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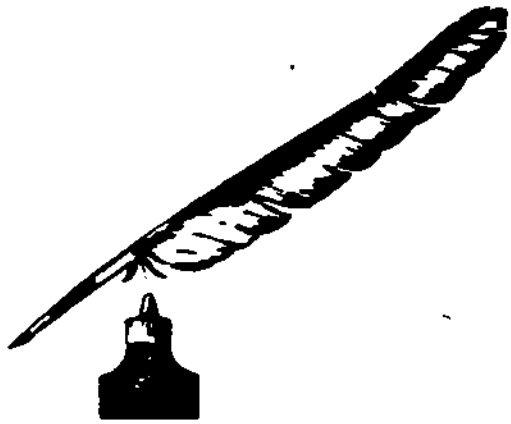
ABSTRACT

Presented are guidelines and recommendations for establishing and implementing a school energy management program. An effective plan of action requires setting an achievable goal, establishing and maintaining communication, assigning actions, monitoring progress, and evaluating the entire process. Teachers, students, and staff should all be involved and energy education activities should be infused into regular classroom experiences. Each of these aspects of an energy management program is outlined in this manual. Included are sources of assistance in developing conservation measures and energy-related activities. (NB)

Managing Your School's Energy Dollar

Keeping Your Schoolhouse Out Of The Red . . . . .

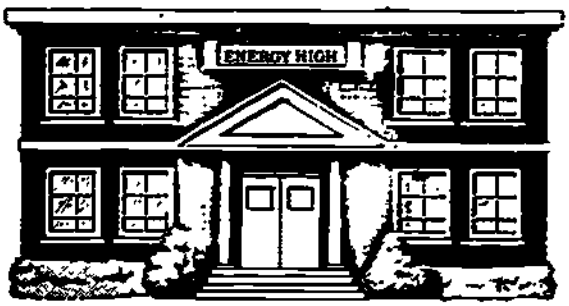


U.S. Department of Education,
Office of School Improvement,
Energy and Education Action Center;
Washington, D C.
July 1980

WHY
WHO
HOW
WHERE

. . . *Makes Good Educational Cents!*

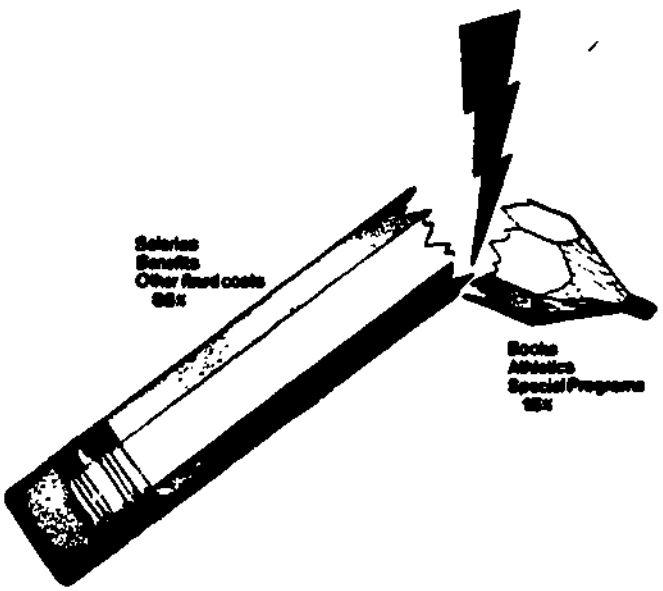
Last year the nation's schools spent over $3 billion to heat, cool and light their buildings and the trend is toward higher costs in the future. Per pupil energy costs have tripled from $20 in 1973 to over $60 in 1979. Increases only in energy costs since 1973 are the equivalent of over 180,000 teaching positions.



The "lamp of knowledge" burns oil, a significant amount of which originates from foreign sources. A continued dependence of our nation on foreign oil can only result in an increased imbalance of trade, more inflation at home, a weakened dollar abroad, and a greater vulnerability to the whims of foreign powers. Educating for energy literacy, as well as for energy management in the school and the community, can be your response to a critical national concern.

This booklet is designed to help you establish a practical energy management program which involves teachers, staff and students.

Wilton Anderson
Director, Energy and
Education Action Center



WHY YOU SHOULDN'T "WRITE OFF" THE RISING COSTS OF ENERGY:

Because sky-rocketing energy costs are consuming a disproportionate share of your budget;

Because this can diminish the effectiveness of your educational programs;

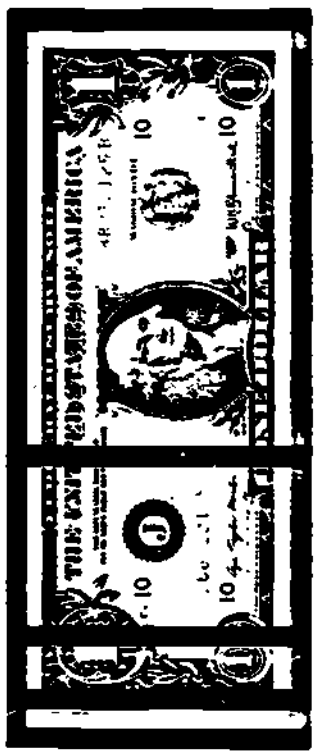
Because a weakened educational system threatens our democratic system

and

Because, as an educator, you care.

TYPICAL ENERGY DOLLAR FOR EDUCATIONAL INSTITUTIONS*

Heating Ventilation Air Conditioning:	$.65
Lighting Special Educational Equipment:	$.25
Food Services:	$.07
Hot Water:	$.03



*Adapted from NTIS circular HCP/M5250 - 01/1

THE VALUE OF SCHOOLHOUSE ENERGY MANAGEMENT

It has long been believed and just recently confirmed by an independent study that schools can reduce their energy usage by almost 50% with the implementation of a total energy management program.

The greater cost avoidance occurs in heating fuels (over 60%), with the remainder being in electricity.

----- **AND,** according to that same study, the average payback for selected energy conservation investments is less than one year!

INTEREST --- ed?

Investing in energy conservation is a wise choice. Even though schools have traditionally invested their capital in stocks, bonds and securities, it makes more ¢ents to get the best return through energy conservation. It doesn't take a mathematical wizard to compare interest rates with rising energy costs!

WHO CAN HELP YOU MINIMIZE THE ENERGY "BITE" ON YOUR BUOGET?

YOUR energy management team.....

YOUR local administrators.....

YOUR faculty.....

YOUR operations/maintenance personnel...

YOUR support staff.....

YOUR students.....

and

THEIR parents

because THEY care, too!

But . . . . THEY need your help and your guidance, and YOU need a PLAN of ACTION. A practical and effective plan should emphasize that:

1. COMMUNICATION IS VITAL. It must be frequent, concise and consistent.

2. INCENTIVES ARE EFFECTIVE. Rewards and continual training produce more positive results than scare tactics.

3. TOTAL INVOLVEMENT IS CRUCIAL. Individuals who are actively involved will support conservation efforts with a higher level of commitment than those who feel no sense of "ownership" in the school's management program.

AN EFFECTIVE PLAN OF ACTION REQUIRES:

1. AN ACHIEVABLE GOAL - Providing for ACCOUNTABILITY
2. COMMUNICATION - MOTIVATING for involvement
3. ACTION - Giving the ASSIGNMENTS
4. MONITORING - Collecting the DATA
5. EVALUATION - PASSING the COURSE

. . . . . *And An Infusion of Energy Concepts Into The Curriculum!*

SET AN ACHIEVABLE GOAL

YOUR GOAL SHOULD BE:

- realistic and should not frustrate or discourage involvement. Initially, try for a 10 or 15% reduction in energy consumption.
- translated into energy units such as BTU's, cubic feet of natural gas, kilowatt hours of electricity - NOT DOLLARS - to reflect ACTUAL savings.
- associated with the elimination of the HABIT of WASTE.
- related to no-cost or low-cost operational and maintenance opportunities.

EXAMPLE

> ENERGY CONSERVATION GOAL
>
> Our school has established an energy management goal of reducing annual energy consumption by 10% by increasing the efficiency of our energy usage. We need everyone's help.

ESTABLISH AND MAINTAIN COMMUNICATION

EFFECTIVE COMMUNICATION SHOULD:

INFORM staff and students of the importance of the goal; it should also be targeted to parents and community organizations.

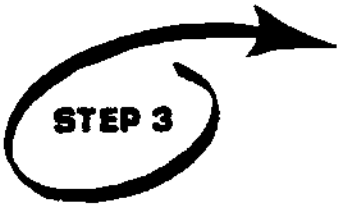
ORIGINATE with the ENERGY MANAGEMENT TEAM and be issued in the form of reminders and updates on a regular basis.

be both ORAL and WRITTEN; graphic and artistic displays should be utilized to gain and maintain momentum and enthusiasm.

include DATA collected by the ENERGY MANAGEMENT TEAM and should illustrate anticipated objectives.

always be POSITIVE, CONCISE and NON-THREATENING.

REFLECT the PROGRAM'S STATUS.



ENERGIZING FOR ACTION

HOW TO PROCEED

ESTABLISH AN ENERGY MANAGEMENT TEAM - Who can help you?

1. AT THE DISTRICT LEVEL - One individual should be in charge of coordinating your district-wide program and monitoring consumption and costs. This person should work with the leader of each facility's Energy Management Team at regular meetings and be responsible to the superintendent.

2. AT THE BUILDING LEVEL - Your building Team should be composed of the following individuals and they should select a leader:

    a. Principal
    b. Teacher
    c. Operations/ Maintenance Supervisor
    d. Support Staff Representatives
    e. Food and/ or Transportation Supervisor
    f. Parent Representative of Parent, Teacher, Student Organization
    g. Student Body Representative

BEGINNING YOUR PROGRAM - How can you motivate your staff?

1. The district energy coordinator should design a special training workshop for the Energy Management Team. Then, specific tasks should be assigned to specific individuals. These tasks should include:

    a. Assessing the current level of interest in energy conservation of the faculty, staff and students with a brief survey form, meetings or individual contacts.

    b. Scheduling brief, yet informative faculty meetings, PTSA and assembly programs to stimulate interest and awareness of the need for energy conservation in the nation - and in your schools. Make sure your programs are presented in a concise and dynamic manner.

2. Utilize one-day inservice meetings as ongoing energy conservation training programs, designed and implemented by the Energy Management Team, for the entire faculty and building support staff. Use these inservice opportunities to maintain a high level of commitment and enthusiasm.

3. Establish a committee composed of interested teachers and led by a representative of the Energy Management Team. Determine what energy topics are currently being taught and collect other energy education materials for possible introduction into the curriculum.

ESTABLISH BASELINE DATA - How much are you using?

1. Analyze utility bills, charting fuel and electricity consumption separately (be sure to include demand readings) and in a common energy unit such as the BTU. Data charts can be designed by a member of the Team, or obtained from your State Energy Office.
2. Use graphical representations to display previous, current and projected energy costs at meetings of staff and parents.
3. Obtain degree-day data from your utility or weather bureau to compare months of successive years and to forecast future consumption.
4. Inform your local utility of your program and ask to work with your representative to reassess your school's rate structure, to learn how electrical demand influences your costs and other ways the utility can help you sustain your program.

IDENTIFY MAJOR AREAS OF CONSUMPTION - Where have all the BTU's gone?

1. Conduct a walk-through energy audit of your building — inside and outside — utilizing the Energy Management Team. Energy audit forms can be obtained from the U.S. Department of Energy or your State energy office. (If your district is participating in the Federal Institutional Building Energy Grants Program, be sure the audit forms you select are in compliance with State and Federal regulations.)
2. Although not critical to the outcome of the audit, two inexpensive devices — a light meter and thermometer — can be especially helpful to the Team.
3. When the audit has been completed, it is important for the Team to "debrief," consolidating data and discussing the findings. Areas of high consumption and energy waste should be identified. The Team should give special consideration to:
   - reducing excessive fresh air in ventilation systems.
   - matching heating and cooling hours with actual operation schedules; using temperature setbacks when building has limited occupation.
   - programming operations to avoid high electrical demand charges.
   - substituting lower wattage tubes which can save up to 14% and reduce air conditioning loads.
   - examining vestibule doors for proper functioning to avoid heating/cooling losses.
   - implementing workshops/seminars to illustrate how illumination can be reduced but still be effective.
   - checking outside lighting to be sure it is in phase with natural lighting and operation schedules.
   - inspecting mechanical equipment periodically for proper functioning. (Frequent thermostat readjustment can be an indicator of malfunctioning equipment.)
   - lowering thermostat settings during the heating season. (For each degree lowered, you can realize a savings of approximately 3%.)
   - raising thermostat settings during the air conditioning season. (Setting at 78°F instead of 72°F is approximately 25% savings.)
   - adjusting custodial hours to coincide with good energy management.
   - utilizing any available natural lighting.
   - questioning the need for and the operating hours of some exhaust fans. (Often fans are discovered to be operating in reverse.)
   - examining motors for proper maintenance and efficient operation.
   - cleaning lighting and mechanical equipment.
   - examining delivery areas for possible heating or cooling loss.

4. Inform the faculty, staff and student body of major findings with memoranda, signs and/or posters.

DECIDE APPROPRIATE OPERATIONAL/MAINTENANCE (O&M) OPTIONS - What inexpensive options does the Team recommend?

Many energy audit forms contain an audit "checklist." Some (Making Cents of Your Energy Dollar, Schoolhouse Energy Efficiency Demonstration [SEED] Project) combine the checklist with appropriate O&M and ECM (Energy Conservation Measures: retrofit and redesign) options. The former can usually be implemented quickly utilizing building or district personnel; the latter requires special expertise and/or equipment.

Implementation of specific O&M's should be assigned to specific individuals who are given specific deadlines. Remember: An effective program requires the involvement of all concerned.

DECIDE APPROPRIATE ENERGY CONSERVATION MEASURES (ECM's) - What options requiring major capital outlay does the Team recommend for consideration?

Use the simple payback equation to rank ECM's. Those yielding the most rapid payback period (1-5 years) should be implemented first. Remember — Simple Payback does NOT take into account escalating energy costs and product cost inflation.

$$\text{SIMPLE PAYBACK} = \frac{\text{Estimated implementation cost}}{\text{Estimated first year dollar savings}}$$

COMMUNICATE YOUR DECISIONS - What should they expect?

1. Organize the Team's decisions according to the building's eight energy using systems:

Human	Cooling
Envelope	Ventilation
Lighting	Water
Heating	Special

2. Utilize special inservices, meetings, workshops and/or assembly programs to inform everyone of the Team's decisions. Explain how various groups or individuals will be involved in your school's comprehensive energy conservation program. For example, have individuals explain:

   - how energy concepts will be infused into the traditional curriculums of each discipline (utilize work of the Faculty Energy Education Committee:)
   - how the student body will be actively involved in promoting energy conservation;
   - how consumption will be reduced in high energy waste areas;
   - how the parent-teacher-student organization will be involved;
   - how consumption will be reduced in the building's eight energy using systems.

MONITOR YOUR CONSUMPTION

YOUR ENERGY MANAGEMENT TEAM SHOULD CONTINUE TO:

- RECORD consumption of fuels, including electrical demand, for each billing period.
- COMPARE current consumption with baseline and degree-day data.
- CONDUCT walk-through energy audits for each season and during times in which the building is occupied and unoccupied.
- DETERMINE energy and dollar savings or extra costs.
- COMMUNICATE results with attractive posters, charts and memos.
- ENCOURAGE total program involvement.

EVALUATE YOUR PROGRAM

YOUR ENERGY MANAGEMENT TEAM SHOULD:

- DETERMINE whether your goal has been achieved for each billing period.
- IDENTIFY strong and weak points of the program.
- MODIFY procedures to increase program effectiveness, motivation and involvement.
- INFORM everyone of the proposed programmatic changes.
- RENEW commitment to the program.

RECHARGING YOUR CURRICULUM

YOUR FACULTY ENERGY EDUCATION COMMITTEE SHOULD SELECT, LOCALIZE AND DEVELOP ENERGY ACTIVITIES WHICH MEET THE NEEDS OF TEACHERS, STUDENTS, AND THE COMMUNITY. THE FACULTY SHOULD THEN INFUSE THESE INTERDISCIPLINARY ACTIVITIES INTO YOUR SCHOOL'S EDUCATIONAL PROGRAMS, UTILIZING THE SCHOOL BUILDING AS AN ENERGY LABORATORY.

For starters you might consider the following:

1. Student energy survey of building
2. Energy Fair staged for the community
3. Poster contest: "Alternative Energy Sources"
4. School-wide "Energy Week"
5. Solar construction projects: cookers, greenhouses, etc.
6. Student energy speakers' bureau/debate club
7. Field trips to energy production/distribution plants
8. Student-conducted home energy audits
9. Student contributions to school/community newspapers
10. Student-designed plays, puppet shows, role playing and slide presentations

11. Student investigation of local energy issues/concerns, utilizing energy resource center in IMC
12. Research of historical patterns of energy use
13. The concept of exponential growth of per capita, national and global energy consumption
14. Use math and art classes to design and construct graphical representations of school's energy consumption patterns.
15. Use energy cartoons for collages, discussion and reports.
16. Analyze gasoline consumption in school and home transportation patterns.
17. Analyze energy consumption of various steps in food processing and preparation.
18. Student design of energy efficient schools/homes, utilizing alternative sources of energy
19. Analyze toys for their energy conversion efficiencies.
20. Use a computer to simulate your school's energy consumption patterns and to recommend modifications for greater energy efficiency.

WHERE CAN YOU OBTAIN ASSISTANCE?

There are many private and public agencies which can help you establish and sustain your school's comprehensive energy conservation program. Note: In seeking Federal funds for your programs, do not overlook legislative resources which are already available because many of them could support your efforts.

A. Facilities

1. U.S. Department of Energy
2. State Energy Office
3. ASHRAE (American Society of Heating & Air Conditioning Engineers)
4. AIA (American Institute of Architects)
5. Local energy engineering firms
6. American Association of School Administrators

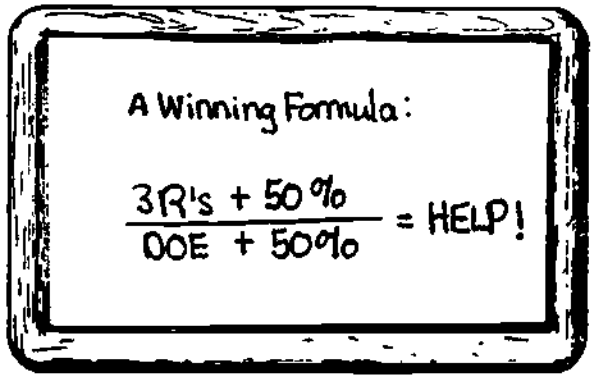
.... and from us - the Energy and Education Action Center!

B. Curriculum

1. State departments of education
2. National Science Teachers Association
3. Education Commission of the States
4. Local energy education consulting firms
5. Solar Energy Research Institute
6. Private corporations

.... and from us - the Energy and Education Action Center!

C.



The National Energy Conservation Policy Act (NECPA) of 1978, (P.L. 95-619), contains major grant programs which provide 50% matching Federal assistance to help you REEXAMINE (Energy Audits), REDESIGN (Technical Assistance Program) and RETROFIT (Energy Conservation Measures) your school. OOE and your State have a plan to help you. Call your State Energy Office for details.

and...

Remind your teachers frequently to:

1. Keep windows and doors tightly closed when the building is being heated or cooled. Use corridor exits rather than exterior classroom doors.
2. Report malfunctioning thermostats and drips or leaks of any kind to the custodian.
3. Be sure that unoccupied spaces are not being heated, cooled or illuminated unnecessarily.
4. Be sure airflow from heating, cooling and ventilating units is not blocked by books, papers, coats or equipment.
5. Turn off exhaust fans when not needed.
6. Use blinds and shades to control solar gain, natural lighting and heat loss.
7. Avoid using large electrical equipment (e.g., welders, kilns, etc.) during high energy demand periods (10:30 a.m. to 1:00 p.m.).
8. Wear warmer clothing during the heating season, cooler clothing during the cooling season.

ENERGY HIGH, U.S.A. — Report Card

Pass	Fail	Subject: ENERGY MANAGEMENT PROGRAM
		District-level energy coordinator appointed
		Local Energy Management Team members appointed
		Achievable goal of _____ % energy reduction established
		Functioning communication network created
		Inservice training meetings for faculty/staff scheduled
		Faculty Energy Education Committee formed
		Baseline energy consumption data collected and organized
		Major energy consuming areas identified
		Appropriate O & M options decided
		Appropriate ECM options considered
		Team decisions communicated
		Consumption monitoring program initiated
		Energy management program evaluated
		Recharged the curriculum

YOUR NEXT ASSIGNMENT

Help us help you to share information which may be of value to others. Because one of the major functions of the Energy and Education Action Center is to serve as a clearinghouse, you are encouraged to assist others by forwarding copies of your best energy conservation materials to us.

* U.S. GOVERNMENT PRINTING OFFICE : 1980 O - 320-606

"We need you!"

WE WANT TO HELP YOU

establish a practical energy management program for YOUR school . . .

Should you need additional information, please call us at (202) 472-7777 or use the attached card.

I would like to receive additional information on the following: (Please be specific.)

- ☐ Sources of Federal Funds _____
- ☐ Federally funded products/materials _____
- ☐ Audit forms _____
- ☐ Data forms _____
- ☐ Management programs _____
- ☐ Elementary curriculum materials _____
- ☐ Secondary curriculum materials _____
- ☐ Other _____

Name _____

School Name _____