MANAGEMENT EXPERIENCE IN PUBLIC SCHOOLS

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ABSTRACT

Public schools have a continuing dilemma of escalating energy costs, deferred maintenance, and enrollment shift. Schools have experienced difficulty in dealing with budgeting and subsequent control of maintenance and operating costs. It is essential that schools carefully plan their energy use and cost just as they plan any other resource. This paper discusses experience obtained in assisting Texas Public Schools in using energy more efficiently. Energy management planning and typical energy conservation measures implemented are discussed.

Our energy management experience in Texas Public Schools has been obtained by conducting energy audits and technical analyses, developing energy management plans, designing retrofit energy conservation projects, and designing mechanical and electrical systems for new school buildings. Detailed energy studies and analyses have been accomplished for more than 150 school buildings. Engineering design work has been accomplished for more than forty school districts. Sharing our experience in assisting schools in using energy efficiently is a welcome opportunity. Our basic approach is to assist schools in using energy efficiently. Energy management should be a tool for increasing productivity. Therefore, when we communicate to anyone the importance of energy conservation, we speak in terms of increasing the productive output per unit of energy consumed or simply an increase in the efficiency of energy used. For schools, we speak in terms of reducing the energy consumed per square ft. of building area. This approach or concept is readily accepted as opposed to energy conservation by eliminating comfortable environments and adequate lighting.

The efficient utilization of energy requires technical and management skills and careful planning. Many school districts do not have the information or specialized skills to identify energy management or conservation opportunities beyond the simple obvious techniques such as turning off lights. It is essential that schools carefully plan their energy usage just as they do any other resource or item. To accomplish successful energy management on a continuing basis, schools must have an organized plan. The higher costs of energy have shifted the economic tradeoffs of managing schools. Investments in energy saving systems are increasingly cost effective. An alarming indicator is the difference in the rate of increase in net current expenditures. The American School and University publication publishes maintenance and operations cost studies for schools. Our observations are similar to their findings in that unless the maintenance and operations cost trend is reversed, average expenditures will soon exceed 20 percent of the schools' operating budget. The major cause of the problem is escalating energy costs. Examples will be provided during the discussion of this paper. Our experience indicates that during the past two years most public schools have initiated action to reverse this trend. The energy management situation and programming is seriously complicated and influenced by the fact that many school districts have deferred maintenance because of budget pressures. Some schools have experienced declining enrollment without corresponding decreases in facility size or numbers. For example, two small school districts we served had their energy management strategy altered simply because declining student enrollment resulted in significant reduction of operating funds available to the district. The Superintendent and School Board simply could not balance the enrollment reduction, required staff, and facilities required without reaching into funds budgeted for a major energy conservation project.

Schools have obvious benefits of establishing an energy program and allocating funds to use energy more efficiently. Controlling energy costs can free dollars for salaries, programs, etc. Significant achievements might prevent additional taxes, minimize tax burdens, or at least make additional taxes more palatable if every effort is taken to operate schools efficiently. School funding and new dollar sources are a constant topic of newspapers, school administrators, and lawmakers.
Public school energy management is the consideration of energy and its cost in managing, planning, and constructing schools. This approach of cost containment is an on-going process. Questions frequently encountered include the following:

- What are the steps of energy management?
- What is the best short-cut to "get right down to savings?"
- How much will it cost to save energy?
- Where do I get the money?

We propose that there are no short-cut gadget methods of sustained energy cost containment. Basically there are three fundamental ingredients of successful energy management which must be implemented if actual dollar savings are to be achieved.

- Commit to Action
- Organize to Action
- Action (Initial and On-going)

Figure 1 illustrates a logical flow of work to accomplish the efficient use of energy in schools. Each step of Figure 1 to the subject for a lengthy discussion and suitable topic for a separate paper. A few observations, however, are appropriate for this session because of their critical nature.

Top administrators must lead the way. This fact has been observed without exception. Until the school board and superintendent decide that energy cost is an important part of their budget and make a public commitment to control these costs, no significant achievements are likely to be made. At the present time, dollars are the argument of justification (financial) and personnel (human) to manage energy more efficiently. In the future, availability of certain resources within acceptable price ranges may be a problem.

The function of the energy manager must be understood by all functions. Experience shows that the day-to-day energy management tasks fall on maintenance personnel, and principals. In many cases particularly in small to medium size schools, the principals are the building operators. They also become involved in maintenance activity. A formal energy management organization is recommended regardless of the district size. The district energy manager must be separate from the administrative office and not the maintenance department is responsible for energy management. Basically the district energy manager is someone such as the superintendent or business manager who has financial responsibilities in the district. One district has operated successfully with the business manager as district energy manager. A successful exception to this suggestion is a large East Texas school district with a professional administrator responsible for energy management, maintenance, construction, and renovation work. This individual has the managerial capabilities and control in how the buildings are operated. For example, power to the cooling mode of air conditioning is provided on a minimum scheduled date and cannot be turned on other than the superintendent for "something to be done about increasing energy costs," to spark successful energy management programs. Making successful energy management as a part of job performance ratings in one method of demonstrating action concerning the school's policy to use energy efficiently. The school administrators initial action should include setting specific goals, formulating the organization, and allocating resources to accomplish the tasks. The district may discourage follow if energy task assignments are made and dollars allocated, but additional dollars keep being focused or "putting out daily fires" does not allow adequate time. A word of caution is to be specific in allocating time for personnel to manage the energy.

As a result of laws passed by Congress and dollars appropriated, the U. S. Department of Energy and State of Texas Public Utility Commission administers an energy grant program to assist schools in managing their energy. Based on our observations, this grant program has been successful because it has provided cost sharing assistance which has served as "seed money" for schools to venture into energy management. It also has resulted in several schools making advances and improvements that might not have ever been accomplished or certainly not for a long time. The grants provide cost sharing for professional engineers to conduct detailed energy technical analyses and for actual incorporation of energy conservation measures identified and recommended by the engineers. One of the major benefits of the grant program is that it has frequently participated with the educators in the detailed engineering studies of all or the majority of school buildings in their district. This is significant in that district wide project ranking and strategy for capital expenditures can be carefully organized and programmed. School districts have experienced that grants first results in savings which can be applied to other energy projects. Problems school districts have experienced with the grant program will be discussed during the session.

The most frequent cost effective and implemented energy conservation measures we have observed are the following:

- Providing controls for HVAC systems.
- Installing insulation and an adequate amount of insulation in a school's buildings with no expenditure.

Table I. Typical Energy Conservation Measures, is a partial listing of energy conservation measures which we have identified, analyzed, recommended, and provided engineering services (plans and specifications) to implement. In addition to these type projects, low cost or no cost maintenance and operating procedures/projects can result in significant benefits.

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OBJECTIVES:

REDUCE ENERGY CONSUMED PER SQ. FT. OF AREA

REDUCE RATE OF INCREASE OF M & O COSTS

SCHOOL BOARD & SUPERINTENDENT COMMITMENT

MANAGEMENT ORGANIZATION & ACTION

• AUTHORIZE BUDGET
• SELECT ENERGY MANAGER/TEAM
• COMMUNICATE

INITIAL ACTION/ACTIVITIES

• CONDUCT ENERGY STUDIES
• DETERMINE ENERGY SITUATION

SHORT RANGE
LONG RANGE

SET SPECIFIC GOALS

DEVELOP STRATEGY

DEVELOP OPERATIONAL/PROJECT PLANNING

APPLY FOR ENERGY CONSERVATION MEASURE GRANTS

ACTION IMPLEMENTATION

FEEDBACK & CONTROL

LONG RANGE PLANNING

MANAGEMENT REVIEW/ACTION

Figure 1 SCHOOL ADMINISTRATION MANAGEMENT ACTION PLAN

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Typical Energy Conservation Measures

- Central energy management control system
- Cooling insulation
- Separate domestic and space heating hot water
- Hot recirculation
- Return space heating hot water as a function of ambient temperature
- Lockout slab floor heating system until pre-set low ambient temperature
- Close-up old wood frame windows
- Window treatment
- Fluorescent lights to replace incandescent
- Metal halide lights to replace incandescent in gym
- Thermostat control of HVAC system
- Solar energy for domestic hot water

Accurate feedback on actual dollar savings and energy savings sometimes is difficult to obtain because of seemingly constant changes in function, usage, extreme weather variations from year-to-year, and remodeling or additions. Recently we obtained good comparisons on two projects. A central microprocessor energy control system was designed for a 125,000 square ft. high school. Savings achieved during the first three months of operation compared to the previous similar year were 230,500 kw-hrs and $8,462. The actual dollar savings does not make any adjustments for approximately a one cent per kw-hr rate increase which was in effect the entire three months. Separating domestic and space heating hot water system at a middle school also saved $4,652 during the first three months of operation. Locking out slab floor space heating until a pre-set low ambient temperature was reached saved several hundred dollars per month at one school, as well as resulting in significantly better comfort.

The following concluding paragraphs summarize additional observations made while working with public schools during the past few years. Suggestions and topics for further evaluation and study are also provided. Each of these topics will be discussed during the session. For example, the type of central energy control system, if any, for a school district is a main concern. Pressures seem to come from all directions when this topic surfaces. One factor to be discussed is matching need, cost effectiveness, and personnel capabilities.

Incentives to manage energy efficiently

- Sharing cost savings with principals (in planning stage).
- Energy usage (kw-hr, mcf) part of job performance review of principals.

Awareness/Action Subheading

- Energy management part of teachers in-service day.
- Principals receive monthly usage and cost of energy compared to previous year.
- Idea contests for students and faculty.
- School board directives.
- Posters and charts displayed.
- Energy usage considered in new facility planning.
- Student concerns and knowledge.
- Participation in State energy grant programs.
- Establishing energy budgets for new schools.
- Specific energy related questions from school board members.

Typical Concerns of School Boards and/or School Superintendents

- What will be the relative cost difference between natural gas and electricity for the next 10-15 years?
- What type of energy management control system should we buy? What should be considered? What approach should be used in purchasing a system?

Suggestions/Recommendations

- Revise State/D.O.E. energy grant program to include buildings occupied before 1982 rather than 1972.
- Revise State/D.O.E. energy grant program to include matching funds for outdoor security lighting.
- Revise State/D.O.E. energy grant program to include cost savings due to maintenance in evaluating cost-effectiveness of energy conservation measures.
- Develop "how-to" films on energy management for viewing of public schools, students, and teachers in-service days.
- Provide recognition/awards for achievements and leaders in public school energy management.
- Conduct detailed study and make results available that show long term benefits of employing higher skilled maintenance personnel.
- Adapt microcomputers into maintenance planning activity and energy usage/performance tracking.

Long Term Considerations Suggested for Evaluation

The following thoughts are provided to encourage re-thinking and objective innovative long range planning of public school energy management considerations.

- Consider twelve month full-time calendar.
- Evaluate basic school district approach in Texas.
- Should smaller and rural school districts be consolidated?
- Would leasing of public schools save money, including energy dollars?
- Build larger schools with greater usage.

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