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ABSTRACT

This report analyzes a 1981 survey of public school districts receiving energy conservation measure (ECM) grants under the National Energy Conservation Policy Act, Title III, Cycle 1. The report contains charts of data, analyses of projects, and sections presenting study design, data treatment, findings, and conclusions. The survey's purpose was to ascertain how ECM installations were progressing just over one year from award, identify types of measures most frequently funded, what paybacks were for various measures, and whether energy savings were meeting expectations. From a total of 724 districts awarded grants, a stratified random sample of 405 was drawn, concluding with a response rate of 43.2 percent. In addition to completion, ECM, and payback information, respondents were asked to supply premodification consumption data for January-March 1980 and postmodification data for January-March 1981, if their project was 60 percent complete. Inferences about recipients include the following: (1) cycle 1 conservation measures are reducing energy consumption 20.7 percent; (2) actual energy savings suggest a payback of 4.832 years; (3) average completion was 83 percent; and (4) completion was not related to project costs, grant size, or projected payback. Findings suggest that installing energy conservation measures is more cost effective than originally projected. (CJH)

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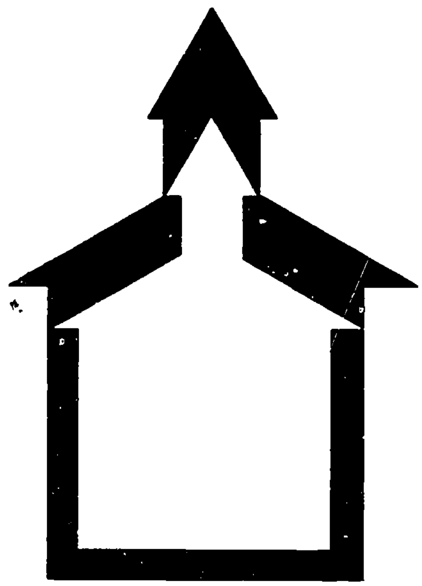
SCHOOL ENERGY MANAGEMENT:

AN ANALYSIS OF ENERGY CONSERVATION MEASURES UNDER THE SCHOOLS AND HOSPITALS PROGRAM

Prepared by
Shirley Hansen Associates, Inc.

for the
AMERICAN ASSOCIATION OF SCHOOL ADMINISTRATORS



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PREFACE

What can a school district do to reduce energy consumption? What things have been tried and proven? What energy conserving measures seem to be most cost effective? How good are engineers or engineer/architect teams in projecting energy savings? How reliable is an estimation of payback, or return on investment? What kinds of measures are being funded by the federal government under the Schools and Hospitals Grants Program (National Energy Conservation Policy Act, Title III)? Is that program working to the benefit of education? As energy costs continue to climb and revenues drop, these kinds of questions become more prevalent and pervasive in school administrators' minds.

Since 1975, the American Association of School Administrators (AASA) has taken a leadership role in helping educators meet their energy needs. Recognizing the need to place before school administrators answers to such questions, AASA secured a grant from the Department of Energy (DOE) to identify and compile information from the field that would benefit other educators as they seek to reduce energy consumption. The survey upon which this report is based was done within the context of the Schools and Hospitals Program in order that the program as well as broader energy conservation needs might be analyzed.

The following report describes the types of energy conservation measures funded under the Schools and Hospitals Program Cycle 1, installation progress, the auditors' projected paybacks and the actual results. Site conditions vary and cited results should not be construed to indicate that the measures as presented can necessarily be installed in other buildings for the costs given nor that they shall necessarily achieve the same results. Rather, the report affords a backdrop of experience against which school people can weigh local considerations. The findings and analyses are presented here by AASA in the hope that it may continue to assist administrators and associated technical personnel in conserving the nation's energy resources as well as perserving the schools' limited revenue for educational purposes.

SHIRLEY J. HANSEN, PRESIDENT
SHIRLEY HANSEN ASSOCIATES, INC.
ENERGY ADVISOR TO AASA

SCHOOL ENERGY MANAGEMENT:

An Analysis of Energy Conservation Measures

under the Schools and Hospitals Program

EXECUTIVE SUMMARY

A survey of the public school districts receiving energy conservation measure (ECM) grants under the National Energy Conservation Policy Act, Title III, Cycle 1 was conducted by the American Association of School Administrators (AASA) in the summer of 1981. The purpose of the survey was to ascertain how ECM installations were progressing just over one year from award, identify the types of energy conservation measures most frequently funded, what paybacks were for the various measures, and whether energy savings were meeting expectations.

A total of 724 public school districts were awarded ECM grants in Cycle 1. A stratified random sample of 405 was drawn from this population. From that number, 175 usable responses were received for a 43.2 percent response rate. In addition to completion, ECM and payback information, the respondents were asked to supply pre-modification consumption baseline data for January through March, 1980 a[illegible]st-modification data, January through March, 1981 if their project was at leas[illegible] percent complete.

To the extent that the sample represents the population, the following inferences for all public school ECM grant recipients in Cycle 1 can be made:

1. Cycle 1 energy conservation measures are reducing energy consumption 20.7 percent. Reported energy savings for installed ECMs are 29 percent higher than expected based on projected paybacks. These higher than anticipated savings were obtained before the projects were all completed and without the benefits of increased energy efficiency in airconditioning anticipated by 22.9 percent of the respondents.

2. The average projected payback for those reporting consumption data was 6.248 years. The actual energy savings suggest a payback of 4.832 years. These projections indicate that analysts tend to be conservative. Over half the analysts for those reporting consumption data were within a plus/minus 10 percentage points of their predictions. Seventy-six percent were between a plus/minus 20 percentage points of projected returns. Beyond the 20 percent expectation level, twice as many analysts underestimated savings as those who overestimated it. (See Figure 7, page 30.)

3. After slightly more than a year from award, the average completion was 83 percent. Fifty-seven were completely done and 71 percent were more than three quarters done. Nine percent had not started. (See Figure 2, page 10.)

4. Project completion did not appear to be related to project costs, grant size, or projected payback. There did appear to be a relationship between completion rate and the types of ECMs funded. Lighting and Insulation exceeded the mean percentage completion; Doors and windows were close to the mean; all others were significantly lower. (See Figure 4, page 13.)

5. The most frequently funded ECM category was Controls, followed by Burners/boilers/AC/distribution; Doors and windows; Lighting; and Insulation in that order. (See Figure 3, page 12.)

6. By category the lowest average payback was for Domestic hot water and plumbing (3.68), then Controls (4.36) and Burner/boilers, etc. (4.38). The highest average payback was for the Doors and windows work (8.18), then Insulation (7.08). Lighting (relamping and fixture changes) fell in the middle (5.64). Average payback for sample was 5.82 years. (See Table 4, page 14.)

7. There was no apparent relationship between the frequency of funding certain types of ECMs and their length of payback.

8. Twenty-eight respondents, or 16 percent, received grants for single energy conservation measures. In ECM combinations the Controls category was most often paired with work in all other categories. (See Tables 5 and 6, pages 16 and 17.)

9. At the time of the survey, 53 of the 175 respondents had reached a sufficient level of completion and had been able to amass the requested consumption data.

10. With average completion at 83 percent and only 30 percent prepared to provide consumption data, it is clear that the survey was conducted at the earliest possible time in the program. The Schools and Hospitals Program has been criticized for lack of evaluative information; however, it is evident that any earlier attempt to gather data relative to ECM effectiveness (a major portion of the program) would have indeed been premature.

11. The Federal investment for the 53 respondents reporting consumption data was $2.91 million. Over a 10 year ECM life, that investment will yield $11.124 million (1980 dollars), or a $3.89 local benefit per Federal dollar expended. With full completion and cooling benefits included in the calculations, the benefit at the local level could be $4 for every $1 of Federal assistance.

12. Cycle 1 energy savings will recover the ECM investments in 4.83 years (1980 dollars) and then redirect $16,270,000 (1980 dollars) to the classroom every year for the life of the ECMs. With a 10 year ECM life, $84,226,000 (1980 dollars) over and above the original investment will be made available; so schools might use it to help students learn and/or alleviate local tax payers' burdens.

The early evaluative data regarding the Schools and Hospitals Program from the AASA survey shows that the program is working very well. From the national perspective, it is saving more energy and is more cost-effective than expected. It is also demonstrably a very cost-effective endeavor for program participants.

> The findings suggest that installing energy conservation measures on the average is more cost-effective than originally projected and clearly evidence sound business investment practices. As energy costs to schools continue to escalate, these cost benefits will become even more attractive.

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SCHOOL ENERGY MANAGEMENT:
An Analysis of Energy Conservation Measures
under the Schools and Hospitals Program

The public schools of America felt the impact of climbing energy costs early ...and hard. Education was saddled with inefficient buildings and soaring energy costs; costs which only the schools could not pass along. School superintendents as early as 1975 identified energy as their number one priority.

Modifying the school plant to reduce consumption became imperative. The Schools and Hospitals Program (National Energy Conservation Policy Act, Title III, Parts 1 and 2) was designed to help the schools do just that.

BACKGROUND

The Federal Energy Administration survey in 1975 showed education's energy costs had risen nearly 50 percent in just two years. School people were alarmed as costs jumped from the 1973 figure of $20/pupil to $29/pupil in 1975. School administrators had not anticipated the impact of escalating costs on their budgets. Since school buildings were more inefficient than most, the impact per square foot hit education harder than other sectors. Approximately 60 percent of the school buildings in use had been built when energy was cheap and plentiful and space to house the post World War II baby boom children was especially critical. Since public schools had no way to "raise prices" and were locked into budgets determined by third party revenue decisions, these energy sieves in the 70's became a great energy and economic burden to education and the nation.

Responding to education's energy plight, Congress passed the Schools and Hospitals Program in 1978.

NECPA, Title III established cost sharing energy conservation grant programs for public and private non-profit schools, hospitals, buildings owned by units of local government and public care institutions, and energy conservation measure programs for schools and hospitals.

Since the initial legislation was introduced in Congress to serve just schools and as schools have been the primary beneficiaries under the program, it seems appropriate to take a careful look at how well the program is serving this particular constituency.

Except for schools owned by the government, the Federal government had never been in the school's brick and mortar business prior to the passage of NECPA. Suddenly the Department of Energy (DOE) was authorized to administer a $900 million matching grants program. There was no precedent for the Federal government serving the public schools in this fashion, and no precedent for DOE managing a grants program of such magnitude. It speaks well for the Department that in just five months from passage, it had a final rule published. Further, after working the states through their State Plans, DOE was able to have money in the streets within a year and a half. Still, whenever a new venture is started, people immediately wonder how effective it will be and whether it will be of any value to them. With the signing of NECPA, it was only natural that speculation as to how well the program would work and whether or not it would serve education's energy needs should arise.

Since the American Association of School Administrators (AASA) was instrumental in the passage of the act, the Association was interested in determining what effect the School and Hospitals Program was having on the school's ability to cope with its energy problems. More specifically, AASA sought to determine what kinds of energy conservation measures (ECM) were funded, if installations were progressing on schedule, what the average paybacks were for various types of ECMs, and whether or not the energy savings were meeting expectations.

Answers to such concerns would not only provide an early assessment of NECPA, Title III but would provide data of broader applicability extending beyond the actual program. AASA believed that an assessment of Cycle 1, a year after the awards had been made, would provide important grantee and federal and state program administrator feedback as well as guidance to potential grantees or school administrators interested in reducing energy consumption. AASA obtained a grant from the Department of Energy to conduct a survey of Cycle 1 public school ECM grant recipients and to seek answers to the above concerns. The following information is the result of that survey. AASA is solely responsible for the research methodology, the findings and the analysis of the survey results. The contents of this report do not necessarily reflect DOE's position regarding any matter related to the Schools and Hospitals Program.

DESIGN OF THE STUDY

The population under consideration were public school districts with elementary and/or secondary school buildings which were awarded energy conservation (ECM) grants in Cycle 1 (March, 1980) under the Schools and Hospitals Grants Program (National Energy Conservation Policy Act, Title III, P.L. 95-619, 92 Stat. 3238 (42 U.S.C. 6371)).

Sampling Frame

The sampling frame was two computer lists provided by the Department of Energy (DOE) displaying the Cycle 1 elementary and secondary ECM grant recipients. These lists were constructed in alpha order by State. The lists provided the grantees name, contract number, address, and the amount of Federal funds granted. Three hundred eighty public school districts were awarded grants for elementary schools and 344 districts were awarded grants for secondary schools. A total of 724 public school grantees constituted the sampled population. Grantees receiving less than $2,000 were deleted from the study in consideration for the respondent's paperwork relative to the size of the grant and the limited value of such data.

This represented 15 recipients in the elementary list and 12 in the secondary list, or a total of 3.9 percent of the population. The remaining grantees on the list were stratified by the size of the Federal share of the grant in order to assure an adequate representation by size of the award.

Sampling Procedures

Disproportionate sampling of the stratified elements was performed. All grants above $50,000 for elementary and $60,000 for secondary grantees were selected. From the remaining list, a systematic sample using a random start was drawn. Every other grantee, or one out of every two, was selected. Table 1 depicts the population and the sample by strata for elementary and secondary.

Table 1. Population and stratified sample; number and percentage by elementary and secondary grantees, Cycle 1 ECM recipients.

	Public Elementary		Public Secondary	
	Total	In Sample	Total	In Sample
Original Sample Frame	380		344	
Stratified by grant size:				
Less than $2,000	15	-0-	12	-0-
$2,000 - $49,999	307	153 (50%)		
$2,000 - $59,999			275	137 (50%)
$50,000 and up	58	58 (100%)		
$60,000 and up			57	57 (100%)
TOTAL IN SAMPLE:		211		194 = 405

A total sample of 405 grantees represented 55.9 percent of the total population. The 211 elementary sample represented 55.5 percent of the grantees, and the secondary sample of 194, 56.4 percent of that population.

Survey Procedures

Mailings. A data collection instrument was devised by AASA in consultation with the Educational Research Service and mailed to the selected sample with a cover letter in late May, 1981. A second mailing to non-respondents was sent in July, 1981.

Survey form. The questionnaire was constructed to: (1) verify the demographic data supplied by DOE; (2) identify the individual ECMs funded, their projected payback and whether or not the work had been completed; (3) the total project cost and payback; (4) whether or not the payback calculations included cooling; (5) the percentage of ECMs completed relative to the total package; and (6) if more than 60 percent of the total project had been completed, the respondent was asked to provide the pre-modification consumption figures for January-March, 1980 and the post-modification consumption figures for January-March, 1981.

Since some grantees received more than one grant in their district, the grant number and the amount of the Federal share were entered onto the form before mailing. Respondents were instructed to provide information for the designated grant only.

TREATMENT OF THE DATA

The survey forms were subjected to a visual scan as well as computer treatment. The visual scan was used to pick up any inconsistencies in data from a single source and to identify any unanticipated relationships or trends. The computer work was done by the Educational Research Service, Arlington, Virginia.

Responses in Relation to Sample

The responses were examined to be sure they were representative of the strata established in the study design. Table 2 displays the response by strata and by the total sample.

Table 2. Respondents by strata and by total sample.						
Strata	Under $50,000			Over $50,001		
	Sample Size	Response	of Sample %	Sample Size	Response	of Sample%
	290	120	41.4%	115	55	44.8%
TOTAL SAMPLE: 405		TOTAL RESPONSE: 175			TOTAL RATE: 43.2%	

Sampling frame. The visual scan of the responses revealed some sampling frame difficulties. One response revealed that the DOE listing was actually for a technical assistance grant; however, the respondent had received an ECM grant, supplied the necessary information for the ECM grant, and it was used. One grantee selected was the State of New Hampshire. This was appropriate to the DOE list as it received the grant as a coordinating agency; however, it was not deemed represetative of the the public school population under study and was deleted from further analytical consideration.

On the DOE computer printouts used for the sampling frame, the digit for the one hundred thousand place (100,000) was omitted; e.g., $197,000 was shown as $97,000 or $324,000 as $24,000. Ten respondents corrected this figure. Since the sample was stratified by the size of the grant, this error caused three of the elements of the sample to be stratified in the wrong strata; i.e., at less than $50,000 or $60,000 when they actually exceeded that amount. However, if the grant figures had been displayed accurately, they would have been selected anyway; so the error did not affect data treatment except to adjust the strata count.

The errors on the DOE printout may have, however, omitted some other grants over $50,000 or $60,000 that were shown at less than that amount and by random selection omitted.

Experience would suggest that at least 1.7 percent (3 divided by 175) could have inadvertently been omitted from the strata of larger grants. Without verifying the size of every grant, no correction was possible. The significance of the problem, however, lies in the disruption of the sampling frame. The opportunity to be selected could have been affected by the result of inappropriate stratification and resulting list placement. Because of this difficulty, any inferences drawn from the data presented should be treated with some caution.

Respondent Information

Information from the respondents varied in completeness and usability. Wherever appropriate, responses were clarified or confirmed by phone. In some instances certain pieces of data were not provided, were not available, or not requested. For example, consumption data were requested only from those districts that had completed at least 60 percent of the project. For these reasons, the _n_ varies with specific data. Whenever the _n_ was deemed to vary significantly from the total number of respondents, the _n_ is given in conjunction with the data. In this fashion all usable data has been presented and the reader may assess its significance.

Not included as respondents were two returned surveys with the note that they could not raise the match and four who indicated they decided not to be involved in the grant effort and hoped to accomplish the work on their own.

Conversion Factors

Consumption figures were requested in the form most accessible to the respondent; e.g., gallons, therms, KWH, Btus, etc. In order to gain a single measure of consumption, these units were converted to British thermal units (Btus) using the factors commonly used in the grant program for Cycle 1. They are given in Table 3.

Table 3. Conversion factors: units of fuel to Btus.		
Fuel	Unit	BTU Conversion Factor
Electricity	KWU(kilowatt hours)	11,600
Gas	mcf(thousand cu.ft.)	1,030,000
Oil (all grades)	gallons	144,190
Coal	ton	24,500,000

Disproportionate Weighting

Since the strata were sampled disproportionately, i.e., over $50,000 or $60,000 at 100 percent and below those figures at 50 percent, it was necessary to assign a weight equal to the inverse of their probability of selection for some calculation purposes.

Energy Conservation Measure Categories

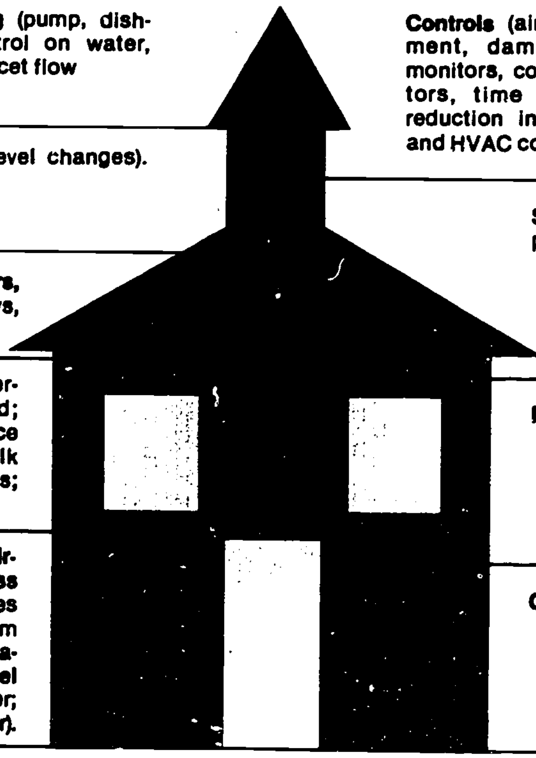
In order to put the description of ECMs in some manageable form for computer work, ECM categories were established as depicted in Figure 1.

For each cluster of ECMs; e.g., Controls, the frequency and the payback period were determined. The paybacks for each category were calculated by mean, median and range. The percentage of schools that calculated cooling in their payback was determined.

The categories for energy conservation measures were formed solely by the type of work to be done. The number of categories was predetermined by what the computer program could accomodate; however, ultimate category designations and their respective parameters were determined only after all respondent information had been subjected to a visual scan.

Figure 1

Energy Conservation Measure Categories



1. **Domestic hot water, plumbing** (pump, dishwasher booster, thermal control on water, water heater, shower heads, faucet flow metering).
2. **Lighting** (fixtures, relamping, level changes).
3. **Insulation of ceiling, roof, floors, walls** (*not* pipes ducts, windows, doors).
4. **Doors and windows** (weatherstripping, double/insulated; storm doors, vestibules; reduce number of windows, caulk windows, double pane glass; skylights).
5. **Burner / boiler / distribution / air-conditioning** (*not controls* unless part of a larger ECM; includes furnace, turbulation, steam trap work; boiler/pipe/duct insulation; changes in fuel source/fuel option; dual fuel; heat reclaimer; recirculate air; chillers; economizer).
6. **Controls** (air balancing, air handling equipment, dampers, thermostats, shedding, monitors, computers, night setbacks, capacitors, time clocks, adjusting ventilators, reduction in fresh air or outside air, ATC, and HVAC controls.)
7. **Solar** (pool, domestic hot water, panels for collection).
8. **Fans** (exhaust, reverse flow).
9. **Other** (paint, pool cover, etc.).

Consumption figures for January through March, 1980 were selected as a data base as the period followed the ECM deadline. It was, therefore, assumed that the energy conservation operations and maintenance (O&M) procedures identified in the energy audit or the technical assistance analysis had been implemented (a requirement for eligibility for ECM grants) and any O&M energy savings accruing were reflected in the 1980 data. The treatment of the data assumed that the few O&M measures deferred with "satisfactory justification" would have a negligible impact on the comparative data analysis.

Climate

Respondents were asked to provide information regarding the climate if significantly different during two comparable periods. Most of those answering this query indicated 1981 was slightly milder, but not sufficiently different to be a factor. The data were not adjusted to reflect any difference in climatic conditions.

FINDINGS

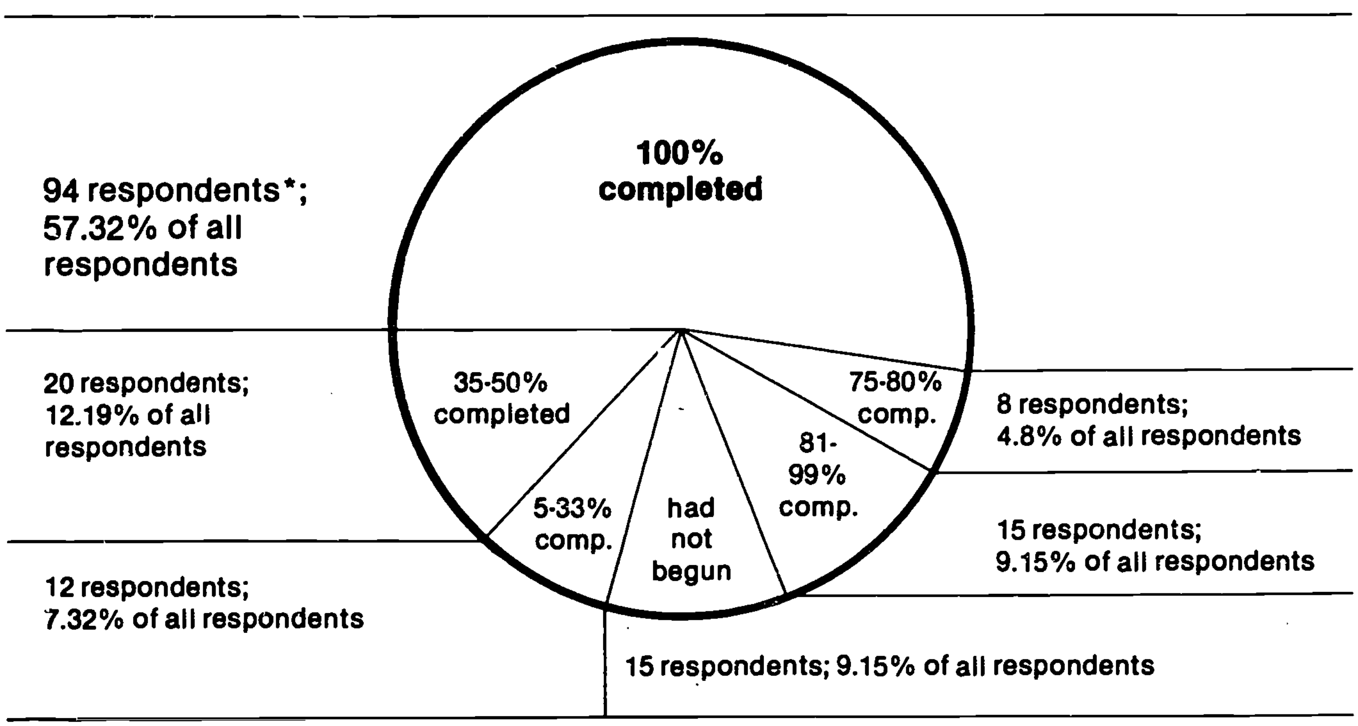
The findings presented here are from 175 respondents from a sample of 405 representing a population of 724 public school districts that received Cycle 1 energy conservation measure (ECM) grants for elementary or secondary school buildings. Where partial data from a subset of respondents are presented the n is given. From the survey responses, the extent of completion, the types of ECMs funded, their paybacks, the energy saved and the relationships between these data are presented.

Completion

The survey was conducted approximately one year after the grants were awarded and received. The degree of activity in the field and the extent of completion is one criterion of program effectiveness. One hundred sixty-four respondents reported an average completion of 83 percent. Figure 2 shows the range of completion with 9.15 percent having not started at the time they responded and 57.3 percent reporting one hundred percent completion.

Figure 2

PROGRESS REPORT
Frequency distribution for ranges of project completion; Cycle 1 ECM public school grantees (June - Aug. 1981)



* total number of respondents: 164

Neither size of the grant nor the payback period length seemed to be a factor in the level of completion. A visual scan of those who had not started does not show any commonality in the size of the grant as they range from about $11,000 to $235,000. This, of course, does not necessarily signify that finances were not a factor. Raising the match may be as difficult for one end of the continuum as the other. The time required for the mechanics of raising the match and complying with bid times may have had a greater effect than actual dollars involved. The reported projected paybacks ranged from 2.5 to 10.92 years for the non-starters. Similarly, an examination of the responses for those with one hundred percent completion does not reveal any pattern with respect to the size of the project cost or payback.

There seemed to be some relationship between the type of ECM and the completion stage. This relationship will be considered after the ECMs themselves have been reviewed.

Energy Conservation Measures (ECM)

The findings relative to the ECMs were grouped for computer processing purposes. The ECM categories were designated as follows:

1. Domestic hot water, plumbing
2. Lighting
3. Insulation
4. Doors and Windows
5. Burner/boiler/distribution/AC
6. Controls
7. Solar
8. Fans
9. Other

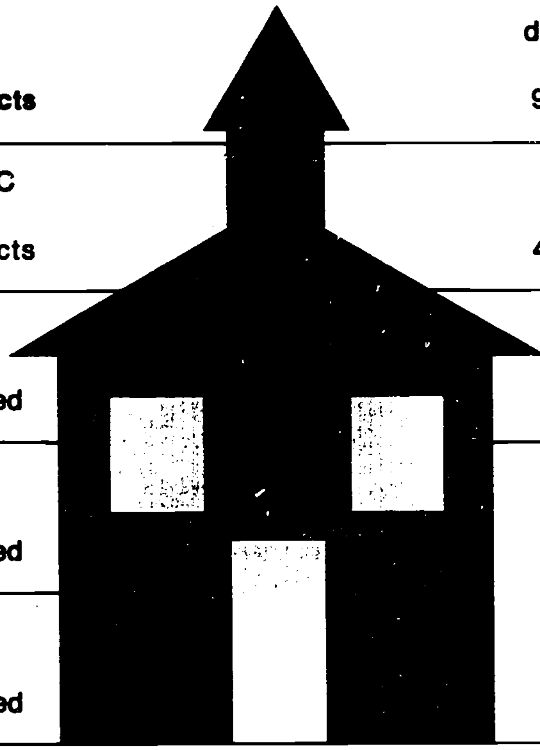
The individual types of ECMs included in each of the above catagories are detailed in the Design of Study section, Figure 1.

The frequency with which the various ECM categories in the sample were funded in Cycle 1 is shown in Figure 3 in order of frequency from the top left.

From Figure 3 it can be seen that Control ECMs were most frequently funded. The next four ECM categories followed closely. There was a real drop in frequency for the remaining ECMs displayed on the right of the schoolhouse in Figure 3.

Figure 3

ECM Categories
Funded Projects by Percentage*



controls
95 projects funded
54.3% of all funded projects

burner/boiler/distribution/AC
82 projects funded
46.9% of all funded projects

doors & windows
81 projects funded
46.3% of all projects funded

lighting
79 projects funded
45.1% of all projects funded

insulation
73 projects funded
41.7% of all projects funded

domestic hot water, plumbing
16 projects funded
9.1% of all projects funded

solar
7 projects funded
4.0% of all projects funded

fans
6 projects funded
3.4% of all projects funded

other
2 projects funded
1.1% of all projects funded
(projects such as pool cover & painting)

*Will add up to more than 100% since most districts installed more than one type of ECM.

Energy Conservation Measure Categories and Completion Rate

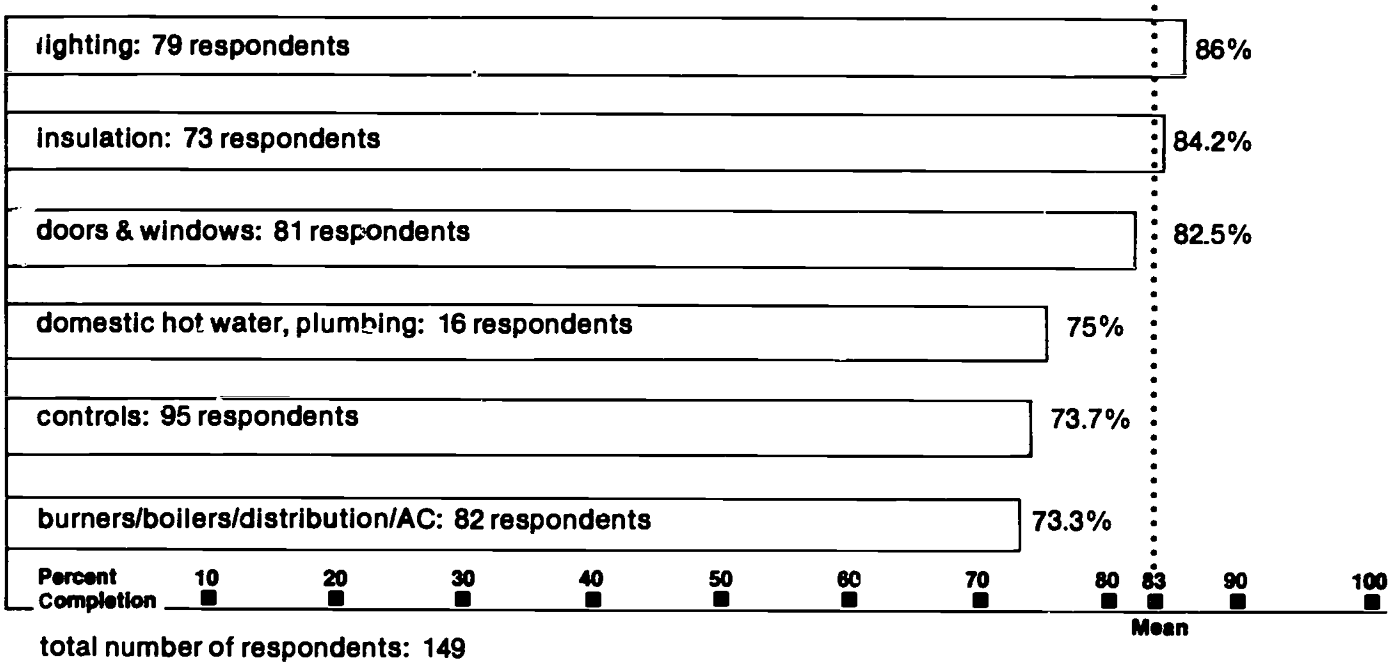
Whenever a project is not completed, the natural question is, "What's the hold up?" The nature of the work and the conditions under which it must be completed are natural considerations. School occupancy and climate often prevent some types of work from being done promptly, but after a full year these conditions are evened out. While these two conditions in relation to financing and bidding procedure may be important, it is logical to look at the actual measures to determine if some measures show a slower completion rate.

Figure 4 (next page) depicts the categories and the average percentage of completion by that category at the time of the survey.

Figure 4

ECM Categories

Percent Completion at Time of Survey



In the categories with a small number of respondents, #8, Fans; and #9, Other; showed one hundred percent completion while the seven respondent with #7, Solar, showed an average completion of 42.9 percent. A review of Figure 4 reveals that for those categories with a statistically sufficient n, only lighting and insulation exceed the mean percentage completion for all districts reporting. The rate of completion for Category 4, Doors and windows, follows closely behind the mean while the other categories are significantly lower.

Energy Conservation Measures and Projected Paybacks

Projected payback is a paramount consideration.' It answers the questions: What is the best return for the limited money the district can invest? What type of measure will save the most energy per dollar invested? Or, How will a proposed measure(s) compete with other appications in state ranking when the first criterion, payback, is considered?

For each energy conservation measure category, the payback in years is given in Table 4. The average payback (mean) for all respondents having installed an ECM for that particular category as well as the mid-point in ranking (median) and the range are shown. For example, for the 95 respondents who indicated they had a "Controls" ECM funded, their average projected payback was 4.36 years, the median was 3.7 years, and they ranged from a low of one year up to 14.59 years.

As shown in Table 4, average projected payback, mean or median, is lowest for ECM #1, Domestic hot water, plumbing; and highest for ECM #4, Doors and windows, for those categories with sufficient response to attach significance to them. Boiler work and controls fall in the mid-range. The mean, median, and range of #7, Solar; #8, Fans; and #9, Other, are presented as a matter of interest and are in parentheses to stress that the n was too small to have any statistical meaning.

Table 4. Projected payback by ECM category; mean, median, and range. Categories with n>16 are ranked by mean payback. n=149

ECM Category	Projected Payback Average per Category		
	Mean (years)	Median (years)	Range (years)
1. Domestic hot water & plumbing, n=16	3.68	2.17	1.00-8.00
6. Controls, n=95	4.36	3.7	1.00-14.59
5. Burner/boiler/distribution/AC, n=82	4.38	4.0	1.10-10.40
2. Lighting, n=79	5.64	5.00	.20-14.14
3. Insulation, n=73	7.08	5.59	1.40-20.00
4. Doors and windows, n=81	8.18	7.65	1.82-16-30
7. Solar, n=7	(11.42)	(10.00)	(8.68-14.90)
8. Fans, n=6	(6.16)	(4.09)	(1.06-14.90)
9. Other, n=2	(2.50)	--	(2.00-3.00)
Total sample average payback:	5.82	5.25	1.30-15.00

Probably the most surprising average projected payback figure is lighting. This fact helps to emphasize that when data are grouped and averages used, the significance of individual situations can be overlooked; therefore, the ranges take on considerable import within category ranges spread up to 18.6 years. The median in relationship to the mean also indicates the extent to which individual extreme scores could be scewing the mean. If only averages are considered, one might assume a quicker return on investment can be achieved by boiler work (mean of 4.38 years payback) than lighting (mean of 5.64 years payback), but the ranges shows individual lighting ECMs as low as .2 years and boiler work as high as 10.4 years. Lighting includes simple relamping to major fixture change out; just as boiler work goes from burner adjustments to complete boiler replacement. Therefore, information regarding payback of certain categories may be more beneficial to the federal or state program administrators in determining broad funding benefits than to the individual districts trying to assess potential grant work against these averages.

Finally, in using Table 4, it should be noted that most measures were in conjunction with other ECMs; so the relative benefit would vary with the comprehensiveness of the work being done. Since the energy to be saved from separate measures is not additive in a given building, a single measure is apt to project a greater saving and a shorter payback than the same measure in conjunction with other energy conserving work.

Energy Conservation Measures; Single Measure and Combinations; Frequencies and Payback Implications

Single measure ECMs were primarily in the area of Controls package and an Energy Management Systems (EMS) or work on the building envelope. Table 5 (next page) shows a breakout of single measures by type with the average payback.

Table 5. ECM categories for single measures; frequency and average projected payback in years. Ranked by average projected payback.

EMC Category	Frequency	Average Projected Payback
6. Controls	9	3.39
Controls package (4)		
EMS (5)		
2. Lighting (1)	1	3.8
5. Boiler work	7	6.39
fuel conversion (5)		
burners (1)		
replace boiler (1)		
Envelope	10	7.36
insulation (5)		
doors and windows (5)		
7. Solar (pool heating)	1	10.00
	28	x = 5.72

As seen in Table 5, single measure awards went to 28, or 16 percent, of the sample's respondents. Since many longer payback measures are known to be paired with shorter ones to make them eligible for the 1-15 year payback window, one might expect single measures would have shorter paybacks. However, there was only a slight difference between the single measure payback mean of 5.7 years and the sample mean of 5.82. It should be noted, however, that the single measure figure is based on an n of 28.

Of the ECM grants awarded in Cycle 1, 147 of the sample, or 84 percent, went to grantees applying for assistance to install more than one measure. The pattern of combinations reveals some interesting patterns. Table 6 shows the frequency and percentage of incidence in which those having one type of funded ECM also had another specific type of ECM. The n's have been provided for each cell as some are too small to be significant, but rather are prsented as a matter of interest.

The most common ECM category, #1, Controls, is also most apt to be installed jointly with other ECMs across the board as shown by percentages in Row 6 in Table 6. The highest relationship in a cell with sufficient n to establish a statistical basis is Controls & Lighting (72.2) followed by Doors and windows paired with Insulation (60.3%). The lowest statistical relationship showed only 44 percent of those doing Boiler work also engaged in Insulation.

Table 6. Paired incidence by ECM category Cycle 1, frequency and percentage.

EMC Categories		Domestic Hot Water #1	Lighting #2	Insulation #3	Doors & Windows #4	Burner etc. #5	Controls #6
1. Domestic hot water, plumbing	n	xx	11	7	5	9	12
	%		13.9	9.6	6.2	11.0	12.6
2. Lighting	n	11	xx	39	40	38	57
	%	68.8		53.4	49.4	46.3	60.0
3. Insulation	n	7	39	xx	44	32	38
	%	43.8	49.4		54.3	39.0	40.0
4. Doors and windows	n	5	40	44	xx	39	40
	%	31.3	50.6	60.3		47.6	42.1
5. Burner/boiler/AC distribution	n	9	38	32	39	xx	45
	%	56.3	48.1	43.8	48.1		47.4
6. Controls	n	12	57	38	40	45	xx
	%	75.0	72.2	52.1	49.4	54.9	

ECMs, singularly or in combinations, and their paybacks are of great interest. However, payback only says what might be saved. The most important information to be gained by the survey was an analysis of what energy had actually been saved in relation to expectations. In other words, did the measures do (energy saved) what they were projected to do (payback)?

Energy Saved

The bottom line for the grantee, the potential grantee, or the program is: Did it save energy? Dollars? If so, how much?

Conditions of the study. Three conditions need to be emphasized before actual consumption figures are presented. First, the completion figures presented earlier show an average completion of 83 percent. These responses were received from June through August, 1981. The consumption period under study was from January through March. It is reasonable to assume that even less work had been completed during the earlier period. Given this factor, consumption figures should be judged as conservative. Actual consumption data was supplied by 53 respondents; of these 11 had not completed their projects. (See Table 7, page 23.)

Secondly, 22.9 percent of the respondents indicated the projected payback had been calculated expecting some savings in airconditioning as well. The January through March figures would not reflect any cooling reduction; so the expected energy savings from cooling for nearly one in ever four respondents is not incorporated in the savings data. This factor suggest the three month consumption figures relative to annual consumption are conservative.

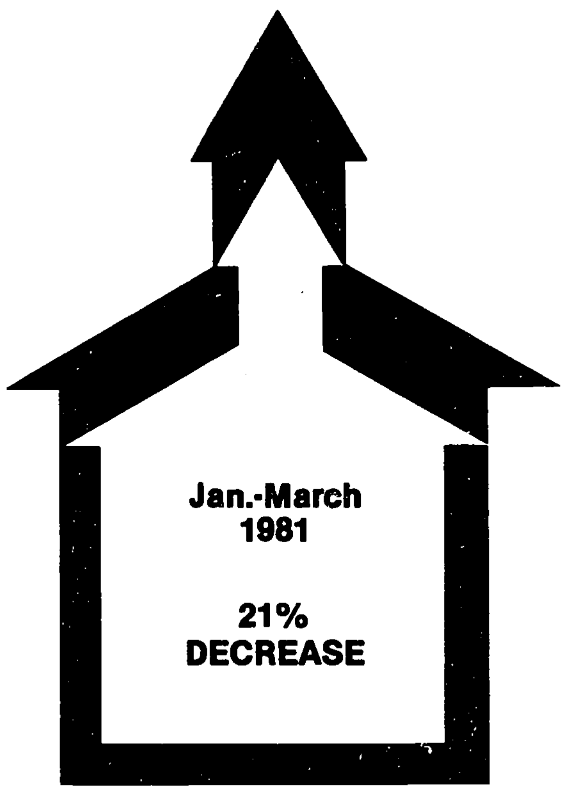
Finally, it should be noted that a visual scan of the responses showed that the nature of the ECMs would probably impact on electrical consumption as well as consumption from another energy source. Partially due to the questionnaire format, many responses indicated consumption figures for one fuel source only. (An examination of Table 7, page 23, will reveal the ECM types and the energy sources reported.) This factor would also point to a reduction in consumption greater than reported.

Reduced consumption. Computer calculations based on 49 responses showed that the Btus used in 1981 (January through March) compared to the same period in 1980 were an average of 20.7 percent lower. In Figure 5, the decrease in Btus resulting from the ECM installations can be seen in contrasting the two schoolhouses. The mean, median and range resulting from this computer analysis of pre- and post-consumption are also given.

Figure 5

Percent Decreased Use of Btus

January - March 1980



ACTUAL REDUCTIONS	Mean 20.7%	Median 20.82%	Range 2.4-50%

Projected Payback in Relation to Savings

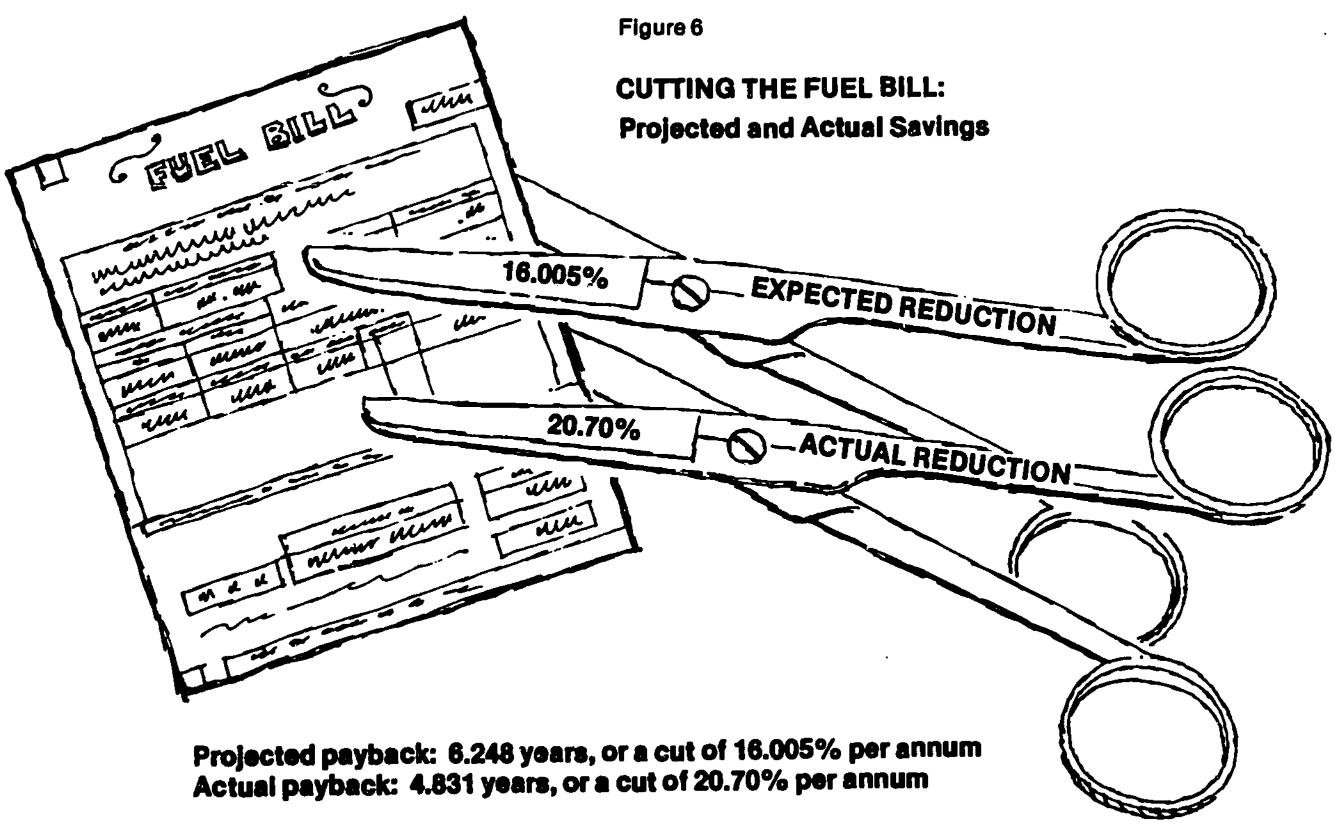
Before school adminstrators spend precious education dollars to reduce energy consumption, they like to know if the projected returns on the investment will bear out. Reduced annual consumption in relation to the payback gives a quick approximation of the relative benefits anticipated. For example:

Average Projected Payback	Anticipated Annual Reduced Consumption in Percent
6 years	16.67%
5 years	20.00%
4 years	25.00%

Figure 6 relates the projected payback for the Cycle 1 ECM grants sample reporting consumption data to the consumption actually experienced by a portion of that sample. The projected payback of 6.248 years meant schools expected to cut their consumption, and their fuel bill (in 1980 dollars), by 16.005 percent. Instead, the fuel bill was cut by 20.70 percent.

Figure 6

CUTTING THE FUEL BILL: Projected and Actual Savings



Projected payback: 6.248 years, or a cut of 16.005% per annum
Actual payback: 4.831 years, or a cut of 20.70% per annum

Individual Grantee Projects and Consumption

Even more helpful to the administrator contemplating energy work or considering participation in the Schools and Hospitals Program is the individual experiences of other grantees. The reader can assess the type of work, its anticipated or actual cost, the expected payback, and the energy savings experienced for the January through March periods in 1980 and 1981. This table presents information from all respondents who provided usable consumption data to the study. Project costs and federal share costs have been rounded up or down slightly in respect for the confidentiality of the individual respondent. ECMs are presented with very abbreviated descriptions in the interests of space and confidentiality. The reader is cautioned that site conditions vary and the costs and results shown may not be applicable to a given location.

In reviewing Table 7, two cautions are warranted. First, it is not known to what extent those with data more readily available might also be the districts more conscientiously pursuing energy conservation, thereby biasing the data to some extent. However, it should be noted that reported savings ran as low as .28 percent. Further, the "Conditions of the Study" and their conservative influences noted earlier should have offsetting effects. Secondly, it is not known to what extent the percentage reduction in January through March for the specific ECM installed might represent annual savings. Nor is it known the degree to which airconditioning benefits were calculated into paybacks for nine of the 53 consumption respondents.

These concerns notwithstanding, there are some valuable implications to be derived from information presented in Table 7.

Table 7. Project cost, Federal share, ECMs, percentage completion, projected payback, percentage reduction per year needed to meet payback, and percentage of reduced consumption, 1-3/80 and 1-3/81 for all respondents reporting usable consumption figures. n = 53

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
1. $144,000	$ 71,500	Insulation Thermostats Reduced outside air (o.a.) Window work Boiler replaced	50	8.04	12.44	10.80 (gal)
2. $282,000	$ 86,000	Controls Reduced o.a. Duty cycle Dampers Reset Optimizer (warm-up) Time clock	80	4.26	23.47	22.71 (mcf) 26.29 (K)
3. $700,000	$250,000	Energy Management System (EMS)	80	2.50*	40	36.32 (K)
4. $ 82,000	$ 41,000	EMS	80	2.2*	42.45	.28 (ccf)
5. $123,000	$ 61,000	Dampers Auto. Set-back thermostat Insulation Return air ducts	80	--	--	2.88 (ccf)

*Payback includes AC energy savings.

Table 7. - Continued

	Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/yr. to meet Payback	Energy saved (%) 1-3/80 & 1-3/81
6.	$ 46,000	$ 23,000	Lighting Flour. & HPS Shower heads Auto. thermostats	85	4.0	25	20.38 (K)
7.	$ 96,000	$ 48,000	Relamping Insulation Thermo. covers Night setback Solar panels	90	8.12	12.31	36.27 (23.10, K and 39.06, mcf)
8.	$ 74,500	$ 37,000	Insulation Controls Temperature Night setback Lighting	90	3.9	25.64	15.15 (gal) 8.01 (K)
9.	$488,000	$ 91,550	Insulation Glazing Plumbing Htg. renovation Electrical	90	4.5	22.22	12.82 (gal)
10.	$330,000	$265,000	Lighting Double pane Solar Pool Domestic hot water	95	9.0	11.11	30.00 (gal 20.00 (K)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
11. $ 57,000	$ 43,000	HVAC Lighting Hot water Electrical work	98	7.0	14.29	21.01 (K)
12. $ 46,000	$23,000	Insulate ducts Dampers Exhaust fans Night setback	100	--	--	10.40 (ccf)
13. $ 24,000	$ 11,800	Replaced windows	100	5.8	17.24	27.51 (ccf)
14. $ 25,000	$ 11,700	Replaced windows Dampers Lighting	100	6.24	16.03	11.95 (K) 4.85 (therms)
15. $ 26,000	$ 13,000	Damper Night setback Reset Lighting Insulation	100	4.04	24.75	13.45(K) 3.14 (therms)
16. $ 42,000	$ 22,000	Replaced windows Dampers Night setback Insulate steam line Lighting	100	7.28	12.85	10.60 (K) 23.14 (therms)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
17. $210,000	$ 92,000	HVAC controls Relamping	100	4.2*	23.81	11.14 (11.05, K, and 14.86, ccf)
18. $ 50,000	$ 30,000	Windows and doors caulking replacement Insulation Lighting EMS	100	10.02*	9.98	41.11 (K) 33.89 (ccf)
19. $165,000	$ 99,000	Lighting Controls Replaced windows Insulation Heat exchanger Fire mechanisms	100	6.0	16.67	40.00 (gal)
20. $ 5,800	$ 3,000	Insulation Lighting	100	7.63	13.11	28.55
21. $ 11,000	$ 9,000	Controls zoning Insulation sealing & lighting old skylights	100	3.00	33.33	32.69 (ccf) .51 (K)
22. $ 8,300	$ 5,600	Reset Lighting Panel Windows	100	7.23	13.83	7.15 (K) 19.9 (therms)
23. $ 44,700	$ 38,700	Weatherstripping Lighting Insulation	100	6.5	15.38	13.35 (K)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
24. $ 9,900	$ 7,200	Time clocks Damper Relamping Insulation	100	6.4	15.62	12.98 (K) 20.90 (mcf)
25. $ 92,000	$ 47,000	Boiler modification Insulation Thermostats Night setback Lighting Pool cover	100	2.64	37.88	.13 (mcf) 12.35 (K)
26. $100,000	$ 86,000	--	100	5.0	20.00	24.73 (gal)
27. $104,000	$ 52,000	Insulation Lighting Temp. controls	100	11.2	8.93	44.12 (ccf)
28. $ 44,000	$ 26,000	Htg. controls Hot water Lighting	100	7.1	14.08	28.69 (therms) 7.07 (K)
29. $129,000	$ 74,000	Insulation Weatherstripping Auto controls Lighting Turbulator	100	8.2	12.19	7.34 (K) 23.84 (ccf)
30. $202,000	$ 69,000	Controls Relamping Load Shedding Insulation	100	2.5*	40.00	25.45 (Btu/ft2)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
31. $343,000	$171,500	New boiler Glass reduction	100	7.9	12.66	2.19 (gal)
32. $ 48,500	$ 24,000	Replace windows Insulation ceiling pipes	100	12.1	8.26	30.3 (Btu/ft^2)
33. $ 18,000	$ 9,000	Lighting	100	3.8	26.32	31.83 (K)
34. $ 10,000	$ 7,500	Insulation attic pipes	100	3.99	25.06	2.46 (therms)
35. $ 9,900	$ 7,200	Time clock Auto. damper controls Relamping Insulation	100	7.6	13.16	8.08 (K) 27.86 (mcf)
36. $ 14,000	$ 7,000	Lighting replacement	100	4.0	25.00	7.64 (K) 11.37 (ccf)
37. $ 60,000	$ 25,000	Controls	100	1.5*	66.67	50.07 (mcf) 30.99 (K)
38. $ 31,000	$ 21,500	Shower heads Exhaust fans Time clocks Lighting Insulation	100	--	--	5.67 (k) 29.46 (ccf)
39. $ 96,000	$ 66,000	Window replacement	100	4.72	21.19	20.67 (gal)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (yrs)	Percent/Yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
40. $ 46,000	$ 23,000	Windows	100	13.3	7.52	23.96 (ccf)
41. $107,000	$ 54,000	Roof replacement Insulation Windows & Doors Controls	100	8.88	11.26	34.03 (gal)
42. $117,000	$ 40,000	Replace boiler	100	8.6	11.62	38.01 (therms)
43. $ 10,000	$ 7,000	Reduce glass Vestibules Insulate pipes Vests time clock	100	3.71	26.95	23.04 (therms)
44. $ 16,500	$ 6,900	Insulation	100	7.82*	12.79	3.08 (K) 2U.08 (mcf)
45. $ 73,000	$ 38,000	Burner replacement Reduce glass Damper replacement Lighting	100	5.2	19.23	5.53 (K) 24.49 (ccf)
46. $ 52,000	$ 38,000	Insulation Insulated doors Glass reduction	100	7.0	14.29	20.00 (gal)
47. $125,000	$733,000 (#47-53 Inclusive)	Insulation Storm windows Fuel conversion Solar hot water space heating Double doors	100	7.03	14.22	11.96 (MBTUs)

Table 7. - Continued

Total Project Cost	Federal Share	ECMs	Percent Complete	Projected Payback (Yrs)	Percent/yr. to meet Payback	Energy Saved (%) 1-3/80 & 1-3/81
48. $ 96,000		Insulation Storm windows Fuel conversion Solar hot water space heating	100	8.14	12.28	6.53
49. $112,500		Same as #47	100	8.23	12.15	17.99 (MBTUs)
50. $ 98,000		Same as #47	100	7.17	13.95	5.53 (MBTUs)
51. $256,500		Insulation Storm windows Solar hot water space heating Double doors	100	7.72	12.95	4.49 (MBTUs)
52. $ 17,000		Insulation Storm windows	100	3.65	27.4	7.22 (MBTUs)
53. $109,000		Solar heating Insulation Storm windows Double doors Fuel conversion	100	5.86	17.06	10.41 (MBTUs)

	Proj. Cost	Fed. Share		
TOTALS	$5,627,100	$3,015,650		$\bar{x}$ = 20.70
TOTALS Respondents w/payback reported	$5,427,100	,910,150	$\bar{x}$ = 6.248	

*Payback includes airconditioning energy savings.

The expected annual energy savings implicit in the projected payback and the actual energy savings are displayed in the last two columns of the table. A careful comparison of these percentages will indicate how well individual technical assistance analysts are doing. The range of discrepancy from expected reductions to actual savings by percentages for individual projects is presented in Figure 7. These are not variations from the mean; i.e., above or below 20.7 percent.

Figure 7

Descrepancy Between
Projected and Actual Savings

(Jan., Feb., March Heating Season)

	% of the 50 ECM Projects	**Individual Projects**
Below – 20%	**8%**	● ● ● ◉
Below – 10% Less than – 20%	12%	● ● ● ◉ ◉ ◉
± 10%	52%	● ● ● ● ● ● ● ● ● ● ● ◉ ◉ ● ● ● ● ● ● ● ● ● ● ● ● ●
Above + 10% Less than + 20%	12%	● ● ● ● ● ●
Above 20%	16%	● ● ● ● ● ● ◉ ◉

◉ Circled projects indicate cooling benefits were calculated in analysts' projections.

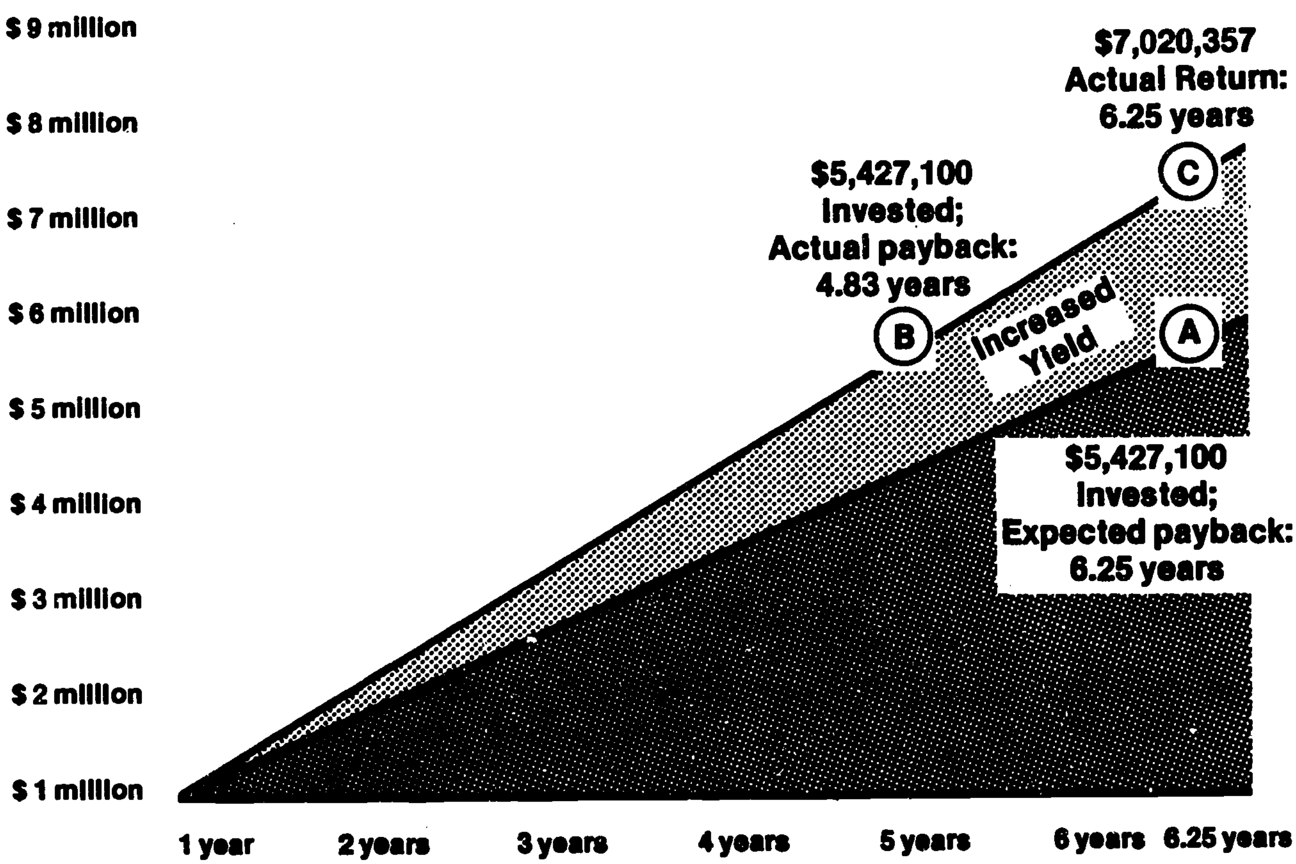
From Figure 7, it can be seen that over half the analysts anticipated the savings within a plus/minus 10 percentage points and 76 percent within a plus/minus 20 points of actual savings. Beyond that range twice as many erred on the conservative side (16%) as those who expected too much (8%). In the extreme cases twice as many underestimated as overestimated the expected results. Although the numbers are small, there is some indication that when cooling benefits are included in the calculations, results falling below projections may more closely match analyst's expectations.

The mean projected payback was 6.248 years for respondents depicted in Table 7. This means it was projected that the average annual energy cost savings would be 16.005 percent with a total return on investment in a little over six years. However, the annual energy savings were actually reported at 20.7 percent, or the original investment would be recovered in 4.831 years. If this difference in rate of recovery is applied to the dollar figures presented in the totals in Table 7, the greater energy savings can be quantified in dollars.

Point A in Figure 8 identifies the time at which the respondents supplying consumption data expected their original investment of $5,427,100 to be fully paid back (an average of 6.25 years). Actual reduction figures reveal that the

Figure 8

Comparison of Expected and Actual Payback



investment should be fully returned at an average of 4.83 years as represented by Point B in Figure 8. The distance from Points A to B indicates that these respondents will have their invested funds returned and available for other purposes an average of 1.42 years sooner than anticipated.

The lighter grey area in Figure 8 represents the increasing yield over time in 1980 dollars. If the "Actual Return" line at the top of the lighter grey area is followed out to the originally projected payback time of 6.25 years at Point C, it can be seen that by that time savings in constant dollars would be $7,020,357. The distance from Points A to C signifies the unanticipated savings of $1.593 million.

The unexpected $1.593 million benefit at the end of the projected payback represents an incrased energy yield to the nation and a financial boon to the participating districts.

To the extent that the consumption respondents represent the sample, the original ECM investment costs will be recovered in 4.83 years (1980 dollars). After original investment costs have been recovered, the net effect for the 724 grant recipients would be a clear "profit" to redirect $16,270,000 (1980 dollars) into the classroom every year for the life of the ECMs. Over and above original costs, these energy savings for Cycle 1 recipients over a ten year ECM life will contribute a "clear profit" of $84,116,000 toward helping young people learn and/or alleviating local tax burdens.

If these calculations are further extrapolated from the sampled population to subsequent grant cycle recipients, the significant benefits to local school systems from the Schools and Hospitals Program becomes very impressive. In any analysis of the program's cost benefits, it should be noted that the savings cited above reflect only the school's ECM portion of the program and do not address the ECM benefits to hospitals and institutions of higher education, nor address the extensive energy audit benefits to all institutions covered by the program.

In summary, to the extent the findings from the sample represent the population, the energy benefits to the nation and financial benefits to education and local tax payers far exceed the anticipated results. If, on the average, the increased benefits from Cycle 1 (29.33%) are equally applicable to succeeding program cycles, the Schools and Hospitals Program, NECPA, Title III, will contribute more to the national energy conservation effort and to the participating public institutions than ever expected.

CONCLUSIONS

To the extent that the sample represents the population, the findings presented above suggest the following conclusions:

1. Average annual energy savings are 20.7 percent for installed Cycle 1 energy conservation measures (ECMs). For those reporting consumption data, the average projected payback was 6.248 years, requiring an annual reduction in energy consumption of 16.005 percent. An actual 20.7 percent annual reduction represents energy and financial savings 29.33 percent greater than anticipated. The data was obtained from a sample showing only an average 83 percent project completion. Nor did it reflect the increased energy efficiency in airconditioning anticipated by 22.9 percent of the respondents. Therefore, the additional 29 percent may be viewed as conservative.

2. The realized energy savings suggest technical assistance analysts' average projected paybacks tend to the conservative. Average payback for all respondents was 5.82 years. Average payback for the 53 reporting data consumption was 6.25 years; however, actual savings data indicate the initial investment could be recovered in 4.83 years. When individual projects are considered, those providing consumption data showed that 52 percent of the analysts projected savings within a plus/minus 10 percent range of actual savings, 76 percent with a plus/minus 20 percent range, and 24 percent outside the plus/minus 20 percent range. However, 8 percent were below the -20 percent expectation

level while 16 percent were above the +20 percent level. In the outside ranges, twice as many analysts underestimated potential payback as overestimated it. These extreme cases tend to scew the mean.

3. With an average 83 percent completion and only 30 percent of these able to report consumption data, it is evident that the survey was conducted at the earliest possible time in the program. Any earlier evaluation of ECMs' effectiveness (which constitute a major portion of the Schools and Hospitals Program) would have been premature.

4. Rate of project completion does not seem to have a relationship to total project costs, size of grants, or the projected payback periods. There does appear to be a relationship between completion rate and the types of ECMs funded.

5. In Cycle 1, the most frequently funded ECMs were not those with the lowest payback. This may have been a function of the ECM categories established for computer purposes, the low level of competition in the first cycle, an aberration of nationally averaging the somewhat disparate state functions, or the offsetting effect of the combined influence of other ranking criteria.

6. The most frequently funded ECM category was Controls with Burner/boiler/AC/ distribution work next. Their average paybacks by categories ranked second and third respectively. The shortest payback by category was Domestic hot water and plumbing which was a very low sixth in frequency. Grouping tended to obscure individual paybacks. Ranges within categories showed a payback spread up to 18.6 years; i.e., from 1.4 to 20 years in Insulation.

7. Sixteen percent of the respondents received grants for a single ECM. The mean payback for single ECMs of 5.72 did not vary significantly from the sample mean of 5.82. When more than one measure was funded, Controls were the only ECM type that showed a consistent pairing with other ECMs. An analysis of ECM combinations did not show any other strong patterns.

8. Over a ten year life of the installed ECMs, the Federal investment of $2.91 million (for those reporting consumption and payback data) will yield $11.124 million (1980 dollars), or $3.89 local benefit per Federal dollar expended. With full completion and cooling benefits included in calculations, the burden on the local taxpayer could be alleviated by $4 for every $1 of Federal assistance.

9. The survey results reaffirm the overall cost-effectiveness of installing recommended energy conservation measures whether they are funded under the Schools and Hospitals Program or not.

10. From the early evaluative data obtained from Cycle 1 participants, the program is working better than expected. It is saving energy for the nation--well beyond anticipation. It is also saving money for the schools--well beyond expectation; thus, redirecting education dollars to the classroom. The Schools and Hospitals Program clearly provides an opportunity to preserve the nation's energy resources while enabling education to better serve the nation's human resources.

LEADERSHIP FOR LEARNING

American Association of School Administrators
1801 North Moore Street, Arlington, VA 22209