____ other, please specify: _____

PLEASE CONTINUE ON WITH QUESTION II, PAGE 3

SECTION B (For food service facilities in which an energy audit has not been conducted).

1. Please check the major reasons for not having an energy audit conducted. (You may check more than one answer, but please assign a priority to your answers with 1 as the highest).

____ no one on the staff qualified to do an energy audit
____ believe that your facility is energy efficient
____ too espensive to hire an energy consultant
____ not familiar with an energy audit
____ do not know of a qualified person or firm to conduct an energy audit
____ energy costs are a small fraction of total operating costs
____ facility could not make energy conservation changes without adversely affecting production or profits.
____ don't know
____ other, please specify: _____

2. How much of your annual energy bill would your facility be willing to spend on an energy audit?

____ none ____ 1-5% ____ 6-10% ____ more than 10% ____ don't know
____ other, please specify: _____

3. From which of the following organizations or people has your food service facility requested energy conservation assistance? (Please check all that apply).

____ government agencies (local, state, federal)
____ utility company
____ energy audit firm
____ engineer
____ university or college
____ chamber of commerce
____ don't know
____ other, please specify: _____
____ have not requested assistance from any of these

4. Has a college or university, government agency, or utility company offered assistance to your facility?

____ yes ____ no ____ don't know

If yes, which one offered assistance?

____ utility company
____ government agency: ____ local ____ state ____ federal
____ university or college

If yes, what type of assistance did they offer? (Please check all answers that apply).

____ conservation information and pamphlets
____ energy auditing services
____ conservation training for employees
____ don't know
____ other, please specify: _____

If yes, did you facility accept the assistance?

____ yes ____ no ____ don't know

PLEASE CONTINUE WITH QUESTION II BELOW

II. Please check all the types of energy used in your facility:

____ coal ____ propane ____ electricity ____ fuel oil ____ natural gas
____ don't know ____ other, please specify: _____

III. Please check the person in your food service facility who makes decisions concerning spending money for energy conservation:

____ food service director
____ chief dietitian
____ authority outside food service facility
____ other, please specify: _____
____ don't know

IV. Has your food service facility experienced a mandatory cutback in energy allocation within the past five years?

____ yes ____ no ____ don't know

If yes, source of cutback:

____ natural gas
____ coal
____ fuel oil
____ propane
____ electricity
____ don't know
____ other, please specify: _____

If yes, duration of cutback:

____ less than 1 week
____ 1-2 weeks
____ 3-4 weeks
____ 1-2 months
____ 3-4 months
____ more than 4 months
____ don't know
____ others, please specify: _____

V. Approximately what percent of your annual operating budget goes toward energy costs?

____ 1-5% ____ 6-10% ____ 11-25% ____ more than 25% ____ don't know

VI. Is your facility a member of a trade or industry association?

____ yes ____ no ____ don't know

If yes, has your facility been working with the trade or industry association in volunteer energy conservation efforts?

____ yes ____ no ____ don't know

If yes, these efforts include: (Please check all answers that apply).

____ filing reports
____ attending meetings
____ monitoring energy use
____ don't know
____ other, please specify: _____

VII. Do you have an in-house person responsible for energy conservation?

____ yes ____ no ____ don't know

If yes, this person is:

____ engineer
____ food service director
____ chief dietitian
____ maintenance staff
____ food service supervisor
____ don't know
____ other, please specify: _____

If yes, has this person started an energy conservation program?

____ yes ____ no ____ don't know

VIII. Please check your main sources of information on how to cope with energy problems in your facility: (Please check all answers that apply).

____ talking with co-workers
____ special energy related committees
____ government speakers
____ special energy related meetings
____ training sessions
____ mass media, please specify: ____
_____

____ talking with others outside work
____ industry or trade association journals
____ don't know
____ other, please specify: _____
_____

IX. What is your normal payback period required for energy conservation expenditures?

____ less than 1 year ____ 1-3 years ____ 4-5 years ____ 6-10 years
____ more than 10 years ____ don't know ____ other, please specify: _____

X. Are you a member of any industrial, trade, or professional societies?

____ yes ____ no

If yes, are these: ____ local ____ regional ____ national

Please list: _____
_____

(If insufficient space, please list on the back)

XI. Do you attend meetings of any of these associations? ____ yes ____ no

XII. What is your educational or professional background?

____ high school
____ 2 year college
____ 4 year college
____ professional school training
____ graduate school
____ other, please specify: _____
_____

XIII. What is the total number of food service employees in your facility?

_____ part-time _____ full-time

XIV. What is the approximate total number of meals served per year?

XV. Type of facility: ____ hospital dietary department
____ college food service
____ university food service

a. If hospital dietary department, what is the size of your hospital?
____ 25-100 beds ____ more than 100 beds

b. If college/university food service, what is the enrollment of your college/university?
____ less than 1000 ____ more than 1000

XVI. What is your position title?

____ food service director
____ chief dietitian
____ food service supervisor
____ engineer
____ other, please specify: ____________

THANK YOU FOR YOUR TIME AND COOPERATION!

* *

If you wish to receive a summary of the results, please complete the form below:

NAME: ______________________________

ADDRESS: ______________________________

CITY: ____________ STATE: ____________ ZIP CODE: ______

APPENDIX B

PILOT TEST RESULTS

TABLE 1

PILOT TEST RESULTS

Pilot Test	Minutes Required to Answer Questionnaire	Type of Facility	
		Hospital	School
A	8	X	-
B	13	X	-
C	14	-	X
D	15	-	X

Additional Comments Regarding Questionnaire

1. Is it necessary to know what trade or industry associations a facility is a member of (see Question VI)?

2. Add a question similar to number six in section A which says: Since the audit, has your energy consumption increased, decreased, or remained about the same?

3. Regarding question 5, section A: add "in your food service facility" to clarify what area you are concerned with.

4. Regarding question I: What about a facility that has multi-units and only one audit has been done? Clarify this.

5. Regarding question 8, section A: add "none as yet."

6. Errors in typing: left out in question IV - "Other, please specify"; question 8, section 8, should read: reduce temperature of "hot water" instead of "storage areas."

APPENDIX C

BACKGROUND INFORMATION

EXPLANATION OF TABLES

For the ease of interpreting the following data, the information below applies to Tables 6-76.

1. "Other" is specified when ten or more responses were the same.
2. Information in the upper left corner of the tables represents the data in each cell in descending order.

TABLE 2

NUMBER OF EMPLOYEES AND MEALS SERVED PER YEAR FOR SMALL HOSPITALS

Q13A - Part-Time Employees

MEAN	4.095	STD ERR	0.640	MEDIAN	3.250
MODE	2.000	STD DEV	2.931	VARIANCE	8.590
KURTOSIS	-0.550	SKEWNESS	0.911	RANGE	9.000
MINIMUM	1.000	MAXIMUM	10.000		
VALID CASES	21	MISSING CASES	12		

Q13B - Full-Time Employees

MEAN	11.103	STD ERR	0.891	MEDIAN	10.000
MODE	6.000	STD DEV	4.798	VARIANCE	23.025
KURTOSIS	0.163	SKEWNESS	0.809	RANGE	19.000
MINIMUM	3.000	MAXIMUM	22.000		
VALID CASES	29	MISSING CASES	4		

Q14 - Approximate Number of Meals Served Per Year

MEAN	62339.520	STD ERR	7704.664	MEDIAN	60000.000
MODE	60000.000	STD DEV	36950.285	VARIANCE	**********
KURTOSIS	0.109	SKEWNESS	0.501	RANGE	146171.000
MINIMUM	6000.000	MAXIMUM	152171.000		
VALID CASES	23	MISSING CASES	10		

TABLE 3

NUMBER OF EMPLOYEES AND MEALS SERVED PER YEAR FOR LARGE HOSPITALS

Q13A - Part-Time Employees

MEAN	13.655	STD ERR	2.825	MEDIAN	6.750
MODE	6.000	STD DEV	15.211	VARIANCE	231.377
KURTOSIS	3.035	SKEWNESS	1.786	RANGE	63.000
MINIMUM	0.0	MAXIMUM	63.000		
VALID CASES	29	MISSING CASES	13		

Q13B - Full-Time Employees

MEAN	58.975	STD ERR	9.043	MEDIAN	33.500
MODE	21.000	STD DEV	57.194	VARIANCE	3271.198
KURTOSIS	1.648	SKEWNESS	1.515	RANGE	240.000
MINIMUM	5.000	MAXIMUM	245.000		
VALID CASES	40	MISSING CASES	2		

Q14 - Approximate Number of Meals Served Per Year

MEAN	486783.875	STD ERR	103711.813	MEDIAN	290500.000
MODE	109500.000	STD DEV	568053.000	VARIANCE	**********
KURTOSIS	8.298	SKEWNESS	2.593	RANGE	2754572.000
MINIMUM	1500.000	MAXIMUM	2756072.000		
VALID CASES	30	MISSING CASES	12		

TABLE 4

NUMBER OF EMPLOYEES AND MEALS SERVED PER YEAR FOR SMALL SCHOOLS

Q13A - Part-Time Employees

MEAN	35.000	STD ERR	21.890	MEDIAN	17.500
MODE	5.000	STD DEV	43.780	VARIANCE	1916.667
KURTOSIS	3.623	SKEWNESS	1.877	RANGE	95.000
MINIMUM	5.000	MAXIMUM	100.000		
VALID CASES	4	MISSING CASES	0		

Q13B - Full-Time Employees

MEAN	16.750	STD ERR	5.391	MEDIAN	20.500
MODE	1.000	STD DEV	10.782	VARIANCE	116.250
KURTOSIS	3.014	SKEWNESS	-1.696	RANGE	24.000
MINIMUM	1.000	MAXIMUM	25.000		
VALID CASES	4	MISSING CASES	0		

Q14 - Approximate Number of Meals Served Per Year

MEAN	343800.000	STD ERR	111394.250	MEDIAN	397400.000
MODE	18000.000	STD DEV	222788.563	VARIANCE	**********
KURTOSIS	2.933	SKEWNESS	-1.721	RANGE	482000.000
MINIMUM	18000.000	MAXIMUM	500000.000		
VALID CASES	4	MISSING CASES	0		

TABLE 5

NUMBER OF EMPLOYEES AND MEALS SERVED PER YEAR FOR LARGE SCHOOLS

Q13A - Part-Time Employees

MEAN	110.950	STD ERR	27.611	MEDIAN	73.000
MODE	400.000	STD DEV	123.479	VARIANCE	15247.063
KURTOSIS	1.432	SKEWNESS	1.515	RANGE	397.000
MINIMUM	3.000	MAXIMUM	400.000		
VALID CASES	20	MISSING CASES	2		

Q13B - Full-Time Employees

MEAN	72.762	STD ERR	16.805	MEDIAN	50.000
MODE	40.000	STD DEV	77.011	VARIANCE	5930.684
KURTOSIS	8.453	SKEWNESS	2.698	RANGE	335.000
MINIMUM	15.000	MAXIMUM	350.000		
VALID CASES	21	MISSING CASES	1		

Q14 - Approximate Number of Meals Served Per Year

MEAN	1212242.000	STD ERR	310016.000	MEDIAN	752562.500
MODE	4000000.000	STD DEV	1240064.000	VARIANCE	**********
KURTOSIS	1.688	SKEWNESS	1.508	RANGE	3999125.000
MINIMUM	875.000	MAXIMUM	4000000.000		
VALID CASES	16	MISSING CASES	6		

TABLE 6

POSITION TITLES OF RESPONDENTS TO ENGINEERY CONSERVATION QUESTIONNAIRE

Q1		C16 Food Service Director Q161	Chief Dietitian Q162	Food Service Supervisor Q163	Engineer Q164	Other Q165	ROW TOTAL
No	0	45	17	3	1	8	71
							72.4%
Yes	1	17	4	0	2	1	23
							23.5%
Don't Know	9	2	1	1	0	1	4
							4.1%
COLUMN TOTAL		64	22	4	3	10	98
		65.3%	22.4%	4.1%	3.1%	10.2%	100.0%

Percents and totals based on respondents.

98 Valid cases. 5 Missing cases.

Note: "Other" includes Director of Auxilliary Services.

[1]Cross Tabulation, Question 1 by Question 16.

TABLE 7

PERSON RESPONSIBLE FOR DECISIONS CONCERNING EXPENDITURES FOR ENERGY CONSERVATION[1]

Q3	Q15 Hospitals 1	Schools 2	ROW TOTAL
Q31-Food Service Director	22	16	38 38.8%
Q32-Chief Dietitian	6	0	6 6.1%
Q33-Authority Outside Food Service Facility	35	12	47 48.0%
Q34-Other	19	4	23 23.5%
COLUMN TOTAL	72 73.5%	26 26.5%	98 100.0%

Percents and totals based on respondents.

98 Valid cases. 5 Missing cases.

Note: "other" includes: Administrator, Engineering Department.

[1]Cross Tabulation, Question 3 by Question 15.

TABLE 8

PAYBACK PERIOD REQUIRED IN FOOD SERVICE FACILITIES FOR ENERGY CONSERVATION EXPENDITURES[1]

Q9	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
2.	8	5	13
	61.5	38.5	16.0%
1-3 years	13.6	22.7	
	9.9	6.2	
3.	4	3	7
	57.1	42.9	8.6%
4-5 years	6.8	13.6	
	4.9	3.7	
4.	3	0	3
	100.0	0.0	3.7%
6-10 years	5.1	0.0	
	3.7	0.0	
5.	1	0	1
	100.0	0.0	1.2%
10 years	1.7	0.0	
	1.2	0.0	
8.	5	2	7
	71.4	28.6	8.6%
Other	8.5	9.1	
	6.2	2.5	
9.	38	12	50
	76.0	24.0	61.7%
Don't know	64.4	54.5	
	46.9	14.8	
COLUMN TOTAL	59	22	81
	72.8%	27.2%	100.0%

Number of missing observations = 22.

[1]Cross Tabulation, Question 9 by Question 15.

TABLE 9

PAYBACK PERIOD IN HOSPITALS REQUIRED FOR ENERGY CONSERVATION EXPENDITURES[1]

Q9	CXV COUNT ROW PCT COL PCT TOT PCT	Small 1.	Large 2.	ROW TOTAL
2.		3	5	8
1-3 years		37.5	62.5	13.6%
		13.0	13.9	
		5.1	8.5	
3.		1	3	4
		25.0	75.0	6.8%
4-5 years		4.3	8.3	
		1.7	5.1	
4.		3	0	3
		100.0	0.0	5.1%
6-10 years		13.0	0.0	
		5.1	0.0	
5.		0	1	1
		0.0	100.0	1.7%
10 years		0.0	2.8	
		0.0	1.7	
8.		1	4	5
Other		20.0	80.0	8.5%
		4.3	11.1	
		1.7	6.8	
9.		15	23	38
Don't Know		39.5	60.5	64.4%
		65.2	63.9	
		25.4	39.0	
COLUMN TOTAL		23 39.0%	36 61.0%	59 100.0%

[1]Cross Tabulation, Question 9 by Question XV.

TABLE 10

PAYBACK PERIOD IN SCHOOLS REQUIRED FOR ENERGY CONSERVATION EXPENDITURES[1]

Q9	COUNT / ROW PCT / COL PCT / TOT PCT	CXV Small 1.	Large 2.	ROW TOTAL
2. 1-3 years		1	3	4
		25.0	75.0	19.0%
		25.0	17.6	
		4.8	14.3	
3. 4-5 years		1	2	3
		33.3	66.7	14.3%
		25.0	11.8	
		4.8	9.5	
8. Other		0	2	2
		0.0	100.0	9.5%
		0.0	11.8	
		0.0	9.5	
9. Don't Know		2	10	12
		16.7	83.3	57.1%
		50.0	58.8	
		9.5	47.6	
COLUMN TOTAL		4	17	21
		19.0%	81.0%	100.0%

Number of missing observations = 23.

[1]Cross Tabulation, Question 9 by Question XV.

TABLE 11

PERCENT OF ANNUAL OPERATING BUDGET IN FOOD SERVICE FACILITIES ALLOCATED TOWARD ENERGY COSTS[1]

Q5	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. 1-5%	11	11	22
	50.0	50.0	23.9%
	16.9	40.7	
	12.0	12.0	
2. 6-10%	8	6	14
	57.1	42.9	15.2%
	12.3	22.2	
	8.7	6.5	
3. 11-25%	0	1	1
	0.0	100.0	1.1%
	0.0	3.7	
	0.0	1.1	
4. 25%	2	1	3
	66.7	33.3	3.3%
	3.1	3.7	
	2.2	1.1	
9. Don't Know	44	8	52
	84.6	15.4	56.5%
	67.7	29.6	
	47.8	8.7	
COLUMN TOTAL	65	27	92
	70.7%	29.3%	100.0%

Number of missing observations = 11.

[1]Cross Tabulation, Question 5 by Question 15.

TABLE 12

PERCENT OF ANNUAL OPERATING BUDGET IN HOSPITALS ALLOCATED TOWARD ENERGY COSTS[1]

Q5	COUNT / ROW PCT / COL PCT / TOT PCT	QXV Small 1.	Large 2.	ROW TOTAL
1. 1-5%		6	5	11
		54.5	45.5	16.9%
		21.4	13.5	
		9.2	7.7	
2. 6-10%		5	3	8
		62.5	37.5	12.3%
		17.9	8.1	
		7.7	4.6	
4. 25%		1	1	2
		50.0	50.0	3.1%
		3.6	2.7	
		1.5	1.5	
9. Don't Know		16	28	44
		36.4	63.6	67.7%
		57.1	75.7	
		24.6	43.1	
COLUMN TOTAL		28	37	65
		43.1%	56.9%	100.0%

[1]Cross Tabulation, Question 5 by Question XV.

TABLE 13

PERCENT OF ANNUAL OPERATING BUDGET IN SCHOOLS ALLOCATED TOWARD ENERGY COSTS[1]

Q5	QXV Small 1.	Large 2.	ROW TOTAL
1. 1-5%	1 9.1 25.0 3.8	10 90.9 45.5 38.5	11 42.3%
2. 6-10%	0 0.0 0.0 0.0	5 100.0 22.7 19.2	5 19.2%
3. 11-25%	1 100.0 25.0 3.8	0 0.0 0.0 0.0	1 3.8%
4. 25%	1 100.0 25.0 3.8	0 0.0 0.0 0.0	1 3.8%
9. Don't Know	1 12.5 25.0 3.8	7 87.5 31.8 26.9	8 30.8%
COLUMN TOTAL	4 15.4%	22 84.6%	26 100.0%

Number of missing observations = 12.

[1]Cross Tabulation, Question 5 by Question XV.

TABLE 14

TYPES OF ENERGY USED IN FOOD SERVICE FACILITIES[1]

Q2	COUNT	Q15 Hospitals 1	Schools 2	ROW TOTAL
Q21 Coal		6	5	11
				11.1%
Q22 Propane		7	0	7
				7.1%
Q23 Electricity		68	24	92
				92.9%
Q24 Fuel Oil		43	10	53
				53.5%
Q25 Natural Gas		38	18	56
				56.6%
Q27 Other		3	1	4
				4.0%
COLUMN TOTAL		72	27	99
		72.7%	27.3%	100.0%

Percents and totals based on respondents.

99 Valid cases. 4 Missing cases.

[1]Cross Tabulation, Question 2 by Question 15.

TABLE 15

PERCENT OF FOOD SERVICE FACILITIES EXPERIENCING A MANDATORY CUTBACK IN ENERGY ALLOCATION[1]

Q4		Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No	COUNT	42	18	60
	ROW PCT	70.0	30.0	63.2%
	COL PCT	61.8	66.7	
	TOT PCT	44.2	18.9	
1. Yes	COUNT	15	5	20
	ROW PCT	75.0	25.0	21.1%
	COL PCT	22.1	18.5	
	TOT PCT	15.8	5.3	
9. Don't Know	COUNT	11	4	15
	ROW PCT	73.3	26.7	15.8%
	COL PCT	16.2	14.8	
	TOT PCT	11.6	4.2	
COLUMN TOTAL		68	27	95
		71.6%	28.4%	100.0%

Number of missing observations = 8.

[1]Cross Tabulation, Question 4 by Question 15.

TABLE 16

PERCENT OF HOSPITALS EXPERIENCING A MANDATORY CUTBACK IN ENERGY ALLOCATION[1]

Q4	CXV COUNT / ROW PCT / COL PCT / TOT PCT	Small 1.	Large 2.	ROW TOTAL
0. No		20 47.6 64.5 29.4	22 52.4 59.5 32.4	42 61.8%
1. Yes		6 40.0 19.4 8.8	9 60.0 24.3 13.2	15 22.1%
9. Don't Know		5 45.5 16.1 7.4	6 54.5 16.2 8.8	11 16.2%
COLUMN TOTAL		31 45.6%	37 54.4%	68 100.0%

[1]Cross Tabulation, Question 4 by Question XV.

TABLE 17

PERCENT OF SCHOOLS EXPERIENCING A MANDATORY CUTBACK IN ENERGY ALLOCATION[1]

Q4		QXV Small 1.	QXV Large 2.	ROW TOTAL
	0. No	3 16.7 75.0 11.5	15 83.3 68.2 57.7	18 69.2%
	1. Yes	1 25.0 25.0 3.8	3 75.0 13.6 11.5	4 15.4%
	9. Don't Know	0 0.0 0.0 0.0	4 100.0 18.2 15.4	4 15.4%
	COLUMN TOTAL	4 15.4%	22 84.6%	26 100.0%

Number of missing observations = 9.

[1]Cross Tabulation, Question 4 by Question XV.

TABLE 18

SOURCES OF MANDATORY CUTBACK IN ENERGY ALLOCATION[1]

Q4A	COUNT	Q15 Hospitals 1	Schools 2	ROW TOTAL
Q4A1 Natural Gas		5	1	6
				30.0%
Q4A2 Coal		1	1	2
				10.0%
Q4A3 Fuel Oil		3	0	3
				15.0%
Q4A5 Electricity		8	5	13
				65.0%
Q4A7 Other		1	0	1
				5.0%
COLUMN TOTAL		15	5	20
		75.0%	25.0%	100.0%

Percents and totals based on respondents.

20 Valid cases. 0 Missing cases.

[1]Cross Tabulation, Question 4A by Question 15.

TABLE 19

DURATION OF CUTBACK IN ENERGY ALLOCATION[1]

Q4B	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
2. 1-2 weeks	0	1	1
	C.0	100.0	5.0%
	C.0	20.0	
	C.0	5.0	
3. 3-4 weeks	1	1	2
	50.0	50.0	10.0%
	6.7	20.0	
	5.0	5.0	
4. 1-2 months	2	1	3
	66.7	33.3	15.0%
	13.3	20.0	
	10.0	5.0	
5. 3-4 months	1	1	2
	50.0	50.0	10.0%
	6.7	20.0	
	5.0	5.0	
6. 4 months	6	1	7
	85.7	14.3	35.0%
	40.0	20.0	
	30.0	5.0	
8. Other	4	0	4
	100.0	0.0	20.0%
	26.7	0.0	
	20.0	0.0	
9. Dont' Know	1	0	1
	100.0	0.0	5.0%
	6.7	0.0	
	5.0	0.0	
COLUMN TOTAL	15	5	20
	75.0%	25.0%	100.0%

[1]Cross Tabulation, Question 4B by Question 15

TABLE 20

ENERGY AUDITS CONDUCTED IN FOOD SERVICE FACILITIES[1]

Q1	Q15 COUNT / ROW PCT / COL PCT / TOT PCT	Hospitals 1.	Schools 2.	ROW TOTAL
No 0.		58	16	74
		78.4	21.6	72.5%
Audits Conducted		77.3	59.3	
		56.9	15.7	
Yes 1.		13	11	24
		54.2	45.8	23.5%
		17.3	40.7	
		12.7	10.8	
Don't KNow 9.		4	0	4
		100.0	0.0	3.9%
		5.3	0.0	
		3.9	0.0	
COLUMN TOTAL		75	27	102
		73.5%	26.5%	100.0%

2 Out of 6 (33.3%) of the valid cells have expected cell frequency less than 5.0.

Minimum expected cell frequency = 1.059.

Chi square = 6.95689 with 2 degrees of freedom. Significance = 0.0309

Number of missing observations = 1.

[1]Cross Tabulation, Question 1 by Question 15.

TABLE 21

ENERGY AUDITS CONDUCTED IN SMALL AND LARGE HOSPITALS

Q1	CXV COUNT / ROW PCT / COL PCT / TOT PCT	Small Hospitals 1.	Large Hospitals 2.	ROW TOTAL
No 0.		28	30	58
		48.3	51.7	77.3%
Audits Conducted		84.8	71.4	
		37.3	40.0	
Yes 1.		3	10	13
		23.1	76.9	17.3%
		9.1	23.8	
		4.0	13.3	
Don't Know 9.		2	2	4
		50.0	50.0	5.3%
		6.1	4.8	
		2.7	2.7	
COLUMN TOTAL		33 44.0%	42 56.0%	75 100.0%

2 Out of 6 (33.3%) of the valid cells have expected cell frequency less than 5.0.

Minimum expected cell frequency = 1.760.

Chi square = 2.79849 with 2 degrees of freedom. Significance = 0.2468.

[1]Cross Tabulation, Question 1 by Question XV.

TABLE 22

ENERGY AUDITS CONDUCTED IN SMALL AND LARGE SCHOOLS

Q1			QXV: Small Schools 1.	Large Schools 2.	ROW TOTAL
Audits Conducted	No	0.	1	15	16
			6.3	93.8	61.5%
			25.0	68.2	
			3.8	57.7	
	Yes	1.	3	7	10
			30.0	70.0	38.5%
			75.0	31.8	
			11.5	26.9	
	COLUMN TOTAL		4	22	26
			15.4%	84.6%	100.0%

2 Out of 4 (50.0%) of the valid cells have expected cell frequency less than 5.0.

Minimum expected cell frequency = 1.538.

Corrected CHI square = 1.15412 with 1 degree of freedom. Significance = 0.2827.

Raw chi square = 2.66648 with 1 degree of freedom. Significance = 0.1025.

Number of missing observations = 2.

[1]Cross Tabulation, Question 1 by Question XV.

APPENDIX D

FACILITIES AUDITED

TABLE 23

TIME ELAPSED SINCE ENERGY AUDIT WAS CONDUCTED[1]

Q1	COUNT / ROW PCT / COL PCT / TOT PCT	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. 1-6 months		6	2	8
		75.0	25.0	33.3%
		46.2	18.2	
		25.0	8.3	
2. 7-12 months		3	6	9
		33.3	66.7	37.5%
		23.1	54.5	
		12.5	25.0	
3. More Than One Year		4	2	6
		66.7	33.3	25.0%
		30.8	18.2	
		16.7	8.3	
9. Don't Know		0	1	1
		0.0	100.0	4.2%
		0.0	9.1	
		0.0	4.2	
COLUMN TOTAL		13	11	24
		54.2%	45.8%	100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question 1 by Question 15.

TABLE 24

APPROVAL FOR AUDIT GIVEN BY FOOD SERVICE DIRECTOR[1]

A21	C15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	13	7	20
	65.0	35.0	83.3%
	100.0	63.6	
	54.2	29.2	
1. First Priorty	0	3	3
	0.0	100.0	12.5%
	0.0	27.3	
	0.0	12.5	
2. Second Priority	0	1	1
	0.0	100.0	4.2%
	0.0	9.1	
	0.0	4.2	
COLUMN TOTAL	13	11	24
	54.2%	45.8%	100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question 21 by Question 15.

TABLE 25

APPROVAL FOR AUDIT GIVEN BY CHIEF DIETITIAN[1]

A22	Q15 COUNT / ROW PCT / COL PCT / TOT PCT	Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		13	11	24
	ROW PCT	54.2	45.8	100.0%
	COL PCT	100.0	100.0	
	TOT PCT	54.2	45.8	
COLUMN TOTAL		13	11	24
		54.2%	45.8%	100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question 22 by Question 15.

TABLE 26

APPROVAL FOR AUDIT GIVEN BY COLLEGE OR UNIVERSITY ADMINISTRATOR[1]

A23	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	13	2	15
	86.7	13.3	62.5%
	100.0	18.2	
	54.2	8.3	
1. First Priority	0	9	9
	0.0	100.0	37.5%
	0.0	81.8	
	0.0	37.5	
COLUMN TOTAL	13	11	24
	54.2%	45.8%	100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question A23 by Question 15.

TABLE 27

APPROVAL FOR AUDIT GIVEN BY HOSPITAL ADMINISTRATOR[1]

A24	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	0 0.0 0.0 0.0	11 100.0 100.0 45.8	11 45.8%
1. First Priority	13 100.0 100.0 54.2	0 0.0 0.0 0.0	13 54.2%
COLUMN TOTAL	13 54.2%	11 45.8%	24 100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question A24 by Question 15.

TABLE 28

MAJOR REASONS FOR ENERGY AUDITS IN FOOD SERVICE FACILITIES[1]

A3	Q15 Hospitals 1	Schools 2	ROW TOTAL
A31 Rising Energy Cost	7	7	14 58.3%
A32 Shortage in Fuel Supplies	1	0	1 4.2%
A33 To Find Ways to Conserve Energy	10	8	18 75.0%
A34 Other	1	0	1 4.2%
COLUMN TOTAL	13 54.2%	11 45.8%	24 100.0%

Percents and totals based on respondents.

24 Valid cases. 79 Missing cases.

[1]Cross Tabulation, Question A3 by Question 15.

TABLE 29

MAJOR REASONS FOR ENERGY AUDITS IN HOSPITALS[1]

A3	COUNT / CXV	Small 1	Large 2	ROW TOTAL
A31 Rising Energy Cost		2	5	7
				53.8%
A32 Shortage in Fuel Supplies		0	1	1
				7.7%
A33 To Find Ways to Conserve Energy		1	9	10
				76.9%
A34 Other		0	1	1
				7.7%
COLUMN TOTAL		3	10	13
		23.1%	76.9%	100.0%

Percents and totals based on respondents.

[1]Cross Tabulation, Question A3 by Question XV.

TABLE 30

MAJOR REASONS FOR ENERGY AUDITS IN SCHOOLS[1]

A3	CXV COUNT	Small 1	Large 2	ROW TOTAL
A31 Rising Energy Costs		1	5	6 60.0 %
A33 To Find Ways to Conserve Energy		3	4	7 70.0 %
	COLUMN TOTAL	3 30.0 %	7 70.0 %	10 100.0 %

Percents and totals based on respondents.

23 Valid cases. 80 Missing cases.

[1]Cross Tabulation, Question A3 by Question XV by Question 15.

TABLE 31

GROUP CONDUCTING FOOD SERVICE FACILITIES' ENERGY AUDITS[1]

A4	COUNT	Q15 Hospitals 1	Schools 2	ROW TOTAL
A41 Engineering Firm		6	3	9 37.5%
A42 University or College Group		2	3	5 20.8%
A43 Government Agency		1	2	3 12.5%
A44 In-House Staff		8	3	11 45.8%
A45 Other		2	0	2 8.3%
A46 Don't Know		0	1	1 4.2%
	COLUMN TOTAL	13 54.2%	11 45.8%	24 100.0%

Percents and totals based on respondents.

24 Valid cases. 79 Missing cases.

[1]Cross Tabulation, Question A4 by Question 15.

TABLE 32

GROUP CONDUCTING HOSPITALS' ENERGY AUDITS[1]

A4	COUNT / CXV	Small 1	Large 2	ROW TOTAL
A41 Engineering Firm		2	4	6
				46.2%
A42 University or College Group		1	1	2
				15.4%
A43 Government Agency		0	1	1
				7.7%
A44 In-House Staff		1	7	8
				61.5%
A45 Other		0	2	2
				15.4%
	COLUMN TOTAL	3	10	13
		23.1%	76.9%	100.0%

Percents and totals based on respondents.

[1]Cross Tabulation, Question A4 by Question XV by Question 15.

TABLE 33

GROUP CONDUCTING SCHOOLS' ENERGY AUDITS[1]

A4	COUNT / CXV	Small 1	Large 2	ROW TOTAL
A41 Engineering Firm		0	3	3
				30.0%
A42 University or College Group		0	2	2
				20.0%
A43 Government Agency		1	1	2
				20.0%
A44 In-House Staff		1	1	2
				20.0%
A46 Don't Know		1	0	1
				10.0%
COLUMN TOTAL		3	7	10
		30.0%	70.0%	100.0%

Percents and totals based on respondents.

23 Valid cases. 80 Missing cases.

[1]Cross Tabulation, Question A4 by Question XV by Question 15.

TABLE 34

TIME REQUIRED TO COMPLETE AUDIT IN FOOD SERVICE FACILITIES[1]

A5	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. Half Day	4	4	8
	50.0	50.0	33.3%
	30.8	36.4	
	16.7	16.7	
2. One Day	2	3	5
	40.0	60.0	20.8%
	15.4	27.3	
	8.3	12.5	
3. Two Days	3	0	3
	100.0	0.0	12.5%
	23.1	0.0	
	12.5	0.0	
4. More Than Two Days	3	2	5
	60.0	40.0	20.8%
	23.1	18.2	
	12.5	8.3	
9. Don't Know	1	2	3
	33.3	66.7	12.5%
	7.7	18.2	
	4.2	8.3	
COLUMN TOTAL	13	11	24
	54.2%	45.8%	100.0%

Number of missing observations = 79.

[1]Cross Tabulation, Question A5 by Question 15.

TABLE 35

TIME REQUIRED TO COMPLETE AUDIT IN HOSPITALS[1]

A5	QXV COUNT ROW PCT COL PCT TOT PCT	Small 1.	Large 2.	ROW TOTAL
1.		1	3	4
Half Day		25.0	75.0	30.8%
		33.3	30.0	
		7.7	23.1	
2.		2	0	2
One Day		100.0	0.0	15.4%
		66.7	0.0	
		15.4	0.0	
3.		0	3	3
Two Days		0.0	100.0	23.1%
		0.0	30.0	
		0.0	23.1	
4.		0	3	3
More Than Two Days		0.0	100.0	23.1%
		0.0	30.0	
		0.0	23.1	
9.		0	1	1
Dont' Know		0.0	100.0	7.7%
		0.0	10.0	
		0.0	7.7	
COLUMN TOTAL		3 23.1%	10 76.9%	13 100.0%

[1]Cross Tabulation, Question A5 by Question XV.

TABLE 36

TIME REQUIRED TO COMPLETE AUDIT IN SCHOOLS[1]

A5	CXV COUNT ROW PCT COL PCT TOT PCT	Small 1.	Large 2.	ROW TOTAL
1. Half Day		3 75.0 100.0 30.0	1 25.0 14.3 10.0	4 40.0%
2. One Day		0 0.0 0.0 0.0	3 100.0 42.9 30.0	3 30.0%
4. More Than Two Days		0 0.0 0.0 0.0	1 100.0 14.3 10.0	1 10.0%
9. Don't Know		0 0.0 0.0 0.0	2 100.0 28.6 20.0	2 20.0%
COLUMN TOTAL		3 30.0%	7 70.0%	10 100.0%

Number of missing observations = 80.

[1]Cross Tabulation, Question A5 by Question XV.

TABLE 37

CHANGE IN TOTAL ENERGY BILL SINCE AUDIT CONDUCTED[1]

A6	COUNT / ROW PCT / COL PCT / TOT PCT	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. Increase		1	0	1
		100.0	0.0	4.3%
		8.3	0.0	
		4.3	0.0	
2. Decrease		8	5	13
		61.5	38.5	56.5%
		66.7	45.5	
		34.8	21.7	
3. Same		2	2	4
		50.0	50.0	17.4%
		16.7	18.2	
		8.7	8.7	
9. Don't Know		1	4	5
		20.0	80.0	21.7%
		8.3	36.4	
		4.3	17.4	
COLUMN TOTAL		12	11	23
		52.2%	47.8%	100.0%

Number of missing observations = 80.

[1]Cross Tabulation, Question A6 by Question 15.

TABLE 38

PERCENT INCREASE OR DECREASE IN ENERGY BILL SINCE AUDIT CONDUCTED[1]

A6B	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
-3. Decreased 26-40 %	1 50.0 10.0 5.3	1 50.0 11.1 5.3	2 10.5%
-2. Decreased 11-25%	3 60.0 30.0 15.8	2 40.0 22.2 10.5	5 26.3%
-1. Decreased 1-10%	4 80.0 40.0 21.1	1 20.0 11.1 5.3	5 26.3%
2. Increased 11-25%	1 100.0 10.0 5.3	0 0.0 0.0 0.0	1 5.3%
9. Don't Know	1 16.7 10.0 5.3	5 83.3 55.6 26.3	6 31.6%
COLUMN TOTAL	10 52.6%	9 47.4%	19 100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A6B by Question 15.

TABLE 39

CHANGE IN TOTAL ENERGY CONSUMPTION SINCE AUDIT CONDUCTED[1]

A7	C15 Hospitals 1.	Schools 2.	ROW TOTAL
2. Decrease	10	5	15
	66.7	33.3	65.2 %
	83.3	45.5	
	43.5	21.7	
3. Same	1	3	4
	25.0	75.0	17.4 %
	8.3	27.3	
	4.3	13.0	
9. Don't Know	1	3	4
	25.0	75.0	17.4 %
	8.3	27.3	
	4.3	13.0	
COLUMN TOTAL	12	11	23
	52.2 %	47.8 %	100.0 %

Number of missing observations = 80.

[1]Cross Tabulation, Question A7 by Question 15.

TABLE 40

PERCENT INCREASE OR DECREASE IN ENERGY CONSUMPTION SINCE AUDIT CONDUCTED[1]

A7B	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
-3. Decreased 26-40%	COUNT 1	1	2
	ROW PCT 50.0	50.0	10.0%
	COL PCT 9.1	11.1	
	TOT PCT 5.0	5.0	
-2. Decreased 11-25%	COUNT 2	1	3
	ROW PCT 66.7	33.3	15.0%
	COL PCT 18.2	11.1	
	TOT PCT 10.0	5.0	
-1. Decreased 1-10%	COUNT 7	3	10
	ROW PCT 70.0	30.0	50.0%
	COL PCT 63.6	33.3	
	TOT PCT 35.0	15.0	
9. Don't Know	COUNT 1	4	5
	ROW PCT 20.0	80.0	25.0%
	COL PCT 9.1	44.4	
	TOT PCT 5.0	20.0	
COLUMN TOTAL	11	9	20
	55.0%	45.0%	100.0%

Number of missing observations = 83.

[1]Cross Tabulation, Question A7B by Question 15.

TABLE 41

ENERGY CONSERVATION MEASURES RECOMMENDED FOR CHANGE IN FOOD SERVICE FACILITIES[1]

A8	C15 Hospitals 1	Schools 2	ROW TOTAL
A801 Improve Boiler Efficiency	6	6	12 52.2%
A802 Improve Building Insulation	3	2	5 21.7%
A803 Stop Steam Leaks	7	5	12 52.2%
A804 Reduce Temperature of Hot Water	9	5	14 60.9%
A805 Reduce Heating of Storage Areas	2	3	5 21.7%
A806 Waste Heat Recovery	2	2	4 17.4%
A807 Change Thermostat Settings	9	9	18 78.3%
A808 Reduce Ventilation	7	3	10 43.5%
A809 Reschedule Equipment Usage	3	3	6 26.1%
A810 Modify Air Conditioning System	6	3	9 39.1%
A811 Reduce Excess Lighting	7	6	13 56.5%
A812 Replace Old Equipment with New Energy Efficient Equipment	7	4	11 47.8%
COLUMN TOTAL	12 52.2%	11 47.8%	23 100.0%

TABLE 41 (Continued)

A8	COUNT	G15 Hospitals 1	Schools 2	ROW TOTAL
A813	Improve Steam Pipe Insulation	5	2	7 30.4%
A814	None As Yet	0	1	1 4.3%
A815	Don't Know	2	2	4 17.4%
	COLUMN TOTAL	12 52.2%	11 47.8%	23 100.0%

Percents and totals based on respondents.

23 Valid cases. 80 Missing cases.

[1]Cross Tabulation, Question A8 by Question 15.

TABLE 42

ENERGY CONSERVATION MEASURES IMPLEMENTED IN FOOD SERVICE FACILITIES[1]

A9	C15 COUNT	Hospitals 1	Schools 2	ROW TOTAL
A901 Improve Boiler Efficiency		5	4	9
				39.1%
A902 Improve Building Insulation		3	0	3
				13.0%
A903 Stop Steam Leaks		7	3	10
				43.5%
A904 Reduce Temperature of Hot Water		7	4	11
				47.8%
A905 Reduce Heating of Storage Areas		2	3	5
				21.7%
A906 Waste Heat Recovery		2	3	5
				21.7%
A907 Change Thermostat Settings		4	6	10
				43.5%
A908 Reduce Ventilation		4	2	6
				26.1%
A909 Reschedule Equipment Usage		7	3	10
				43.5%
A910 Modify Air Conditioning System		6	3	9
				39.1%
A911 Reduce Excess Lighting		8	6	14
				60.9%
A912 Replace Old Equipment with New Energy Efficient Equipment		4	3	7
				30.4%
	COLUMN TOTAL	12	11	23
		52.2%	47.8%	100.0%

TABLE 42 (Continued)

A9	COUNT	C15 Hospitals 1	Schools 2	ROW TOTAL
A913 Improve Steam Pipe Insulation		3	1	4 17.4%
A914 None As Yet		1	0	1 4.3%
A916 Other		0	2	2 8.7%
	COLUMN TOTAL	12 52.2%	11 47.8%	23 100.0%

Percents and totals based on respondents.

23 Valid cases. 80 Missing cases.

[1]Cross Tabulation, Question A9 by Quesstion 15.

TABLE 43

PERCENT OF IMPLEMENTATION FOR ECO'S PER FOOD SERVICE FACILITY

Facility Number	Number of ECO's Recommended	Number of ECO's Implemented	Percent Implementation
1	9	8	89
2	6	5	83
3	4	4	100
4	11	11	100
5	6	4	67
6	5	3	60
7	2	0	0
8	6	2	33
9	3	2	66
10	1	1	100
11	3	1	33
12	2	1	50
13	4	4	100
14	9	7	78
15	6	5	83
16	3	2	66
17	6	6	100
18	6	6	100
19	12	12	100
20	13	1	62
21	2	8	50
22	7	3	43
23	5	4	80
24	6	2	33

Note: 69.8% Average ECO Implementation Rate.

TABLE 44

BARRIER TO IMPLEMENTATION OF ECO'S: COST OF EQUIPMENT[1]

A1001	Q15 COUNT / ROW PCT / COL PCT / TOT PCT	Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		2	4	6
		33.3	66.7	31.6%
		20.0	44.4	
		10.5	21.1	
1. First Priority		7	4	11
		63.6	36.4	57.9%
		70.0	44.4	
		36.8	21.1	
2. Second Priority		1	1	2
		50.0	50.0	10.5%
		10.0	11.1	
		5.3	5.3	
COLUMN TOTAL		10	9	19
		52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1001 by Question 15.

TABLE 45

BARRIER TO IMPLEMENTATION OF ECO'S: PAYBACK PERIOD TOO LONG[1]

A1002	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	5 45.5 50.0 26.3	6 54.5 66.7 31.6	11 57.9%
1. First Priority	1 50.0 10.0 5.3	1 50.0 11.1 5.3	2 10.5%
2. Second Priority	3 100.0 30.0 15.8	0 0.0 0.0 0.0	3 15.8%
4. Fourth Priority	0 0.0 0.0 0.0	1 100.0 11.1 5.3	1 5.3%
5. Fifth Priority	1 50.0 10.0 5.3	1 50.0 11.1 5.3	2 10.5%
COLUMN TOTAL	10 52.6%	9 47.4%	19 100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1002 by Question 15.

TABLE 46

BARRIER TO IMPLEMENTATION OF ECO'S: PRODUCTION SCHEDULE INTERRUPTED[1]

A1003	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	5	4	9
	55.6	44.4	47.4%
	50.0	44.4	
	26.3	21.1	
1. First Priority	1	2	3
	33.3	66.7	15.8%
	10.0	22.2	
	5.3	10.5	
3. Third Prioity	2	1	3
	66.7	33.3	15.8%
	20.0	11.1	
	10.5	5.3	
4. Fourth Priority	1	2	3
	33.3	66.7	15.8%
	10.0	22.2	
	5.3	10.5	
5. Fifth Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1003 by Question 15.

TABLE 47

BARRIER TO IMPLEMENTATION OF ECO'S: REQUIRES FACILITY SHUTDOWN[1]

A1004	COUNT / ROW PCT / COL PCT / TOT PCT	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		8	6	14
		57.1	42.9	73.7%
		80.0	66.7	
		42.1	31.6	
2. Second Priority		1	1	2
		50.0	50.0	10.5%
		10.0	11.1	
		5.3	5.3	
3. Third Priority		0	1	1
		0.0	100.0	5.3%
		0.0	11.1	
		0.0	5.3	
4. Fourth Priority		1	0	1
		100.0	0.0	5.3%
		10.0	0.0	
		5.3	0.0	
5. Fifth Priority		0	1	1
		0.0	100.0	5.3%
		0.0	11.1	
		0.0	5.3	
COLUMN TOTAL		10	9	19
		52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1004 and Question 15.

TABLE 48

BARRIER TO IMPLEMENTATION OF ECO'S: GOVERNMENT REGULATIONS[1]

A1005	Q15 COUNT / ROW PCT / COL PCT / TOT PCT	Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		6	8	14
	ROW PCT	42.9	57.1	73.7%
	COL PCT	60.0	88.9	
	TOT PCT	31.6	42.1	
2. Second Priority		2	0	2
	ROW PCT	100.0	0.0	10.5%
	COL PCT	20.0	0.0	
	TOT PCT	10.5	0.0	
3. Third Priority		1	0	1
	ROW PCT	100.0	0.0	5.3%
	COL PCT	10.0	0.0	
	TOT PCT	5.3	0.0	
4. Fourth Priority		0	1	1
	ROW PCT	0.0	100.0	5.3%
	COL PCT	0.0	11.1	
	TOT PCT	0.0	5.3	
5. Fifth Priority		1	0	1
	ROW PCT	100.0	0.0	5.3%
	COL PCT	10.0	0.0	
	TOT PCT	5.3	0.0	
COLUMN TOTAL		10	9	19
		52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question 1004 by Question 15.

TABLE 49

BARRIER TO IMPLEMENTATION OF ECO'S: STATE REGULATIONS[1]

A1006	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	7	8	15
	46.7	53.3	78.9%
	70.0	88.9	
	36.8	42.1	
2. Second Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
3. Third Priority	2	1	3
	66.7	33.3	15.8%
	20.0	11.1	
	10.5	5.3	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1006 by Question 15.

TABLE 50

BARRIER TO IMPLEMENTATION OF ECO'S: LOCAL REGULATIONS[1]

A1007	Q15 Hospitals 1.I	Schools 2.I	ROW TOTAL
0. No Priority	9	8	17
	52.9	47.1	89.5%
	90.0	88.9	
	47.4	42.1	
4. Fourth Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
5. Fifth Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1007 by Question 15.

TABLE 51

BARRIER TO IMPLEMENTATION OF ECO'S: RISK OF NEW TECHNOLOGY[1]

A1008	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	9	7	16
	56.3	43.8	84.2%
	90.0	77.8	
	47.4	36.8	
2. Second Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
4. Fourth Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
5. Fifth Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question 1008 by Question 15.

TABLE 52

BARRIER TO IMPLEMENTATION OF ECO'S: NEED SECOND OPINION OF RECOMMENDATION[1]

A1009	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	4	6	10
	40.0	60.0	52.6%
	40.0	66.7	
	21.1	31.6	
1. First Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
2. Second Priority	2	0	2
	100.0	0.0	10.5%
	20.0	0.0	
	10.5	0.0	
3. Third Priority	1	0	1
	100.0	0.0	5.3%
	10.0	0.0	
	5.3	0.0	
4. Fourth Priority	2	2	4
	50.0	50.0	21.1%
	20.0	22.2	
	10.5	10.5	
5. Fifth Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question 1009 by Question 15.

TABLE 53

BARRIER TO IMPLEMENTATION OF ECO'S: EXPENSE OF BORROWING MONEY[1]

A1010		Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	COUNT	5	5	10
	ROW PCT	50.0	50.0	52.6%
	COL PCT	50.0	55.6	
	TOT PCT	26.3	26.3	
1. First Priority	COUNT	2	1	3
	ROW PCT	66.7	33.3	15.8%
	COL PCT	20.0	11.1	
	TOT PCT	10.5	5.3	
2. Second Priority	COUNT	0	1	1
	ROW PCT	0.0	100.0	5.3%
	COL PCT	0.0	11.1	
	TOT PCT	0.0	5.3	
3. Third Priority	COUNT	1	2	3
	ROW PCT	33.3	66.7	15.8%
	COL PCT	10.0	22.2	
	TOT PCT	5.3	10.5	
5. Fifth Priority	COUNT	2	0	2
	ROW PCT	100.0	0.0	10.5%
	COL PCT	20.0	0.0	
	TOT PCT	10.5	0.0	
COLUMN TOTAL		10	9	19
		52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1010 by Question 15.

TABLE 54

BARRIER TO IMPLEMENTATION OF ECO'S: MANAGEMENT NOT INTERESTED[1]

A1011	COUNT / ROW PCT / COL PCT / TOT PCT	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		8	7	15
		53.3	46.7	78.9%
		80.0	77.8	
		42.1	36.8	
4. Fourth Priority		1	1	2
		50.0	50.0	10.5%
		10.0	11.1	
		5.3	5.3	
5. Fifth Priority		1	1	2
		50.0	50.0	10.5%
		10.0	11.1	
		5.3	5.3	
COLUMN TOTAL		10	9	19
		52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1011 by Question 15.

TABLE 55

BARRIER TO IMPLEMENTATION OF ECO'S: LACK OF MANPOWER TO DO WORK

A1012	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	8	7	15
	53.3	46.7	78.9%
	80.0	77.8	
	42.1	36.8	
2. Second Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
3. Third Priority	0	1	1
	0.0	100.0	5.3%
	0.0	11.1	
	0.0	5.3	
4. Fourth Priority	2	0	2
	100.0	0.0	10.5%
	20.0	0.0	
	10.5	0.0	
COLUMN TOTAL	10	9	19
	52.6%	47.4%	100.0%

Number of missing observations = 84.

[1]Cross Tabulation, Question A1012 by Question 15.

TABLE 56

PERCENT OF FOOD SERVICE FACILITIES WITH AN IN-HOUSE PERSON RESPONSIBLE FOR ENERGY CONSERVATION[1]

Q7		Q15 Hospitals 1.	Schools 2.	ROW TOTAL
	0.	18	9	27
No		66.7	33.3	27.6%
		25.4	33.3	
		18.4	9.2	
	1.	46	18	64
Yes		71.9	28.1	65.3%
		64.8	66.7	
		46.9	18.4	
	9.	7	0	7
Don't Know		100.0	0.0	7.1%
		9.9	0.0	
		7.1	0.0	
COLUMN TOTAL		71	27	98
		72.4%	27.6%	100.0%

Number of missing observations = 5.

[1]Cross Tabulation, Question 7 by Question 15.

TABLE 57

IN-HOUSE PERSON RESPONSIBLE FOR ENERGY CONSERVATION[1]

Q7A	Q15 Hospitals (1)	Schools (2)	ROW TOTAL
Q7A1 Engineer	29	5	34
			54.0%
Q7A2 Food Service Director	3	4	7
			11.1%
Q7A3 Chief Dietitian	1	1	2
			3.2%
Q7A4 Maintenance Staff	17	8	25
			39.7%
Q7A5 Food Service Supervisor	0	2	2
			3.2%
Q7A7 Other	3	2	5
			7.9%
COLUMN TOTAL	46	17	63
	73.0%	27.0%	100.0%

Percents and totals based on respondents.

63 Valid cases. 1 Missing case.

[1]Cross Tabulation, Question 7A by Question 15.

TABLE 58

PERCENT OF PERSONS RESPONSIBLE FOR ENERGY CONSERVATION WHO HAVE STARTED AN ENERGY CONSERVATION PROGRAM[1]

Q7B		Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No	COUNT	2	2	4
	ROW PCT	50.0	50.0	6.5%
	COL PCT	4.5	11.1	
	TOT PCT	3.2	3.2	
1. Yes	COUNT	34	15	49
	ROW PCT	69.4	30.6	79.0%
	COL PCT	77.3	83.3	
	TOT PCT	54.8	24.2	
9. Don't Know	COUNT	8	1	9
	ROW PCT	88.9	11.1	14.5%
	COL PCT	18.2	5.6	
	TOT PCT	12.9	1.6	
COLUMN TOTAL		44	18	62
		71.0%	29.0%	100.0%

Number of missing observations = 2.

[1]Cross Tabulation, Question 7B by Question 15.

APPENDIX E

FACILITIES NOT AUDITED

TABLE 59

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: NO ONE ON THE STAFF QUALIFIED TO DO AN ENERGY AUDIT[1]

B11	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	41 80.4 69.5 55.4	10 19.6 66.7 13.5	51 68.9%
1. First Priority	12 75.0 20.3 16.2	4 25.0 26.7 5.4	16 21.6%
2. Second Priority	5 83.3 8.5 6.8	1 16.7 6.7 1.4	6 8.1%
3. Third Priority	1 100.0 1.7 1.4	0 0.0 0.0 0.0	1 1.4%
COLUMN TOTAL	59 79.7%	15 20.3%	74 100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B11 by Question 15.

TABLE 60

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: BELIEVE THAT FACILITY IS ENERGY EFFICIENT[1]

B12	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Prioirty	51	15	66
	77.3	22.7	89.2%
	86.4	100.0	
	68.9	20.3	
1. First Priority	4	0	4
	100.0	0.0	5.4%
	6.8	0.0	
	5.4	0.0	
2. Second Priority	2	0	2
	100.0	0.0	2.7%
	3.4	0.0	
	2.7	0.0	
4. Fourth Priority	1	0	1
	100.0	0.0	1.4%
	1.7	0.0	
	1.4	0.0	
6. Sixth Priority	1	0	1
	100.0	0.0	1.4%
	1.7	0.0	
	1.4	0.0	
COLUMN TOTAL	59	15	74
	79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B12 by Question 15.

TABLE 61

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: TOO EXPENSIVE TO HIRE AN ENERGY CONSULTANT[1]

B13	COUNT / ROW PCT / COL PCT / TOT PCT	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		50	14	64
		78.1	21.9	86.5%
		84.7	93.3	
		67.6	18.9	
1. First Priority		4	1	5
		80.0	20.0	6.8%
		6.8	6.7	
		5.4	1.4	
2. Second Priority		3	0	3
		100.0	0.0	4.1%
		5.1	0.0	
		4.1	0.0	
3. Third Priority		1	0	1
		100.0	0.0	1.4%
		1.7	0.0	
		1.4	0.0	
5. Fifth Priority		1	0	1
		100.0	0.0	1.4%
		1.7	0.0	
		1.4	0.0	
COLUMN TOTAL		59	15	74
		79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B13 by Question 15.

TABLE 62

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: NOT FAMILIAR WITH AN ENERGY AUDIT[1]

B14		C15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	COUNT	39	11	50
	ROW PCT	78.0	22.0	67.6%
	COL PCT	66.1	73.3	
	TOT PCT	52.7	14.9	
1. First Priority	COUNT	14	3	17
	ROW PCT	82.4	17.6	23.0%
	COL PCT	23.7	20.0	
	TOT PCT	18.9	4.1	
2. Second Priority	COUNT	2	1	3
	ROW PCT	66.7	33.3	4.1%
	COL PCT	3.4	6.7	
	TOT PCT	2.7	1.4	
3. Third Priority	COUNT	4	0	4
	ROW PCT	100.0	0.0	5.4%
	COL PCT	6.8	0.0	
	TOT PCT	5.4	0.0	
COLUMN TOTAL		59	15	74
		79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B14 by Question 15.

TABLE 63

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: DO NOT KNOW OF A QUALIFIED PERSON OR FIRM TO CONDUCT AN ENERGY AUDIT[1]

B15	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	50	15	65
	76.9	23.1	87.8%
	84.7	100.0	
	67.6	20.3	
1. First Priority	2	0	2
	100.0	0.0	2.7%
	3.4	0.0	
	2.7	0.0	
2. Second Priority	3	0	3
	100.0	0.0	4.1%
	5.1	0.0	
	4.1	0.0	
3. Third Priority	3	0	3
	100.0	0.0	4.1%
	5.1	0.0	
	4.1	0.0	
4. Fourth Priority	1	0	1
	100.0	0.0	1.4%
	1.7	0.0	
	1.4	0.0	
COLUMN TOTAL	59	15	74
	79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B15 by Question 15.

TABLE 64

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: ENERGY COSTS ARE A SMALL FRACTION OF TOTAL OPERATING COSTS[1]

B16	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	52	15	67
	77.6	22.4	90.5%
	88.1	100.0	
	70.3	20.3	
1. First Priority	3	0	3
	100.0	0.0	4.1%
	5.1	0.0	
	4.1	0.0	
2. Second Priority	3	0	3
	100.0	0.0	4.1%
	5.1	0.0	
	4.1	0.0	
4. Fourth Priority	1	0	1
	100.0	0.0	1.4%
	1.7	0.0	
	1.4	0.0	
COLUMN TOTAL	59	15	74
	79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B16 by Question 15.

TABLE 65

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: FACILITY COULD NOT MAKE ENERGY CONSERVATION CHANGES WITHOUT ADVERSELY AFFECTING PRODUCTION OR PROFITS[1]

B17	Q15 COUNT / ROW PCT / COL PCT / TOT PCT	Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority		54	14	68
		79.4	20.6	91.9%
		91.5	93.3	
		72.0	18.9	
1. First Priority		2	0	2
		100.0	0.0	2.7%
		3.4	0.0	
		2.7	0.0	
2. Second Priority		1	0	1
		100.0	0.0	1.4%
		1.7	0.0	
		1.4	0.0	
3. Third Priority		1	1	2
		50.0	50.0	2.7%
		1.7	6.7	
		1.4	1.4	
7. Seventh Priority		1	0	1
		100.0	0.0	1.4%
		1.7	0.0	
		1.4	0.0	
COLUMN TOTAL		59	15	74
		79.7%	20.3%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B17 by Question 15.

TABLE 66

REASON FOR NOT HAVING AN ENERGY AUDIT CONDUCTED: OTHER[1]

B19		Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No Priority	COUNT	48	8	56
	ROW PCT	85.7	14.3	75.7%
	COL PCT	81.4	53.3	
	TOT PCT	64.9	10.8	
1. First Priority	COUNT	11	7	18
	ROW PCT	61.1	38.9	24.3%
	COL PCT	18.6	46.7	
	TOT PCT	14.9	9.5	
COLUMN TOTAL		59	15	74
		79.7%	20.3%	100.0%

Number of missing observations = 29.

Note: "Other" includes energy audit planned for the future.

[1]Cross Tabulation, Question B19 by Question 15.

TABLE 67

AMOUNT OF ANNUAL ENERGY BILL FACILITIES WILLING TO SPEND ON AN ENERGY AUDIT[1]

B2	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. None	5	1	6
	83.3	16.7	8.1%
	8.6	6.3	
	6.8	1.4	
2. 1-5%	9	3	12
	75.0	25.0	16.2%
	15.5	18.8	
	12.2	4.1	
3. 6-10%	3	2	5
	60.0	40.0	6.8%
	5.2	12.5	
	4.1	2.7	
4. More Than 10%	0	1	1
	0.0	100.0	1.4%
	0.0	6.3	
	0.0	1.4	
5. Other	2	1	3
	66.7	33.3	4.1%
	3.4	6.3	
	2.7	1.4	
9. Don't Know	39	8	47
	83.0	17.0	63.5%
	67.2	50.0	
	52.7	10.8	
COLUMN TOTAL	58	16	74
	78.4%	21.6%	100.0%

Number of missing observations = 29.

[1]Cross Tabulation, Question B2 by Question 15.

TABLE 68

ORGANIZATIONS OR PEOPLE REQUESTED BY FOOD SERVICE FACILITY FOR ENERGY CONSERVATION ASSISTANCE[1]

B3	C15 Hospitals (1)	Schools (2)	ROW TOTAL
B31 Government Agencies (local,state,federal)	8	1	9 12.9%
B32 Utility Company	4	3	7 10.0%
B33 Energy Audit Firm	2	0	2 2.9%
B34 Engineer	10	4	14 20.0%
B35 University or College	0	5	5 7.1%
B37 Dont' Know	13	0	13 18.6%
B38 Other	4	3	7 10.0%
B39 Have Not Requested Assistance from any of These	23	5	28 40.0%
COLUMN TOTAL	55 78.6%	15 21.4%	70 100.0%

Percents and totals based on respondents.

70 Valid cases. 33 Missing cases.

[1]Cross Tabulation, Question B3 by Question 15.

TABLE 69

TYPES OF ASSISTANCE OFFERED BY OUTSIDE GROUPS[1]

B4B	C15 Hospitals 1	Schools 2	ROW TOTAL
B4B1 Conservation Information and Pamphlets	4	1	5 41.7%
B4B2 Energy Auditing Services	5	1	6 50.0%
B4B3 Conservation Training for Employees	3	0	3 25.0%
B4B5 Other	3	1	4 33.3%
COLUMN TOTAL	10 83.3%	2 16.7%	12 100.0%

Percents and totals based on respondents.

12 Valid cases. 0 Missing cases.

[1]Cross Tabulation, Question B4B by Question 15.

TABLE 70

GROUPS OFFERING ENERGY ASSISTANCE TO FOOD SERVICE FACILITIES[1]

B4A	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
1. Utility Company	2	0	2
	100.0	0.0	16.7%
	20.0	0.0	
	16.7	0.0	
3. State Government Agency	4	0	4
	100.0	0.0	33.3%
	40.0	0.0	
	33.3	0.0	
4. Federal Government Agency	4	0	4
	100.0	0.0	33.3%
	40.0	0.0	
	33.3	0.0	
5. University or College	0	2	2
	0.0	100.0	16.7%
	0.0	100.0	
	0.0	16.7	
COLUMN TOTAL	10	2	12
	83.3%	16.7%	100.0%

[1]Cross Tabulation, Question B4A by Question 15.

TABLE 71

PERCENT OF OUTSIDE GROUPS OFFERING ENERGY ASSISTANCE TO FOOD SERVICE FACILITIES

B4	C15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No	26	9	35
	74.3	25.7	47.9%
	44.8	60.0	
	35.6	12.3	
1. Yes	10	2	12
	83.3	16.7	16.4%
	17.2	13.3	
	13.7	2.7	
9. Don't Know	22	4	26
	84.6	15.4	35.6%
	37.9	26.7	
	30.1	5.5	
COLUMN TOTAL	58	15	73
	79.5%	20.5%	100.0%

Number of missing observations = 30.

[1]Cross Tabulation, Question B4 by Question 15.

TABLE 72

PERCENT OF FOOD SERVICE FACILITIES ACCEPTING ASSISTANCE FROM OUTSIDE GROUPS[1]

B4C	C15 Hospitals (1.)	Schools (2.)	ROW TOTAL
0. No	3	0	3
	100.0	0.0	25.0%
	30.0	0.0	
	25.0	0.0	
1. Yes	7	2	9
	77.8	22.2	75.0%
	70.0	100.0	
	58.3	16.7	
COLUMN TOTAL	10	2	12
	83.3%	16.7%	100.0%

[1]Cross Tabulation, Question B4C by Question 15.

TABLE 73

PERCENT OF FOOD SERVICE FACILITIES WHICH ARE MEMBERS OF A TRADE OR INDUSTRY ASSOCIATION[1]

Q6	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No	27	11	38
	71.1	28.9	40.4%
	40.3	40.7	
	28.7	11.7	
1. Yes	24	12	36
	66.7	33.3	38.3%
	35.8	44.4	
	25.5	12.8	
9. Don't Know	16	4	20
	80.0	20.0	21.3%
	23.9	14.8	
	17.0	4.3	
COLUMN TOTAL	67	27	94
	71.3%	28.7%	100.0%

Number of missing observations = 9.

[1]Cross Tabulation, Question 6 by Question 15.

TABLE 74

PERCENT OF FOOD SERVICE FACILITIES WORKING WITH TRADE OR INDUSTRY ASSOCIATIONS IN VOLUNTARY ENERGY CONSERVATION EFFORTS[1]

Q6A	Q15 Hospitals 1.	Schools 2.	ROW TOTAL
0. No	4	6	10
	40.0	60.0	30.3%
	17.4	60.0	
	12.1	18.2	
1. Yes	13	3	16
	81.3	18.8	48.5%
	56.5	30.0	
	39.4	9.1	
9. Don't Know	6	1	7
	85.7	14.3	21.2%
	26.1	10.0	
	18.2	3.0	
COLUMN TOTAL	23	10	33
	69.7%	30.3%	100.0%

Number of missing observations = 3.

[1]Cross Tabulation, Question 6A by Question 15.

TABLE 75

VOLUNTARY ENERGY CONSERVATION EFFORTS INITIATED BY FOOD SERVICE FACILITIES AND TRADE/INDUSTRY ASSOCIATIONS[1]

Q6B		Q15 Hospitals 1	Schools 2	ROW TOTAL
Q6B1 Filing Reports	COUNT	9	2	11
	ROW PCT			55.0%
Q6B2 Attending Meetings	COUNT	11	3	14
	ROW PCT			70.0%
Q6B3 Monitoring Energy Use	COUNT	11	2	13
	ROW PCT			65.0%
Q6B4 Don't Know	COUNT	1	1	2
	ROW PCT			10.0%
COLUMN TOTAL	COUNT	15	5	20
	COL PCT	75.0%	25.0%	100.0%

Percents and totals based on respondents.

20 Valid cases. 16 Missing cases.

[1]Cross Tabulation, Question 6B by Question 15.

TABLE 76

SOURCES OF INFORMATION FACILITIES USE TO COPE WITH ENERGY PROBLEMS[1]

Q8	COUNT / Q15	Hospitals 1	Schools 2	ROW TOTAL
Talking with Co-Workers	Q801	25	13	38
				40.9%
Special Energy Related Committees	Q802	13	4	17
				18.3%
Government Speakers	Q803	4	0	4
				4.3%
Special Energy Related Meetings	Q804	26	6	32
				34.4%
Training Sessions	Q805	21	8	29
				31.2%
Mass Media	Q806	4	8	12
				12.9%
Talking with Others Outside Work	Q807	16	7	23
				24.7%
Industry or Trade Assoc. Journals	Q808	35	13	48
				51.6%
Don't Know	Q809	8	2	10
				10.8%
Other	Q810	2	4	6
				6.5%
	COLUMN TOTAL	66	27	93
		71.0%	29.0%	100.0%

Percents and totals based on respondents.

93 Valid cases. 10 Missing cases.

[1]Cross Tabulation, Question 8 by Question 15.

VITA

Dorothy Susan Mitchell was born in Morristown, Tennessee, on August 22, 1955. After graduation from West High School in Knoxville, Tennessee, she attended the University of Tennessee where she received her Bachelor of Science degree in Home Economics as a student in the Coordinated Undergraduate Program in Dietetics in 1977. During her undergraduate studies, she did her dietetic clinical experience at Park West Hospital in Knoxville. As a recipient of a Traineeship in Food Systems Administration from the National Institute of Health, she pursued a Master of Science and was granted the degree in Food Systems Administration from the University of Tennessee in August 1978.

She continued her education at the University of Tennessee to complete the Ph.D. degree. During this period she has been employed as a registered dietitian and consultant in various hospitals and nursing homes. These facilities include Park West Hospital in Knoxville; Care Inn, Loudon, Tennessee; and Lake Community Hospital in Leesburg, Florida. She has been employed as a graduate assistant for the University of Tennessee Food Services, and as a graduate research assistant for the Energy Analysis and Diagnostic Center, Department of Engineering Science and Mechanics in the College of Engineering at the University of Tennessee. In addition, she was a graduate teaching assistant for the University of Tennessee Nutrition and Food Sciences Department in the College of Home Economics.

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