DOCUMENT RESUME

ED 120 894 95 EA 007 296

TITLE ERIC Abstracts: ERIC Document Resumes on Energy Conservation and the Schools ERIC Abstract Series, Number 35.

INSTITUTION American Association of School Administrators, Washington, D.C. National Academy for School Executives.; Oregon Univ., Eugene. ERIC Clearinghouse on Educational Management.

SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE 76
CONTRACT OEC-0-8-080353-3514
NOTE 18p.
AVAILABLE FROM American Association of School Administrators, 1801 North Moore Street, Arlington, Virginia 22209 (Stock No. 021-00448, $2.00, plus $1.00 handling charge for each order, quantity discounts, orders under $15.00 must be prepaid)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage
DESCRIPTORS *Annotated Bibliographies: *Energy; *Energy Conservation: *Fuel Consumption; Heating; *Literature Reviews; Solar Radiation
IDENTIFIERS *Energy Crisis

ABSTRACT

Documents previously announced in Resources in Education (RIE) concerning energy conservation discuss the current energy crisis and its implications for the public schools, offer practical suggestions for reducing energy consumption, and examine the efficiency of various energy systems. The index terms used to select the documents are "energy," "energy conservation," and "energy crisis." The listing is complete for all issues of (RIE) through September 1975 and contains 24 annotations. (Author/MLF)

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ERIC Abstracts on:

Energy Conservation and the Schools

ERIC

Document

Resumes

on

Energy Conservation and the Schools

Compiled by the
ERIC Clearinghouse
on Educational Management

University of Oregon
Eugene, Oregon 97403

1976

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PREFACE

The Educational Resources Information Center (ERIC) is a national information system operated by the National Institute of Education. ERIC serves the educational community by disseminating educational research results and other resource information that can be used in developing more effective educational programs.

The ERIC Clearinghouse on Educational Management, one of several clearinghouses in the system, was established at the University of Oregon in 1966. The Clearinghouse and its companion units process research reports and journal articles for announcement in ERIC's index and abstract bulletins.

Research reports are announced in *Resources in Education (RIE),* available in many libraries and by subscription for $42.70 a year from the United States Government Printing Office, Washington, D.C. 20402. Most of the documents listed in *RIE* can be purchased through the ERIC Document Reproduction Service, operated by Computer Microfilm International Corporation.

Journal articles are announced in *Current Index to Journals in Education. CIJE* is also available in many libraries and can be ordered for $50 a year from Macmillan Information, 216R Brown Street, Riverside, New Jersey 08075. Semiannual cumulations can be ordered separately.

Besides processing documents and journal articles, the Clearinghouse has another major function—information analysis and synthesis. The Clearinghouse prepares bibliographies, literature reviews, state-of-the-knowledge papers, and other interpretive research studies on topics in its educational area.

The *ERIC Abstracts* series is the result of a cooperative arrangement between the Clearinghouse and the American Association of School Administrators. The Clearinghouse compiles the abstracts from document resumes in *Resources in Education* and the collection is published by the American Association of School Administrators.

Philip K. Piele
Director, ERIC Clearinghouse
on Educational Management

The material in this publication was prepared pursuant to a contract with the National Institute of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to express freely their judgment in professional and technical matters. Prior to publication, the manuscript was submitted to the American Association of School Administrators for critical review and determination of professional competence. This publication has met such standards. Points of view or opinions, however, do not necessarily represent the official view or opinions of either the American Association of School Administrators or the National Institute of Education.

ERIC Abstracts Series, Number Thirty-five
Clearinghouse Accession Number: EA 007 296

Published by

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

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INTRODUCTION

Since the beginning of ERIC in 1966, more than ninety thousand documents have been announced in ERIC's monthly catalog, *Resources in Education (RIE).* Of the total, about seven thousand documents have been processed by this Clearinghouse. This growing collection is so extensive that it is useful to compile lists of ERIC documents on a number of critical topics in educational management. Published separately, these selected lists of documents make up the *ERIC Abstracts* series.

To compile each list, the *RIE* subject indexes are searched, using key terms that define the topic. The documents are selected on the basis of their currency, significance, and relevance to the topic.

For this compilation on energy conservation, the index terms used are ENERGY, ENERGY CONSERVATION, and ENERGY CRISIS. The documents discuss the current energy crisis and its implications for the public schools, offer practical suggestions for reducing energy consumption, and examine the efficiency of various energy systems. The listing is complete for all issues of *RIE* through September 1975 and includes documents processed by this and other clearinghouses.

Based on the document resumes in *RIE*, the following information is presented for each document: personal or institutional author, title, place of publication, publisher, publication date, number of pages, ERIC document ("ED") number, price of the document if it is available from the ERIC Document Reproduction Service, and the abstract. The documents are listed alphabetically by author and are numbered.

A subject index, beginning on page 10, refers to the document listing number. The subject terms, arranged in alphabetical order, are identical to those contained in the subject index of *RIE*.

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1. Abelson, Philip H., editor. *Science, Volume 184, Number 4134. Energy.* Washington, D.C.: American Association for the Advancement of Science. *Science,* 184, 4134 (April 1974). 185 pages. ED 088 719 Document not available from EDRS. (Available from American Association for the Advancement of Science, 1515 Massachusetts Avenue NW, Washington, D.C. 20005. $1.00.)

   This entire issue of *Science* is devoted to the topic of energy and issues relating to the energy crisis. Its content was chosen to present material relevant to important public decisions of the next few years. Twenty-six articles cover a wide range of topics, including the impact of the energy crisis on people and institutions, state and federal policies, economics, the developed technologies relating to oil, coal, gas, and uranium, and the developing technology for utilizing geothermal and solar energy. Certain topics relevant to the subject matter of this issue were omitted because they had already been treated in recent issues of the journal. These articles, together with their dates of publication, are listed in a Bibliography of Energy.

2. American Automobile Association. *Driver Education Saves Gas.* Falls Church, Virginia: Traffic Engineering and Safety Department, 1974. 4 pages. ED 098 294 MF $0.76 HC $1.58.

   The argument that driver education should be dropped because driver education cars use gas is shortsighted. High school driver education is an excellent opportunity for teaching concepts of energy conservation. A small investment in fuel now can result in major savings of gasoline over a student's lifetime. In addition, good driver education courses graduate well-informed, competent drivers with positive outlooks on responsible driving—an asset that cannot be readily measured in gallons of fuel. The fuel used for high school driver education should be regarded as an investment that can be easily recouped in the first year a person drives after taking the course. Driver education fuel facts are presented and discussed.

3. Association of Physical Plant Administrators of Universities and Colleges. *Energy Conservation Checklist for Universities and Colleges.* Washington, D.C.: [1974]. 24 pages. ED 086 075 MF $0.76 HC $1.58. (Also available from Association of Physical Plant Administrators of Universities and Colleges, Suite 510, One Dupont Circle, Washington, D.C. 20036. $1.50.)

   Several specific success stories are included here from institutions that have had energy conservation programs long enough to establish meaningful statistics. They illustrate why it is not unreasonable for most institutions to meet the federal objective of a 15 percent reduction in energy consumption, even if 1973 is used as the base year, but with some allowance made for new space added that year. A comprehensive list of suggestions primarily taken from existing programs at approximately 35 institutions is suggested as a cross-fertilization of energy conservation ideas. Other ideas solicited from federal agencies, utility associations and private industry are included. The suggestions are categorized broadly. There is no attempt to separate the design/construct ideas from those that can be applied with little or no capital outlay through budgeted operating funds.

4. Baas, Alan M. *Thermal Environments. Educational Facilities Review Series Number 17.* Eugene: ERIC Clearinghouse on Educational Management, University of Oregon, 1973. 8 pages. ED 074 587 MF $0.76 HC $1.58. (Also available from the ERIC Clearinghouse on Educational Management, University of Oregon, Eugene, Oregon 97403. Free.)

   This review surveys documents and journal articles previously announced in *Resources in Education* and *Current Index to Journals in Education* that deal with climate control, integrated thermal and luminous systems, total energy systems, and current trends in school air conditioning. The literature cited indicates that selection of thermal systems must take into account long-term operating costs in addition to relative costs of available fuels. The review also notes that because of the national energy crisis, educators must examine the energy efficiency of each proposed system. A supplemental bibliography gives additional references, many of which are technically oriented and may be of more interest to the architect and the school engineer than to the administrator.

5. Building Systems Information Clearinghouse. *Case Studies of Energy Use: Elementary and Secondary Schools. BSIC/EFL Energy Workbook No. 1.* Menlo Park, California: 1974. 24 pages. ED 096 733 MF $0.76 HC $1.58. (Also available from Educational Facilities Laboratories, 3000 Sand Hill Road, Menlo Park, California 94025. $2.00.)

   This report is the first in a series of energy use studies intended to provide real life examples of the implication of energy conservation practices. Research reports from five public school districts describing their methods of measuring and conserving energy are summarized. While investigating the responses of various school districts to the energy crisis, Building Systems Information Clearinghouse arrived at some conclusions regarding the current energy situation and the possibility of coping with it by rational procedures. These conclusions, discussed in the final section, relate to (1) the problems of analysis using existing tools, (2) the need for design and operation energy use guidelines, and (3) the need for more complete energy use studies.

6. Building Systems Information Clearinghouse. *Energy Conservation and the Building Shell. BSIC/EFL Energy Workbook: Section I.* Menlo Park, California: 1974. 34 pages. ED 094 477 MF $0.76 HC $1.95. (Also available from Educational Facilities Laboratories, 3000 Sand Hill Road, Menlo Park, California 94025. $3.00.)

   This energy conservation workbook was developed to provide specific data on the effect of various design and operating decisions on both cost and energy consumption. It is designed to make clear the energy consumption and cost implications of various building design and operating decisions in terms that both the layman and design professional can understand. The intent is to provide a simple means for determining the consequences of the various possible decision options open to designers and school officials. This section examines what can be done in designing or redesigning the building's shell to make the wisest long-run use of resources. The text explains how the building shell affects the building's energy consumption, identifies energy-conserving ideas for use in the design (or redesign) of the shell, gives

examples showing how these ideas could be applied to new construction and modernization projects, provides a simple method for determining the effects of each idea, and identifies sources of further information to assist design professionals in complete analysis of the effect of the building shell on energy consumption.

7. Congress of the United States. *Effects of Energy Crisis on Education, 1974. Hearing before the Subcommittee on Education of the Committee on Labor and Public Welfare, United States Senate. Ninety-third Congress, Second Session on Examination of Current Energy Crisis and the Effect It Will Have on the Education Offering of the Nation's Schools and Colleges.* Washington, D.C.: Senate Committee on Labor and Public Welfare, 1974. 296 pages. ED 094 474 MF $0.76 HC $14.59.

   Congressmen, federal administration spokesmen, education association representatives, and state and local officials offer their comments in these hearings on the effects of the energy crisis on the nation's education programs.

8. de Winter, Francis, editor. *Solar Cooling for Buildings. Workshop Proceedings (Los Angeles, California, February 6-8, 1974).* Pasadena, California: Jet Propulsion Laboratory, 1974. 239 pages. ED 105 552 MF $0.76 HC $12.05. (Also available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 3800-00189. $3.00.)

   A consensus has developed among United States solar researchers that the solar-powered cooling of buildings is an important topic. Most solar heating systems are technically simpler, and more highly developed, than solar cooling devices are. The determination of the best design concept for any particular application is not a simple process. Significant problems remain in the understanding of mechanisms, in the design and operation of cost-effective hardware, and in the understanding of the economic performance that is possible. Because of these remaining research and development problems, many different concepts were explored at the workshop. In addition to the purely technical problems, there are problems of reconciling novel equipment with current buildings and with building practices, with other present-day hardware, with engineering, architectural, and building trade practices, with codes and other legal requirements, with financial practices and taxation systems, with consumer esthetic and practical needs, and with a myriad of other such "non-engineering" interfaces. A specific session on "implementation" was devoted to discussion of obstacles facing solar cooling, with the participation of specialists in many of the nonengineering areas.

9. Douglass, Donald D. "The College and the Energy Crisis." Paper presented at Middle Atlantic States Two-Year College Conference, June 1974. 8 pages. ED 095 965 MF $0.76 HC $1.58.

   Ways in which colleges can conserve energy are discussed. Reduction in the use of heat and light can be accomplished by taking several steps, such as reducing the amount of fresh air introduced into heating systems, turning off ventilating fans at night, cutting temperatures back during vacation periods and breaks, lowering the

temperature of the hot water in the buildings, installing water flow restricters, decreasing both interior and exterior lighting, and rescheduling classes so that buildings are not heated for a few students. York College's program to conserve energy is described.

10. Educational Facilities Laboratories. *The Economy of Energy Conservation in Educational Facilities. A Report.* New York: 1973. 85 pages. ED 082 321 MF $0.76 HC $4.43. (Also available from Educational Facilities Laboratories, 850 Third Avenue, New York, New York 10022. $2.00.)

    Prepared with the assistance of a panel of experts, this report sets forth available information for school architects and administrators facing the energy crisis. The booklet tells specifically how economies can be effected in the operation and maintenance of school buildings, in the modernization of existing schools, and in the planning of future facilities. School administrators are advised to (1) review operation and maintenance personnel to be sure that they are qualified to cope with the increasingly sophisticated mechanical/electrical equipment in schools; (2) identify sources of energy waste through an analysis of energy consumption in existing schools; (3) include energy conservation as a major part of an architectural program for both modernization and new construction projects; and (4) use life-cycle costing to replace initial cost as the sole basis for contract awards for energy-consuming systems. Appendixes provide an explanation of the basic techniques for computing life-cycle (long-term) costs, and a summary of the background to the energy crisis.

11. Electric Energy Association. *Cost and Energy Savings Opportunities with Heating, Air Conditioning and Lighting Systems in Schools.* New York: 1973. 12 pages. ED 083 674 MF $0.76 HC $1.58. (Also available from Electric Energy Association, 90 Park Avenue, New York, New York 10016. $0.60.)

    Great potential exists for saving energy and operating costs with a wide variety of heat conservation systems. Two major electric services—space conditioning and lighting—afford cost and energy savings opportunities. These services are detailed in checklist fashion in this brochure, with the suggestions included under space conditioning generally applicable to all types of systems—electric, gas, or oil. Electric space conditioning and lighting concepts are reviewed, with discussions pertinent to new construction and modernization activities.

12. Electric Energy Association. *Design Concepts for Optimum Energy Use in HVAC Systems.* New York: [1974]. 31 pages. ED 096 747 MF $0.76 HC $1.95. (Also available from Electric Energy Association, 90 Park Avenue, New York, New York 10016. Free.)

    Much of the innovative work in the design and application of heating, ventilating, and air conditioning (HVAC) systems is concentrated on improving the cost effectiveness of such systems through optimizing energy use. One approach to the problem is to reduce a building's HVAC energy demands by designing it for lower heat gains and losses in the first place. Another approach taken by designers in response

to their awareness of the need to optimize HVAC energy has been to seek new systems and equipment. This booklet is a conceptual review of the state of the art of HVAC systems and components that have come out of continuing efforts toward more efficient use of energy through technology.

13. ENVIRO/INFO. *Energy/Environment/Economy. An Annotated Bibliography of Selected U.S. Government Publications Concerning United States Energy Policy.* Green Bay, Wisconsin: 1973. 24 pages. ED 077 704 MF $0.76 HC $1.58. (Also available from ENVIRO/INFO, P.O. Box 115, Green Bay, Wisconsin 54305. $2.00.)

    This annotated bibliography attempts to provide a selective listing of 109 United States federal government publications germane to the energy crisis and its attendant environmental and economic implications. Primary emphasis is placed on documents presenting energy policy issues that have emerged, plus statistical reportage providing quantitative substantiation. Documents of a technical nature are generally avoided, though sections of some items include such material. Information for each entry includes title of the publication, source, date, pages, Superintendent of Documents number or National Technical Information Service number, price, and annotation. Items found in federal depository libraries are so noted. With a few exceptions, most of the items listed were issued during the period 1970 through the first quarter of 1973.

14. ENVIRO/INFO. *Energy/Environment/Economy. An Annotated Bibliography of Selected U.S. Government Publications Concerning United States Energy Policy. Supplement.* Green Bay, Wisconsin: 1973. 25 pages. ED 089 946 Document not available from EDRS. (Available from ENVIRO/INFO, P.O. Box 115, Green Bay, Wisconsin 54305. $3.00.)

    This annotated bibliography supplements ED 077 704. It provides a selective listing of 93 United States federal government publications germane to the energy crisis and its attendant environmental and economic implications. Primary emphasis is placed on documents presenting energy policy issues that have emerged, plus statistical reportage providing quantitative substantiation. Documents of a technical nature are generally avoided, though sections of some items include such material. Information for each entry includes title of the publication, source, date, pages, Superintendent of Documents number or National Technical Information Service number, price, and annotation. Items found in federal depository libraries are so noted. Items listed were issued during the period 1971 through the middle of 1973.

15. General Electric Company. *Solar Heating and Cooling of Buildings: Phase 0. Feasibility and Planning Study. Volume I: Executive Summary. Document No. 74SD419. Final Report.* Philadelphia: Space Division, 1974. 29 pages. ED 100 004 MF $0.76 HC $1.95.

    The purpose of this study was to establish the technical and economic feasibility of using solar energy for the heating and cooling of buildings and to provide baseline information for the widespread application of solar energy. The initial step in this

program was a study of the technical, economic, societal, legal, and environmental factors involved with solar energy and the identification of barrier problems in its use and of potential solutions to these problems. The study also includes definitions and plans for proof-of-concept experiments.

16. General Electric Company. *Solar Heating Experiment on the Grover Cleveland School, Boston, Massachusetts. Final Report.* Philadelphia: Space Division, 1974. 207 pages. ED 100 007 MF $0.76 HC $10.78.

    General Electric Company was one of four contractors who received a contract in early January 1974 to design, build, and install a solar heating experiment in a public school. The overall objective of this program was to obtain data that would assist in evaluating the applicability of solar heating systems in large metropolitan areas. This data was to be of an "operational" nature, in contrast to theoretical, and to encompass the areas of construction, societal interactions, economics, and aesthetics, as well as the thermal performance aspects. The data was obtained by constructing and operating a solar heating system of pilot plant scale on a middle school in Boston, Massachusetts. The Grover Cleveland School was the first solar heating experiment to come on line for continuous operation when heat was supplied at 4:10 p.m. on March 6, 1974. The system was operated through May 15, 1974. The experimental data collected during this period is presented in this report. The report describes the system in detail, presents the analysis of operation, and discusses recommendations and conclusions based on the results of the experiment.

17. Grossbach, Wilmar, and Shaffer, William. *The Energy Crisis in the Public Schools: Alternative Solutions.* Ventura, California: Ventura County Superintendent of Schools, 1974. 88 pages. ED 100 069 MF $0.76 HC $4.43. (Also available from Ventura County Superintendent of Schools, County Office Building, Ventura, California 93001. $2.00.)

    One hundred and eighty school personnel held a workshop with representatives of the petroleum, natural gas, and electrical power industries. The objectives of the workshop were (1) to provide participants with a common body of knowledge and a common understanding of the energy crisis and its implications for the public schools, (2) to delineate procedures that school districts can use to conserve energy, and (3) to identify problems and problem areas created by the energy shortage and to seek solutions through cooperative planning. After a general session, participants were divided into sixteen small groups. Nine of the groups utilized a brainstorming technique to identify solutions to problems in the areas of transportation of pupils, administration, regular classrooms, specialized classrooms, classroom uses outside the regular school day, extracurricular activities, maintenance, and food services. The remaining groups incorporated problem-solving techniques into their responses to the following hypothetical situations: delay in delivery of instructional supplies, blackouts, diesel fuel reduction, gasoline reduction, natural gas reduction, electrical power reduction, and increase in bus riders. A bibliography of additional reference materials is provided.

18. Hawke, Sharryl. *Solving a Community Problem: Computer Car Pooling. Profiles of Promise 26.* Boulder, Colorado: ERIC Clearinghouse for Social Studies/Social Science Education, [1974]. 4 pages. ED 091 283 MF $0.76 HC $1.58.

The idea of computerized car pooling originated in an American Contemporary Issues class at George Washington High School in Denver, Colorado, in the fall of 1973 when a fuel shortage was imminent. The students saw car pooling as a way to take effective action and, with the expertise of a computer math class, devised a program capable of delivering information that matched students living near each other and attending school at the same hour. Although the student population did not respond as eagerly as hoped, the working community of Denver did, when newspaper, radio, and TV exposed them to the program's potential. Response was great enough to require an Action Office and briefing teams of students to describe the program to the interested firms. City, state, and federal governments also saw the potential of the program. At George Washington the experience brought self-confidence to those students involved, an interdisciplinary togetherness to the teachers, and a new reputation to the school as a viable institution for education.

19. National Association of Secondary School Principals. *The Energy Crisis. A Legal Memorandum.* Washington, D.C.: 1973. 5 pages. ED number not yet assigned. MF $0.76 HC not available from EDRS. (Available from National Association of Secondary School Principals, 1904 Association Drive, Reston, Virginia 22091. $0.50, quantity discounts, payment must accompany orders of $10 or less.)

The energy crunch is being felt by everyone—at home, at work, and in the pocketbook. Schools, like others, are sharing in the efforts to conserve energy; thermostats are being turned down and lights are being turned off. Always in the vanguard of patriotism, schools throughout the country are among the first to initiate cutbacks in fuel and electricity to share in alleviating the crisis. The question of what more can be done, however, continues to perplex school principals and other administrators. Something "more" can always be done, it seems, but the time comes when the practical must be weighed against the impractical, and when some serious questions must be asked about priorities and values, and where education and the schools rank among them. A number of the important questions are presented here.

20. National Bureau of Standards (Department of Commerce). *Technical Options for Energy Conservation in Buildings. National Conference of States on Building Codes and Standards and National Bureau of Standards Joint Emergency Workshop on Energy Conservation in Buildings. (Washington, D.C., June 19, 1973). NBS Technical Note 789.* Washington, D.C.: Institute for Applied Technology, 1973. 190 pages. ED 102 715 MF $0.76 HC $9.51. (Also available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Order No. C13.46:789, $0.80.)

The purpose of this report is to provide reference material on the technical options for energy conservation in buildings. Actions pertinent to existing buildings and new buildings are considered separately. Regarding existing buildings, principal topics include summer cooling, winter heating, and other energy-related features such as

insulation, fenestration, lighting, appliances, hot water, and human comfort. Suggested actions include those that can be accomplished voluntarily or without expense and those that require some modest effort or expense on the part of the building owner or occupant. Regarding new buildings, energy conservation actions that deal with building design and mechanical systems are described. The report concludes with a summary of mechanisms for implementation of conservation methods and criteria for use in evaluation of them. Throughout the report, emphasis is placed on technical options. The economic implications of such options have not been detailed.

21. National School Boards Association. *Schools and the Energy Crisis. A Research Report.* Evanston, Illinois: 1973. 49 pages. ED 088 203 MF $0.76 HC $1.95.

This report summarizes information from 43 states, the District of Columbia, Puerto Rico, and 55 local school districts. The majority of the information in the report was provided by state school boards associations and NSBA direct affiliate districts. Survey results indicate that (1) nationwide, at both the state and school district levels, schools have been cooperative with requests to constrain energy use and willing to institute voluntary measures to conserve energy; (2) the energy crisis has had different effects on schools in different regions of the country, and shortages of fuel for buses (and escalating prices for available fuel) are nationwide; (3) with few exceptions, the emphasis in schools has been on developing short-range methods to cope with fuel shortages; and (4) more often than not, respondents discussed energy conservation measures but failed to discuss the character of actual energy shortages. State school boards association responses to the energy crisis vary. A few exercise active state leadership (Nebraska and New Jersey); most are cooperating with the state government agencies (Iowa and Michigan); some have chosen only to keep aware of the state situation (Alabama and Nevada).

22. Oswalt, Felix E. *Computer Profile of School Facilities Energy Consumption.* Memphis, Tennessee: Memphis City School System, 1972. 7 pages. ED 078 508 MF $0.76 HC $1.58.

This document outlines a computerized management tool designed to enable building managers to identify energy consumption as related to types and uses of school facilities for the purpose of evaluating and managing the operation, maintenance, modification, and planning of new facilities. Specifically, it is expected that the statistics generated will (1) provide information to aid in evaluating the human element of operating the facility, with reasonable consideration for the cost of energy consumed; (2) identify malfunctions of equipment and/or controls that result in unusual consumption of energy; (3) identify inefficient equipment that should be modified or replaced; (4) provide a comparative evaluation of different types of building enclosures in terms of energy consumed; (5) provide a comparative evaluation of different types of mechanical systems in terms of energy consumed; and (6) provide statistical information for forecasting energy consumption and managing budgeted funds.

23. Ross, Doris M. *Education's Response to the Energy Crisis. A Survey of the States.*

Research Brief, Volume 2, Number 1. Denver: Department of Research and Information Services, Education Commission of the States, 1974. 31 pages. ED 103 216 MF $0.76 HC $1.95. (Also available from Education Commission of the States, 300 Lincoln Tower, 1860 Lincoln Street, Denver, Colorado 80203. $2.00.)

This report lists the results of a 50-state survey on education's response to the energy crisis conducted in December 1973. The survey asked respondents in state departments of education and state higher education executive offices to report facts about their state's response to the energy crisis, as well as their own opinions and projections. Seventy-two respondents in 48 states sent back completed questionnaires from which information was extracted for this report. Among the topics discussed are action that has been taken, transportation and heating, contingency plans formulated by states, state legislative changes, gasoline shortages, rising costs, education and the economy, ecology, unique scheduling alternatives, and lesson plans. A copy of the survey instrument is included in the appendix.

24. Stein, Richard G., and Stein, Carl. *Low Energy Utilization School: Research, Design, Construction, and Evaluation. Phase I: Interim Report.* New York: Richard G. Stein and Associates, Architects, 1974. 297 pages. ED 099 962 MF $0.76 HC $14.59. (Also available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 3800-00194, $3.75.)

The purpose of this study was to establish more precisely what factors determine energy use in schools, to evaluate the efficiency of and necessity for these, and to make recommendations for the reduction of energy use. These recommendations will be applied to the design of specific projects that will be built, monitored, and evaluated. This report covers the predesign research phase. Data sources for the study include New York City schools, five suburban school systems in the New York City region, and 31 electrically heated schools in the northeastern United States. The report concludes that with recommended new standards in lighting, ventilation, and building design and with utilization of solar energy schools can be designed to operate with no educational penalty at a savings of from 25 to 50 percent of the monitored New York City level.

SUBJECT INDEX