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ABSTRACT

This document provides information and suggestions to enable education officials to better control rising energy costs and to plan appropriate reactions to energy supply disruptions. Information is also provided on major changes in federal policies addressing energy shortages and the implications of these policies for state and local jurisdictions. The major focus of the document is on information generally not available in current energy plans: revised federal policies, characteristics of state energy contingency documents, planning considerations, fuel characteristics, and energy supply management techniques. Also included are the conclusions and recommendations made by the State Energy and Education Task Force. An annotated bibliography lists sources of information for monitoring energy-related data, a sampling of state-developed energy conservation and emergency plans, and other related references. (Author/JN)

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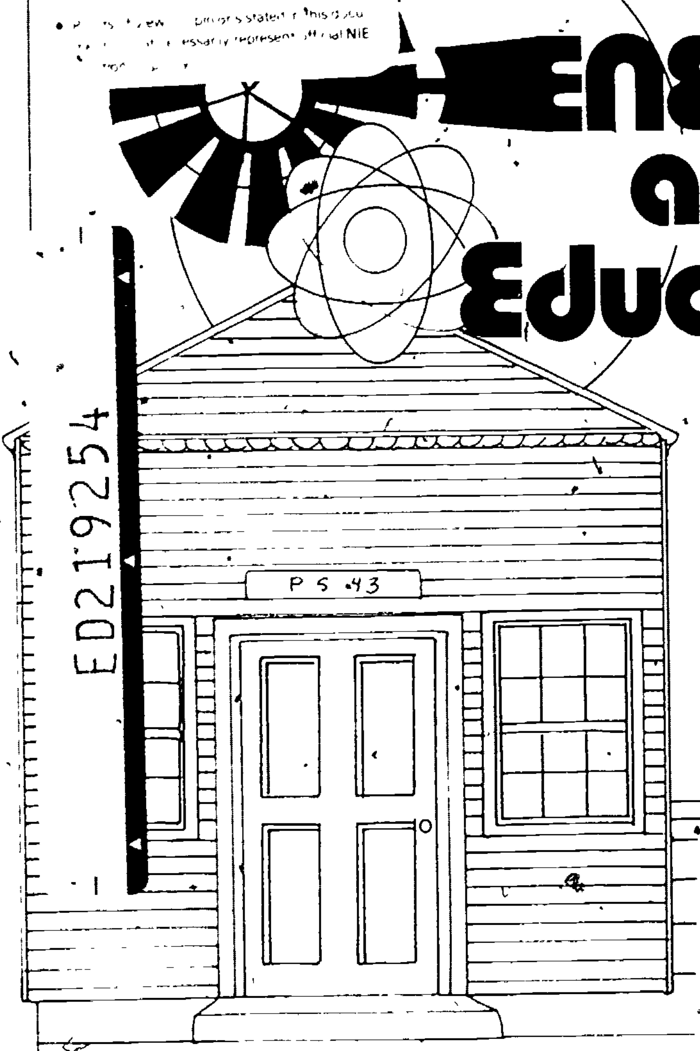

Education Commission
of the States

Planning for Higher Prices and Potential Shortages

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Energy and Education:

Planning for Higher Prices and Potential Shortages

Report No. 182-2

by Edith M. Petrock
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State Energy and Education Project

Education Improvement Center
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July 1982

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Contents

Preface

Energy and Education Planning for Higher Prices and Potential Shortages is designed to provide information and suggestions that will enable education officials to better control rising energy costs and to plan appropriate reactions to energy supply disruptions. It also informs education decision makers about major changes in federal policies addressing energy shortages and the implications of these policies for state and local jurisdictions.

Because conservation measures must be site-specific in their application and because many state and local education and energy departments have already written excellent energy management handbooks, this publication is not intended as a conservation guide. Instead, a sampling of energy conservation handbooks is provided in the annotated bibliography. (Readers utilizing any of these documents are cautioned, however, to exercise their own judgment and experience in selecting only those energy saving options that may be appropriate to their setting and situation.)

This publication focuses on information generally not available in current energy plans. revised federal policies, characteristics of state energy contingency documents, planning considerations, fuel characteristics and energy supply management techniques. Also included are the conclusions and recommendations made by the State Energy and Education Task Force, chaired by the Honorable Richard D. Lamm, governor of Colorado, and composed of policy makers and experts in energy and education matters. The annotated bibliography lists sources of information for monitoring energy-related data, a sampling of state-developed energy conservation and emergency plans and other related references.

Overview

Energy is crucial for maintaining educational programs. It heats, cools and ventilates facilities, transports students, faculty, administrators and support personnel, illuminates classrooms, runs computers, audiovisual and office equipment, and supports energy-intensive vocational/technical programs.

Since the 1973-74 oil embargo, some schools have been forced to close sporadically or curtail activities because of energy shortages caused by international, regional and local events.

Along with disruptions, schools have experienced dramatic increases in energy costs. Prior to the OPEC oil embargo, per-pupil energy costs for elementary/secondary schools averaged $20 per year. By the 1980-81 school year, this figure had jumped to over $100 – five times as much.

School systems generally rely on three major energy categories. petroleum; natural gas, and electricity generated from coal, oil. nuclear or hydropower. Projections for a continuous supply of these sources are not encouraging. (The present petroleum surplus can be misleading because petroleum is only one energy source, and its availability and price could be altered by a number of factors, including a surge in the economy, a disruption in imports or a slowdown in foreign or domestic production.)

Despite the present leveling in the cost of petroleum, most energy experts predict continuing increases in aggregate energy costs. The hotly debated natural gas deregulation proposals will inevitably raise prices. Since approximately 60 percent of U.S. schools rely on natural gas for space heating, education could be hit particularly hard by these rising costs. The impact of projected increases in electric utility rates, largely due to regulatory changes and higher fuel costs, could be compounded in some areas by anticipated rises in total demand significantly above projected generating capacity. (Projections published in the November 1981 issue of *The School*

Administrator suggest that energy cost increases could translate into actual per-pupil energy costs of $282 to $380 by 1985 and $515 to $689 per pupil by 1989 – a five-fold jump during this decade.)

Regardless of whether schools experience energy supply shortages or higher energy costs, school functions can be threatened. Higher energy costs have the potential of diverting a portion of school budgets that could be spent on instructional programs and other activities. Supply shortages ranging from mild to severe can result in partial or extended school closures.

The proposed federal policy dealing with rising energy costs is to remove existing regulations, stimulate domestic energy production and, in the event of another energy supply disruption, allow pricing to restrain demand and the free market to allocate scarce resources.

Because of federal budget cuts in programs aimed at helping state and local agencies deal with higher energy costs and supply disruptions, states and local units of government will have to assume greater responsibility for dealing with these energy issues. However, most state and local jurisdictions do not have comprehensive contingency plans that specify actions to be taken in the event of an energy supply shortage or sudden rise in cost. Moreover, existing state and local plans often ignore or do not deal effectively with the education sector.

While education policy makers cannot control market forces, they can take action to help insulate the education sector from some of the impacts resulting from supply shortages and price escalations. Many schools have already instituted low-cost energy conserving measures as a response to past price hikes and supply scarcities. Others have not yet implemented energy efficiency programs and therefore are more vulnerable. This publication is designed to assist state officials in helping the education sector prepare for potential energy shortages and higher prices.

I. Introduction

Prior to the 1973-74 oil embargo, per-pupil energy costs for elementary/secondary schools averaged $20 per year. By the 1980-81 school year, this figure had jumped to over $100 and was expected to climb another 25 percent for the 1981-82 school year, the exact figure varying according to fuel type, geographic region, and the extent to which conservation measures had been implemented.[1] Nationally, the annual per-pupil energy cost translates to over $4.5 billion. Since states pay approximately 49 percent of the costs of public elementary/secondary education, the state share of the education sector's energy bill is about $2.2 billion.

As dramatic as recent price increases have been, the rapid escalation of energy costs is not over. Projections published in the November 1981 issue of *The School Administrator* suggest a range of $282 to $380 per pupil, varying with the level of conservation, by 1985. (This range was calculated by applying a 10 percent annual inflation factor to the oil industry's 1981 prediction of a doubling of real energy costs by mid-decade.) Using the lower figure of $282, and assuming a seven percent inflation rate and a five percent annual increase in the real cost of energy, 1989 energy costs would average $513 per pupil – a five-fold increase by the end of this decade. Accelerated natural gas deregulation could increase these projected figures significantly – to about $350 per pupil in 1985 and $689 in 1989.[2]

Furthermore, energy cost increases are outpacing increases in other budgetary categories. According to a recent report released by the U.S. Department of Energy (DOE), since 1973 the average percentage of a school budget allocated to utility bills has quadrupled, from about 3 percent to approximately 12 percent,

[1]Shirley Hansen, "Cost vs. Consumption. Managing Energy," *The School Administrator*, November 1981, p. 11.

[2]*Ibid.*

and is still growing.[3] While some analysts suggest a lower figure, most agree that the share of the school budget allocated for energy costs has risen and will continue to rise. For example, according to the Colorado Energy Research Institute:

> In 1979, Colorado school districts spent an average of 3.6 percent of their general fund budgets on school-related energy costs. With utility rate increases in 1980 and 1981 and a 7 percent increase in budgets, this percentage has risen to an average of 5 percent for any district not cutting back on energy consumption. With only conservative projected price increases, school districts will be paying 80% more for the same energy by 1985. The increases will be greatest for small districts, which will be paying 8 percent of their general fund budgets, compared with 6.5 percent for medium districts and 5 percent for large districts.[4]

The impact of escalating fuel costs on the education sector has been compounded by its inability to pass higher costs directly on to the consumer, but instead having to cover them through increased taxes, special assessments or cuts in other expenditures, all of which have significant time lags. And, in the current climate of fiscal austerity, federal, state and local revenues earmarked for education are unlikely to keep pace with growing energy bills. This means that energy costs will be and in some areas already are displacing expenditures for such items as staff, educational programs and conservation measures. Furthermore, while conservation saves energy, budget outlays for energy may actually continue to rise, but by a lesser amount than would otherwise occur. In other words, a net savings is accrued due to cost avoidance - the difference between the cost of the original quantity consumed and the cost of a lesser quantity consumed at the prevailing price per unit.

Added to the problem of higher fuel bills is that of fuel availability. Shortages of conventional energy supplies (oil, coal, gasoline, natural gas and electricity) have occurred in recent years and can recur with little warning. While U.S. citizens have tended to be complacent over the 1982 oil glut, the future may not be so

[3]Office of Institutional Conservation Programs, *Energy Efficient Schools DOE-Assisted Retrofit Projects* (Washington, D.C. U.S. Department of Energy, September 1981), Foreword.

[4]Colorado Energy Research Institute, *Policies to Enhance Energy Conservation in Colorado Schools* (Lakewood, Colorado CERI, March 1982), p. 2.

secure. The oil industry has not been alone in regarding the surplus condition as transient: Energy Secretary James B. Edwards told the National Petroleum Council, "We don't have a glut right now, ... we have a temporary supply sufficiency."[5] In a later meeting with newsmen, Edwards explained:

> We have to realize that the difference between a glut – a word we really shouldn't use – and a shortage is a matter of only a few million barrels of oil a day. We're not as secure as some people like to think.[6]

As Nobel Laureate Hans Bethe reminded DOE officials, two-fifths of the oil consumed by the free world is subject to such risks as terrorist attacks and government upheavals, and loss of that oil could lead to a major economic depression.[7] In the September-October 1981 issue of *Harvard Business Review*, Franklin Lindsay, a trustee of the Committee for Economic Development, advised the business community to "Plan For the Next Energy Emergency," which he considered to be a virtual certainty during the 1980s. And, whether or not oil-exporting nations take overt action to cut available supplies, many energy watchers warn that a gradual dwindling of the world's crude oil stock is inevitable.

Meanwhile, the Emergency Petroleum Allocation Act expired on Sept. 30, 1981. (This act had given state and federal authorities the power to set aside for emergency allocation up to five percent of the gasoline, four percent of the diesel fuel and three percent of the propane from each energy supplier in a state on a monthly basis.) Ironically, one day prior to the act's demise, the General Accounting Office (GAO) released a report entitled, "The United States Remains Unprepared for Oil Import Disruptions." According to this report, the nation is no more able to cope with a major oil cutoff than it was in 1973-74, in spite of having had eight years since the OPEC embargo to reflect and to plan. The GAO claims that the nation remains vulnerable because "the Department of Energy has never mounted an adequate contingency planning

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[5] *Energy Insider*, U.S. Department of Energy, January 1982, p. 3

[6] *Ibid.*, April 1982, p. 2

[7] *Ibid*, December 1981, p. 4.

effort" and "the executive has never given emergency preparedness the priority and attention it deserves."

"The paradox," as noted by Governor Richard Lamm of Colorado in his opening remarks at the February 1982 meeting of the Education Commission of the States' Energy and Education Task Force, "is that we sleep when there is no crisis, wasting valuable preparation time. This is a mistake that may haunt us." He advises policy makers to "think of the stakes, not the odds. Another major petroleum disruption could have such devastating economic and political consequences worldwide that even small odds are unacceptable."

While nationwide petroleum shortages have resulted from international events, such as the 1973-74 OPEC embargo and the 1979 Iranian cutoff, other types of energy shortages have had a damaging impact on a regional basis. For example, in 1977-78 the combination of inclement weather, a coal strike and curtailment in natural gas production crippled parts of the Midwest and East, the Northeast suffered from a natural gas shortage during January 1981, and electrical brownouts and blackouts have been known to occur in many areas from equipment failure and/or demand in excess of peak capacity. Past energy curtailments have resulted in revised school calendars, pupil transportation policy changes, and even emergency school shutdowns, often without adequate attention to the overall impact with respect to total energy usage, economic and social dislocation and education loss.

The American Association of School Administrators conducted a state survey to determine the impact of school closings due to energy shortfall during the winter of 1977. According to the 10 states reporting closures of three or more days, approximately 40 million pupil days were lost, affecting nearly 6 million students. And, because data gathering ended while some schools were still experiencing shortages, the actual impact was greater than the figures in Table 1 indicate.

Preparing now for future energy shortages will enable policy makers to consider carefully, during noncrisis conditions, the obvious and not-so-obvious options at their disposal as well as the long-range consequences of particular choices. Prudent planning

Table 1

Winter of 1977:

School Disruptions Due to Energy Shortfall

Responses from states having closures of three days or more due to energy curtailment.

State	Number of Schools Closed	Number of Pupils Affected	Number of Pupil-Days Lost
Illinois	261	NA*	NA*
Kentucky	200 (33 school systems)	149,025	1,128,982
Minnesota	300	181,475	1,088,850
Mississippi	58	29,327	238,869
New Jersey	9	5,920	24,000
New York	1,345	610,000	4,880,000
Ohio	4,085	2,314,420	14,229,620**
Pennsylvania	4,077	2,193,673	13,000,000
Virginia	172	91,764	275,292***
West Virginia	1,270	402,371	5,365,904

*Not available.

**Still had 13 districts closed when data was submitted. Total count went higher.

***Figure based on 3-day minimum. total was estimated to go as high as 3 million.

Source American Association of School Administrators. Survey directed by Shirley Hansen. procedures and data compilation by Education Research Service, Feb. 15-25, 1977.

will enhance the likelihood of selecting those options that will result in maximum fuel savings and minimum community disruption. A plan put in place prior to an emergency also has the advantage of enabling appropriate actions to be taken immediately.

Prior to a detailed consideration of contingency planning, a discussion of related federal and state policies and programs is in order. Changes in the federal perspective are having significant ramifications for state and local policy makers, giving them far greater responsibilities and options, but making many existing plans and assumptions obsolete. A survey of these changes and the content of present policies and plans will provide the starting point from which effective contingency planning must necessarily proceed.

Federal Policies and Programs

Before the 1973-74 oil embargo, severe peacetime shortages of energy in the United States had not occurred, and the only related federal strategies in existence were civil defense or disaster relief plans. In 1973 the initial government response to problems arising from the embargo was the *Emergency Petroleum Allocation Act (EPAA)*, which authorized crude oil price controls, state set-aside programs (allowing states to hold back a certain percentage of liquid fuels for the governor's discretion in shortage situations), and several petroleum production and refinement management programs. (These provisions expired on Sept. 31, 1981.)

In 1974 the *Federal Energy Administration (FEA)* was established and began preparing national contingency plans for energy-related emergencies.

In 1975 the *Energy Policy and Conservation Act (EPCA)* created the strategic petroleum reserve, which was to store up to one-half billion barrels of crude oil in order to replace what might be lost during a disruption in the supply of imported oil. (The storage goal was doubled to one billion barrels in 1979.) EPCA also authorized gasoline rationing as an emergency procedure that has never been put into effect. (The emergency preparedness components of EPCA expired with EPAA at the end of fiscal year 1981.)

In 1977 the U.S. Department of Energy was formed to assure a coordinated national energy policy. DOE provided federal support for state-level contingency planning through grants to state energy offices authorized in the 1978 *National Energy Conservation Policy Act (NECPA)*. The Department of Energy's Institutional Building Grants Program, best known as the Schools and Hospitals Program, was authorized by Title III of NECPA. The program was designed to promote efficient energy use in the nation's schools and consequently to better prepare them for energy shortages and higher prices. Grants have been awarded through DOE regional offices and state energy offices to local school districts for technical assistance analyses and energy conservation measures. According to a report on the program's first funding year, "DOE technical assistance and retrofit grants amounting to more than $160 million were awarded to schools in 49 states, 4 territories and the District of Columbia."[8] In accordance with federal budget cuts, the 1982 Schools and Hospitals Grant cycle has been reduced to $48 million (compared to $150 million in fiscal year 1981). The initial fiscal year 1983 federal budget request included no funding for this program.

The emergency planning components of NECPA were continued through the *Emergency Energy Conservation Act of 1979 (EECA)*. EECA authorized several procedures and programs for implementation under energy shortage or curtailment conditions, including standby conservation programs with specific energy reduction targets, emergency building temperature restrictions, and initial grants for state-specific contingency plans to be developed over several phases. In 1980 first phase funding for state contingency plans was authorized through DOE, and all states developed a structure for comprehensive planning. Because funding for the second phase was eliminated in fiscal year 1982, the initial grants under EECA were the primary source of support for most existing state plans that address energy emergencies. (See State Policies and Programs on page 9.)

In 1981 federal policy on planning for energy-related emergencies was significantly revised, shifting from a posture of federal regulation to one of reliance on the free market to increase production and to allocate scarce supplies on the basis of escalating prices. As stated above, emergency provisions under EPAA and EPCA were allowed to expire in 1981. The chief remaining component of earlier federal programs for energy emergencies has been the *Strategic Petroleum Reserve*, which was scheduled to contain 250 million barrels by April 1982. (This represents one-third of the Administration's goal of 750 million barrels by 1990, designed to last approximately six months at a maximum utilization rate of four-and-one-half million barrels per day.) No distribution plans have been promulgated by May 1982.

A July 1981 document, entitled *Domestic and International Energy Emergency Preparedness*, contained the following elements of DOE's revised policy on energy emergency contingency planning:

[8] U.S. Department of Energy, *Energy Efficient Schools* (Washington, D.C., Sept. 1981), Introduction.

- Increase the protection provided by the Strategic Petroleum Reserve,
- Reduce disincentives to private oil stockpiling (such as petroleum price controls and allocation plans),
- Allow the market to allocate scarce resources among competing demands,
- Adhere to a policy of steady monetary growth to reduce inflation and
- Support the International Energy Agency agreement.

(The International Energy Agency was formed in 1974 under the aegis of the Organization for Economic Cooperation and Development. Its members have agreed to distribute available oil supplies among participating nations in times of crisis.)

In a letter to a member of the House Energy and Commerce Committee, dated Oct. 16, 1981, William Vaughan, DOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, acknowledged the importance of working with state regulatory agencies and coordinating with state and local governments in energy emergency preparedness activities. While no staff have been assigned to promote intergovernmental cooperation, several revenue recycling programs have been discussed and various schemes have been proposed in Congress. Assuming that an energy supply shortage would be accompanied by a dramatic price escalation, the federal government would benefit from the existing windfall profits tax (enacted to prevent excessive oil company profits due to deregulation) as well as from increased business income tax among energy producing corporations. Therefore, one consideration has been to recycle such revenues through tax credits, withholding tax deductions and/or block grants to the states for distribution according to state-developed priorities. However, while such equity schemes remain controversial, many business leaders and public officials have warned that market responses alone may not be adequate during a severe energy shortage.

Participants at the 1980 National Energy Users' Conference for Transportation, conducted by the Transportation Research Board of the National Research Council's Commission on Socio-Technical Systems and jointly sponsored by the U.S. Department of Energy and the U.S. Department of Transportation, concluded that.

> Government should serve as a last recourse, it should allow the private sector to respond to relatively minor shortfalls. . . . Stronger government response is appropriate when a shortage is so severe that social and economic institutions are threatened.[9]

As a mechanism to better coordinate the nation's response to an energy crisis, an energy emergency preparedness board or office has been proposed, both by participants at the 1980 National Energy Users' Conference for Transportation and by Franklin Lindsay.[10] Both proposals suggest representation from the public and private sectors, including federal and state agencies, the energy industry, and other large and small business interests. The purpose of such a body would be to prepare for an emergency and to properly coordinate a crisis response.

The next section describes state actions that have been taken in response to federal legislation and to state-determined needs.

State Policies and Programs

There is considerable variance in the status of state energy emergency plans. Some states, including Florida, Illinois, Nebraska and Ohio, began developing their own contingency plans for energy emergencies before receiving federal support through EECA in 1980. Other states began the planning process with Phase I EECA funds, but suspended activities due to the lack of further federal support or state funding. Some states only included motor fuel provisions in their energy emergency plans, as was the case with Colorado's *Motor Fuel Shortage Contingency Plan.* In contrast, Illinois, Nebraska and Ohio were among the states that addressed a wide spectrum of energy types, including coal, heating oil, propane, transportation fuels, natural gas and electricity.

The organizational framework under which states developed their energy emergency management plans varied greatly, as did the

[9]Lee Greathouse, "Planning for the Oil Emergency," *News Report,* April 1981, p. 12.

[10]Franklin Lindsay, "Plan for the Next Energy Emergency," *Harvard Business Review,* September-October 1981, p. 152 and Greathouse, p. 13.

assignment of implementation responsibilities. In most states the governor's office, state energy office or transportation office has had primary responsibilities for both planning and implementation, with required participation by other state agencies, coordinating committees and/or task forces.

The inclusion or exclusion of the energy industry and citizen groups within the planning process has differed significantly among states. Similarly, the extent to which the education sector has been part of the planning process – and the resultant plans – has also varied. Some states have omitted education decision makers and education considerations entirely, while others have addressed school conservation, data collection and fuel allocation. However, those states including education concerns have tended to treat them at a rather superficial level, thereby allowing considerable discretion as well as potential confusion and/or education disruption should the plan actually be implemented.

More detailed descriptions of state and local contingency planning structures and processes will be given in the following section, along with content considerations.

II. Contingency Planning Considerations

Education's dependence on energy has two interrelated facets. obtaining adequate supplies of different forms of energy and buying them at affordable prices. Planning for shortages or for higher costs requires the development of conservation strategies appropriate to the severity of the change in energy availability and/or price. Therefore, contingency plans for responding to energy shortfalls should provide an array of conservation measures from mild to extreme. Many of these conservation procedures, particularly those at the low end of the continuum, are good energy management practices applicable to noncrisis conditions.

Under both the Carter and Reagan Administrations, the state has had the primary responsibility to protect its citizens during extreme energy shortages. With or without federal support for preparing for such contingencies, a state-level comprehensive energy emergency plan is a valuable tool for a rational, coordinated response. Since 1981 the federal contingency policy has been to allocate fuel by price. The absence of more detailed operational guidelines has placed the burden on the state to develop well-conceived plans in order to avoid massive confusion and hardship. Not only must states plan to provide for the energy requirements of their residents, but in addition they must consider interstate allocation policies and plans. The policy of free market pricing and allocation is also causing many local units of government to develop their own plans to prepare for and cope with energy shortages. The present reality is that state and local units of government can no longer assume that the interests of their citizens will be automatically protected by federal action in the event of fuel shortages. Nor can they assume that interstate coordination of energy plans and allocation procedures is a federal activity.

Energy Planning Responsibilities

The governor and state legislature, by virtue of their vested authorities, are ultimately responsible for the development and, if necessary, the implementation of the state-level energy emergency plan.

The state legislature can assign powers and responsibilities for emergency preparations and responses among state and local officials and agencies, representatives of business and industry, and the general public. The legislature can also develop guidelines for the planning process, its participants and its content, including such factors as conservation goals, energy-use priorities, data requirements, and requisite staff and funds.[11]

The governor's role varies among states, largely due to differences in emergency powers determined through legislative or constitutional provisions. With or without the authority to declare an emergency or to take special executive action in such a situation, governors and their cabinet members are involved in the emergency planning process and in implementation procedures, as specified in a state's plan.

Comprehensive state-level emergency planning generally has included some level of participation from virtually all state agencies, some having greater responsibility than others. Participants in the process most often have been directors of departments of energy, civil defense (or its equivalent), planning, natural resources or environmental protection, health and public safety, and the heads of agencies representing major energy consumers.

The absence of education leadership in many existing state-level contingency plans appears to be a serious omission. As policy-making representatives of a sizable energy-use sector (education), the chief state school officer and the state higher education executive officer should be part of the planning unit so that education functions and school energy consumption issues can be integrated into the broader spectrum of considerations. Representatives from education associations, private enterprise, the media, consumer citizen groups and the public utility commission should

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[11] Russell W. Frum, "State Legislatures and Emergency Preparation," *The Energy Consumer* (Washington, D.C. U.S. Department of Energy, December 1980/January 1981), p. 30.

also be involved in order to ensure broader input and public understanding and acceptance of the plan.

As in the case of state-level planning, too often the school sector has been omitted from the local planning process and allocation procedures, apparently through oversight. However, parallel to the state-level situation, it is important for local policy makers to include education decision makers in developing comprehensive plans and coordinated implementation strategies. To ensure that this participation occurs, it is incumbent upon school officials to become better informed and more assertive in sharing the responsibility for wise energy planning.

In addition to the incorporation of education interests in comprehensive contingency plans, some state and local education agencies have created their own energy management plans providing more detailed strategies to be utilized for specified levels of energy conservation. To be workable, these plans require input from a variety of perspectives administrators, school facility managers, transportation coordinators, providers of ancillary services and instruction personnel from different disciplines. Obviously, education sector plans must be coordinated with the more general state and local plans.

Contingency Planning Methodology

The development of a strategy for reducing consumption of a fuel, with a minimum of adverse societal impacts, suggests following some form of rational decision making. The policy development process described in the companion document, *Energy Education A Policy Development Handbook*, is therefore applicable to energy emergency planning. That process includes the following nine steps, arranged in roughly sequential order [12]

1. Determining goals and objectives.
2. Collecting and analyzing data.
3. Preparing a set of alternatives.

[12] For a more detailed description of this process, see Edith Petrock, *Energy Education A Policy Development Handbook* (Denver. Education Commission of the States, Report No. 142, August 1981), pp. 7-14.

4. Predicting the significant impacts of the various alternatives.
5. Comparing the predicted benefits and costs of alternatives and identifying the acceptable ones.
6. Selecting the best alternative.
7. Publicizing the selected policy (or plan).
8. Executing the policy (or plan).
9. Evaluating the adopted policy (or plan) and making revisions, as appropriate.

In either state or local energy emergency planning, two preliminary tasks should be taken. (1) selecting a representative planning coalition and a principal coordinator, and (2) reviewing relevant federal and state policies and legislation. Because step eight, executing the contingency plan, may not be necessary, a pilot test should be substituted. If the results of the simulation are inconclusive or unanticipated, then the entire process should be reviewed, with major attention placed on steps four, five and six.

Content of Energy Contingency Plans

The purpose of comprehensive state and local contingency planning is to prepare for various levels of shortfall of specific energy sources, adjusted for seasonal needs. Plans should include at least the following content. an ordering of priority among user sectors, required or recommended conservation measures to be implemented at various levels of shortfall, expected impacts of such measures, specific fuel allocation policies and procedures, implementation responsibilities and data monitoring requirements.

In determining priority users, meeting critical health and basic human needs obviously deserves the highest rating. Within this parameter, the ordering of energy-consuming sectors must be based on such considerations as these. individual sector consumption of specific energy sources, additional energy requirements that will spring up in other sectors as a result of curtailment in one particular sector, economic ramifications, environmental consequences and political implications. Clearly, basic hospital and residential needs will be given a high priority, while allocations to business, industry, transportation and government services (including schools) will vary among states and localities, largely depending upon energy-use patterns and citizen values.

Allocation plans will depend upon the availability of a specific fuel as well as its price, whether or not deliberately manipulated. The formulation of appropriate intervention measures requires an examination of legal barriers, implementation authority and emergency powers. Also, the principle of equity must be applied, treating similar situations consistently. However, care must be taken not to penalize energy users who have already taken conservation measures, as noted in the *Draft Contingency Plan for Florida Districts and Community Colleges*

> We realize that many of the school districts and community colleges are already conserving energy in their facilities and we want it clearly understood that provisions must be made for those districts and colleges having records indicating the percentages saved will get credit and not be penalized for already having conserved [13]

To avoid confusion, it is essential to provide for coordination among various energy-consuming sectors and among different levels of government jurisdiction. federal, state and local. The *Florida Energy Management Handbook for School Administrators* gives the following advice.

> Early in the planning process, the personnel responsible for developing the emergency contingency plan for the school district should review contingency plans developed by the state and federal energy agencies. These plans can serve as models and provide some of the information that the energy management team will need to assure that the school's plan is consistent with plans already in place.[14]

Emergency plans become operational when predetermined levels of shortfall of specific energy sources occur. Clearly, data must be collected to assist in identifying the threshold points at which different conservation and allocation programs are to be implemented. In addition to monitoring energy prices and spot shortages, persons responsible for implementation should watch such indicators as labor disputes in the energy or transportation

[13]Florida Energy Education Advisory Committee, with the assistance of the Governor's Energy Office and Department of Education, *Draft Contingency Plan for Florida Districts and Community Colleges* (Tallahassee Governor's Energy Office, 1980), p. 1.

[14]Governor's Energy Office, Department of Education and Colony Productions, *Florida Energy Management Handbook for School Administrators* (Tallahassee Governor's Energy Office, 1981), p. 6-5.

industries, potential and actual supply disruptions within energy producing nations, severe weather conditions, equipment failures and regulatory changes.

Not only must energy planners employ sound methodology, but they also must be knowledgeable about the characteristics and appropriate applications of specific energy sources. The three primary energy categories utilized by the education sector are described and energy management options are discussed in the following two sections.

III. School Energy Utilization

Variations in climate, terrain, facility design and energy-using systems account for significant differences in energy consumption patterns – with respect to fuel types as well as fuel quantities – among regions, states, school districts and even individual school buildings. Because the comparative cost and availability of alternate energy sources also vary and such variations may be regional in nature, reactions to changes in supply and price must be site-specific. For example, different schools in a single district may depend upon electricity, natural gas or oil for their primary heating fuel. A natural gas shortage potentially would affect only those schools using that fuel within the region experiencing the shortage. For this reason, neither state nor local contingency plans can impose uniform conservation or emergency strategies. Instead, they must be flexible, based on a relationship between a single energy source and the school sites that depend upon that source for specific purposes.

Energy-Consuming School Functions

Most of the energy consumed by the education sector is for space heating and cooling and for transportation purposes. Energy is also required for ventilation, domestic hot water, illumination, food services and other equipment needs.

Space Heating and Cooling

Educational Facilities Laboratories (EFL) reported that in 1977, "88,000 public [elementary and secondary] school buildings used almost 3 percent of the total energy consumed in all buildings in the United States."[15] Space heating and cooling needs accounted for approximately 80 percent of school building energy consumption in 1974, the most recent year for which this information is

[15] *Questions and Answers on Energy Conservation in Schools* (New York. EFL, 1978).

available. (Domestic hot water and lighting consumed an additional 19 percent.)[16] Applying the 80 percent figure to EFL's data, approximately 2.4 percent of all energy consumed in the United States heats and cools public schools.

Results from a survey conducted by the American Association of School Administrators showed that in 1979, 63.6 percent of the nation's elementary and secondary school buildings utilized natural gas for heating, 19.1 percent relied upon oil, 6.7 percent used electricity for both heating and cooling, 5.9 percent used electricity for heating only, 2.7 percent used propane, 1.6 percent used coal, and almost negligible percentages of school buildings were heated with butane, diesel or steam. (The energy sources used to generate steam were not specified.)[17] A comparison of these figures to data collected in 1978, when 55 percent of the buildings used natural gas and 25 percent used oil, shows a national trend toward the use of natural gas in lieu of oil.

Regionally, however, the pattern varies, the northeastern and northwestern sections of the nation rely heavily upon fuel oil, while natural gas is the dominant heating fuel in the remainder of the country. Although the Northeast increased its reliance on oil between 1978 and 1979, from 78 percent to 86 percent, the Northwest followed the national trend of increased dependency upon natural gas.

Transportation

Within the school district operation, transportation has grown into a significant energy-consuming function. While most school buses still use gasoline, there are three alternative fuels that are seeing increasing use. These are (1) diesel, (2) propane or liquid propane gas (LPG) and (3) compressed natural gas (CNG).

While actual figures are not available nationally, the use of diesel-powered school buses is growing rapidly. The chief advantages of diesel are increased fuel mileage and lower maintenance

[16] U.S. Department of Commerce, *Energy Consumption in Commercial Industries by Census Division, 1974* (Washington, D.C., 1977), p. 267.

[17] John Pisapia, *AASA Energy Use Study* (Washington, D.C. American Association of School Administrators, July 1980), p. 8.

costs per mile. In converting to diesel, additional planning should be considered with regard to fuel storage needs, maintenance requirements, mechanic competencies and driver training.

Propane (LPG), a byproduct of natural gas and oil production, has been used to power various small vehicles for a number of years. Again, national figures are not available, but an increasing number of school buses are now being equipped to utilize this fuel. Although LPG is as much as one-third cheaper than gasoline, it has approximately 10 to 15 percent fewer BTUs per gallon, and vehicle maintenance needs may be altered. According to one expert, the cost of converting a gasoline engine to LPG has a potential payback of one year and results in lower emissions, fewer oil changes and tune-ups, as well as longer engine life.[18] Since no data base has been compiled regarding use of this fuel in school buses, extra safety precautions are in order. Districts contemplating such a move should pay close attention to National Fire Protection Association Pamphlet No. 58, latest edition.[19]

Within the past two years, several school districts have converted school buses to "dual-fuel" systems utilizing compressed natural gas and regular gasoline. Four Colorado districts have all or nearly all buses so equipped. West Des Moines, Iowa, has also converted 12 buses. Initial costs for installation of a fueling (compressor) station and alterations to vehicle carburetion are relatively high. Latest cost estimates for converting 12 buses (including fueling station) approach $55,000.[20] Advantages to such a system include lower cost per comparable fuel amount (100 cubic feet of natural gas is about equal to 1 gallon of gasoline), no reliance on foreign sources of supply, low emissions and less maintenance per unit. CNG is attractive in areas where schools are drilling their own gas wells, such as in Ohio, Pennsylvania and West Virginia. No regula-

[18] Hanford L. Combs, "Time for Toughness in School Transportation," *The School Administrator*, November 1981, p. 34.

[19] National Fire Protection Association, Inc., *Standards for the Storage and Handling of Liquified Petroleum Gases* (Boston. NEDA, Inc., 1979). This publication is updated regularly.

[20] *Legislative Review* (Denver ECS, April 5, 1982), p. 2. Additional data from Augie Campbell, Senior Consultant, Colorado Department of Education, May 1982.

tions are available for safety requirements in CNG installations, thus, safety factors should be carefully set and stringently applied.

Payback periods vary widely for costs of installing (or changing over) to one of the above systems. Eaton, Colo., estimated 2.4 years for payback in conversion to CNG. Raytown, Mo., schools have been able to cover the costs for both conversion and fuel storage expenses in one year for a propane installation.[21] Early results from a South Carolina experiment in propane use for school buses showed a savings of 6.7 cents per mile over gasoline, paying back the $875 cost in about 13,000 miles of driving.[22]

Two major concerns should be thoroughly researched before retrofitting to any alternative fuel system. The first is obviously cost. there are significant cost differences in the three systems mentioned above. Propane may not, for instance, require as expensive a fueling station as does CNG, all three do require some special attention to fueling needs. The second concern is somewhat more complicated but no less important. This has to do with changing any vehicle component that might (1) void a warranty or (2) alter the weight characteristics (GVW) now set out in federal and state requirements. A diesel engine, for example, weighs considerably more than a gasoline engine. larger front axles may be needed to take care of this extra poundage.

While currently not widely utilized, alcohol fuels, such as methanol and ethanol, bear consideration as a fourth transportation fuel option. Because alcohol fuels can be produced domestically and because they are liquid fuels, they could become a vital resource in the advent of another international oil crisis.

Other Functions

Other energy-consuming functions, such as school lunch preparation, lighting and equipment-using classes (like shop and home economics), are much lower in their energy demands than space heating and transportation. But, in combination, they constitute another major use of energy by schools.

[21] "Districts Studying Natural Gas for Buses," *Education USA*, Oct. 19, 1981, p. 61.

[22] South Carolina Board of Education, *Action Report*, Nov. 13, 1981.

Major Energy Sources Utilized by Schools

In 1981 the United States consumed 73.9 quads of energy, down from the 75.9 of the previous year. The sources from which this energy was derived are listed in Table 2.

Table 2
U.S. Energy Consumption: 1980 and 1981

Energy Source	Quads*		Percentage	
	1980	1981	1980	1981
Petroleum	34.2	32.0	45	43
Natural gas (dry)	20.4	19.9	27	27
Coal	15.5	16.0	20	22
Hydroelectric power	3.1	3.0	4	4
Nuclear electric power	2.7	2.9	4	4
Other	0.1	0.1	--	--
Total	75.9**	73.9	100	100

*One quad is one quadrillion (10^{15}) BTUs. One BTU (British thermal unit) is the amount of heat necessary to raise the temperature of 1 lb of water 1° fahrenheit

**Total varies due to rounding.

Source Energy Information Administration, Monthly Energy Review (Washington, D.C U.S. Department of Energy, March 1982), p. 6.

The education sector relies primarily upon three major fuel categories petroleum, natural gas and electricity derived from a variety of energy sources. Future prognoses for supply, availability and price of these three major fuel types are complex and often controversial. While ultimately finite, the retrievable reserves of the fossil fuels (petroleum, natural gas and coal) are subject to several different forecast scenarios, based on differing assumptions regarding geological formations, viable technologies, production costs and market prices. Likewise, market price projections, adjusted for inflation, vary greatly, depending on conjectures about availability, future demand and market regulations. The energy sources for electrical production include the fossil fuels as well as nuclear power, hydropower, geothermal power and other alternative energy sources, such as solar photovoltaic cells. Future availability of these nonfossil fuels is also difficult to estimate due to many technological, environmental, economic and regulatory factors associated with their development and use.

Petroleum-Based Fuels

The petroleum-based fuels commonly used by schools are gasoline and diesel fuel for transportation and fuel oil (residual fuels) for space heating. Some schools use additional petroleum products, such as propane, for their transportation or heating needs.

Petroleum-based fuels are all derivatives of crude oil, which is produced domestically and imported from foreign sources, chiefly in the Middle East. A March 1982 Energy Information Administration report showed that in 1981 the United States was importing 5.7 million barrels of oil per day (exclusive of that added to the Strategic Petroleum Reserve), or roughly one-third of U.S. consumption.[23] The use of imported oil compounds the difficulty of assuring adequate supplies to meet national demand. Supplies of imported oil have been interrupted during the 1973-74 oil embargo and the 1979 Iranian cutoff. Also, prices have escalated since 1973, due primarily to OPEC controls. (In the early 1980s, however, petroleum market conditions have changed demand has fallen, largely as a result of conservation and the economic recession, supply has been plentiful and prices have fallen, although nowhere near to their early 1973 levels. The duration of these conditions, however, is a matter for conjecture.)

Production of domestic oil has been declining since reaching an all-time high of 9.2 million barrels per day in 1970.[24] In 1979 the Carter Administration instituted a phased decontrol of domestic oil prices, and in January 1981 President Reagan removed the controls completely. Since decontrol, the price of domestically-produced crude oil has stabilized and actually declined due to world market conditions, as noted above. The petroleum industry has not assumed that this situation will continue indefinitely, however. A recent report published by the American Petroleum Institute states

> The cutoff dangers of 1973 and 1979 have not disappeared. And the war between Iran and Iraq, begun in 1980, once again demonstrated the

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[23] Energy Information Administration, *Monthly Energy Review* (Washington, D.C.: U.S. Department of Energy, March 1982), p. 32.

[24] Energy Information Administration, *Short-Term Energy Outlook* (Washington, D.C.: U.S. Department of Energy, May 1981), p. 25.

potential instability of oil imports. The Department of Energy has estimated that there is a 75 percent probability of another oil supply disruption in the 1980s.[25]

> **Education Policy Implications; Petroleum**
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> Petroleum-based liquid fuels are used by virtually all schools for transportation and by many schools for heating and other purposes. These may be vulnerable to curtailment, primarily due to U.S. dependency on foreign imports from the politically unstable Middle East. However, school systems may be able to continue some operations by revising transportation and scheduling policies or by switching to other fuels to operate facility and transportation systems. Administrators may wish to consider maintaining duel systems to provide for flexibility in responding to different market conditions.

Natural Gas and Its Derivatives

Natural gas is used for heating approximately 60 percent of the nation's schools and, in some cases, for transportation, in the form of liquified or compressed natural gas. The United States produces most of its own natural gas and in 1978 was responsible for 39 percent of the world's marketed production. As is the case with petroleum, the availability of natural gas is linked to regulation and pricing. According to the American Petroleum Institute,

> How much U.S. oil and natural gas will be found and produced and how quickly depends to a large extent on continued progress in government leasing and regulatory policies, including price controls on most categories of natural gas, laws and regulations controlling the use of government land for much-needed energy exploration and development, and complex environment laws and regulations.[26]

Natural gas prices have been highly regulated since 1954 The Federal Energy Regulatory Commission controls the price of "old" gas (discovered before February 1977), while the price of "new" gas (discovered after February 1977) is presently controlled by the Natural Gas Policy Act (NGPA) of 1978. Under this law, both interstate gas (produced in one state and transported to another) and intrastate gas (produced and consumed in the same state) are subject to extensive yet differing sets of controls and

[25] American Petroleum Institute, *Energy in America Progress and Potential* (Washington, D.C. API, 1981), p. 28.

[26] *Ibid.*, p. 13.

time frames for decontrol. NGPA will deregulate "new" gas by 1985, while "old" gas will still be subject to controls after 1985. Although NGPA pricing is linked to the 1978 world oil price, which was $15 per barrel, the market price for oil had doubled by 1982. Natural gas prices, consequently, have lagged behind crude oil prices, and this discrepancy has spurred regulatory, economic and political controversy. Much of the controversy has focused on the question of whether or not to accelerate deregulation.

In a speech before the American Gas Association in May 1981, Energy Secretary James Edwards stated what was then the Administration's position on this matter:

> We must move toward full deregulation, but just how we do this, and how rapidly, will be influenced by our need to avoid unnecessary hardship for our people and to prevent unnecessary inflationary pressure on our economy. . . . The nation will experience a substantial gas price increase from 1984 to 1985, when roughly 50 percent of the domestic natural gas will be released from controls.[27]

Although the Administration has since modified its stance, Edwards' explanation of the consequences of deregulation still has validity.

Like oil, natural gas is difficult to track in terms of supply and price projections. As noted in a recent DOE report, "The natural gas industry, particularly in recent years, has been in a state of flux, reacting primarily to legislative and regulatory changes."[28]

Education Policy Implications: Natural Gas

Deregulation of natural gas could cause a sudden or steady increase in price, which would negatively impact school district budgets that are already constrained. Natural gas is used for space heating and cooling, cooking and some transportation, and its curtailment may cause school closure if alternative energy sources are not available.

Electricity and Its Sources

Electricity is used in virtually all schools for illumination and ventilation, and the operation of equipment essential to communi-

[27] *Energy Insider*, U.S. Department of Energy, May 11, 1981, p. 3.

[28] Energy Information Administration, *Short-Term Energy Outlook*, p. 40.

cation, instruction, ancillary services and administration. In addition, many schools rely upon electricity for space heating and cooling as well as for hot water.

Electricity is generated from several energy sources. In the United States, coal supplies 52 percent of the fuel used for electrical power, oil accounts for 9 percent, natural gas for 15 percent and nuclear power and hydropower each supply 12 percent. Other renewables, including wind, geothermal and a variety of solar applications, supply less than 1 percent of the energy used to generate electrical power.[29]

While electrical usage can often be decreased through reductions in illumination and ventilation levels, thermostat cutbacks, schedule modifications and temporary suspension of equipment utilization, there is virtually no way to mitigate the devastating impact of a complete electrical failure – or "blackout" – other than school closure. The only strategy to avoid this problem is to invest in backup generators.

The American way of life is dependent upon electricity. As noted by the National Energy Strategies Project, conducted by Resources for the Future

> The electric motor, modern lighting, radio and television, and now the developing importance of computers of all sizes and uses have made sources of electric current indispensable to an industrialized civilization.[30]

Electrical generation and utilization have been growing as a result of increased population and improved living standards. This growth is expected to persist, but perhaps at a lower rate, as suggested by projections made in 1979 by the Energy Project at the Harvard Business School

> In 1978, most electric utility executives anticipated an average annual growth in electricity demand of about 5.5 percent during the decade

[29] Energy Information Administration, *Monthly Energy Review*, March 1982, p 25.

[30] Resources For the Future, *Energy in America's Future The Choices Before Us* (Baltimore The Johns Hopkins University Press, 1979), p 269.

ahead, in contrast to the 7 to 7.5 percent that characterized the 1960s. . . . Demand growth at 3.5 percent, half the historic rate, would still mean that approximately 250 gigawatts of new capacity would be required to avoid an electricity shortage in the 1990s.[31]

According to the Edison Electric Institute (EEI), the high interest rates characteristic of the early 1980s have caused utility companies to curtail expansion to meet projected future demand for electricity. Due to the 20-year time frame to plan and build generating facilities, EEI estimates a 15 percent gap between electrical capacity and demand by 1990 and a 30 to 40 percent gap by the year 2000.[32]

Shifts in the mix of energy sources utilized for electrical generation have been occurring and will probably continue. For example, the escalating cost of crude oil has caused a movement toward other energy sources, particularly coal, for electrical power generation. Deregulation of natural gas pricing might have a similar effect. According to a recent report by the Energy Information Administration, annual coal utilization, particularly for electrical power generation, increased by over 3 quadrillion BTUs between 1977 and 1980.[33] This trend was expected to persist. However, as noted in a National Geographic special report:

> A number of problems will have to be tackled capital shortages at high interest rates, manpower (potential strikes and declining productivity), and transportation, including inadequate rail facilities. Environmental concerns include the proper reclamation of mine sites, potential changes in global climate caused by increased carbon dioxide from burning coal, and the emissions from coal stacks that erode buildings, poison lakes and damage human lungs.[34]

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[31] Robert Stobaugh and Daniel Yergin, eds., *Energy Future* (New York Random House, 1979), p. 111.

[32] Information from Walter Prudy, Manager, Educational Services, Edison Electric Institute, May 27, 1982.

[33] Energy Information Administration, *Short-Term Energy Outlook*, p. 59.

[34] *National Geographic*, "Energy Facing Up to the Problem, Getting Down to Solutions," A Special Report, February 1981, p. 63.

Nuclear power is another source for generating electricity. In a July 1981 report to Congress, the Reagan Administration articulated a new policy toward nuclear power:

> . The Administration is committed to reversing past Federal Government excesses and to providing a more favorable climate for efficient energy production, thus allowing nuclear power to compete fairly in the marketplace with all other sources of energy supply.[35]

The nuclear industry has, however, experienced major setbacks in the construction of new plants and in the amount of electricity generated from existing plants. This slowdown is due to questions of economic feasibility, regulatory red tape, and plant safety design with respect to operating procedures and waste disposal. Consequently, the outlook for the use of nuclear power in electrical generation is uncertain.

The remaining sources of energy for electrical generation – primarily hydropower, wind and the sun are not expected to significantly raise or lower domestic electrical generating capacity in the near future. (While hydropower generation is likely to remain about the same, the use of renewable sources is difficult to project due to economic and technological unknowns.)

In all states but Nebraska, the cost of electricity to consumers is regulated by state utility commissions, and this system is expected to continue. The Public Utilities Regulatory Policy Act (PURPA) established several regulatory changes in 1978, thereby allowing users to take advantage of differing rate structures.

Education Policy Implications: Electricity

Informed school administrators should be able to realize considerable savings in school budgets by monitoring utility rate structures and improving electrical load management techniques. By clustering high electrical usage activities during nonpeak periods and by keeping electrical demand under an established peak load, schools can take advantage of significantly lower rates. To avoid the adverse impacts of electrical black-outs or brown-outs, school officials may have to consider investing in back-up generators for selected facilities. However, such generators can be very costly on a per-building basis.

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[35] *The National Energy Policy Plan* (Washington, D.C. U.S. Department of Energy, July 1981), p. 7.

IV. Fuel Supply Management

Several variables determine the impact of a shortage or rapid price escalation of any of the fuels upon which the education sector depends. These variables include the degree and duration of the shortage and/or price increase, the utilization purpose and demand level for the fuel affected, and the school system's ability to respond with alternative measures, such as drawing upon stockpiles, switching to alternate fuels or using buildings dependent upon unaffected fuels.

Due to the vital importance of various energy sources to all aspects of school operation, policy makers, administrators and management personnel need to be alert to indicators of possible supply shortages and/or price escalations of each fuel used, recognizing the inherent difficulties of predicting either price or availability. Nevertheless, international events since the 1970s, national emergencies, regional shortages and the likelihood of unpredictable future events underscore the importance of emergency contingency planning.

While education policy makers cannot control market forces, they nevertheless can take measures to help insulate the education sector from some of the impacts resulting from supply shortages and price escalations. Among the options to consider are revising contracts with energy suppliers, developing collaborative purchasing arrangements, stockpiling, diversifying energy-use patterns, monitoring energy consumption, modifying facility design standards, retrofitting existing buildings and designating an energy coordinator. Each of these options is described on the following pages. Examples of state-level energy management and contingency plans containing a variety of these and other response measures are listed in the Appendix.

Revising Contracts with Energy Suppliers

In the absence of federally-mandated fuel allocations, state set-aside programs and constraints on energy price increases, state and local authorities must assume a greater responsibility to protect their citizens by developing strategies for obtaining supply-security and assured pricing. Negotiating favorable contracts with energy suppliers must be considered an important component of any energy management plan.

In most states, individual school districts contract with energy suppliers to secure a given amount of a specified fuel at an agreed-upon price. (One exception to this pattern is North Carolina, where the state education agency is the contracting agent for all school districts within the state.) Obviously, it behooves school officials to seek the most favorable contractual terms possible to assure an adequate energy supply at the lowest possible price. However, during severe energy shortages, suppliers may be unable to obtain adequate fuel to meet their distribution requirements, and "black markets" can develop wherein fuel flows to the highest bidder.

In order to determine whether or not administrators should attempt to revise contracts with energy suppliers, the following five steps should be completed.

1. Determine amounts of specific energy sources needed by schools, generally based upon current consumption patterns.
2. Review specifications in contracts with suppliers
3. Determine supplier allocation systems, if possible.
4. Locate other potential suppliers, if available
5. Compare contractual provisions with those of other similar agencies within the state or region.

If administrators believe that better contracts can be obtained with existing suppliers or their competitors, negotiations are in order.

Possible options to consider include the following. (1) specifying a base price plus a fixed portion of the difference between the base price and current market price and (2) obtaining a favored customer status. (It must be noted, however, that severe market conditions may make the latter provision virtually meaningless.)

Collaborative Purchasing

In some states, including Massachusetts, two or more school districts have joined together to contract with energy suppliers. The purpose of such cooperative purchasing arrangements is to gain advantages only available to large customers. Because the supplier generally has lower per unit costs for administration and delivery – and has a dependable market for a bigger portion of his or her inventory – a consortium often can negotiate lower prices than the buyers can obtain independently. (If the energy source in question is one that is stored at the utilization site, buyers may have to agree upon a single delivery location in order to maximize their savings. Therefore, cooperating parties should be in the same geographical area.)

Collaborative purchasing can often be a means of securing a more favored status with an energy supplier, thereby providing the advantage of a more dependable energy supply under adverse market conditions. As an additional contingency planning strategy, cooperating districts might wish to consider developing interdistrict energy emergency plans that provide for greater flexibility in meeting minimal operating needs.

Before entering into collaborative agreements, however, administrators must determine if the procedure is permissible under existing state laws or if statutory revisions are necessary.

Stockpiling

Bulk purchasing and storage of fuels can be a strategy to reduce energy costs (due to lower unit prices for large quantity buying) and to hedge against future price increases. Stockpiling is also a way to avoid supply disruptions while the inventory is being depleted. Stockpiling, however, is limited to those fuels that can be physically stored and, in panic situations, hoarding can cause false shortages.

Stockpiling requires the purchase or lease of storage facilities. Therefore, as an option, it requires budget outlays in excess of those required for fuel purchasing alone. Three ways to reduce the necessary expenditure and associated risks are sharing capital costs with other energy users, leasing a portion of a facility, and paying an energy supplier a storage fee for some of his or her stockpile.

Diversifying Energy-Use Patterns

By lessening dependence on any one fuel, schools can gain some level of immunity from adverse market conditions for fuels that can be replaced with alternatives. An example of this strategy is the installation of tri-option boilers for plant heating purposes. Boiler plants capable of burning coal, oil, gas or some combination of these fuels can protect users from specific shortages and enable users to select the least expensive fuel at any given time.

Energy diversification can also be applied to school transportation systems. While most school buses use liquid petroleum fuels – either gasoline or diesel fuel – a significant number of school districts are experimenting with liquid propane gas (LPG) and compressed natural gas (CNG), as discussed in Section III.

Another way to diversify energy consumption is to use energy that would otherwise be wasted. Many heating, cooling, ventilating and illuminating systems lose energy that can be recaptured through a process called cogeneration.

Schools can also lessen their dependence on external energy sources by becoming more reliant on renewable energy. The most prevalent examples are active and passive solar systems designed to provide all or a portion of a facility's heating and domestic hot water requirements.

Monitoring Energy Consumption

According to Ohio's publication, *Energy Management for School Administrators:*

> Collecting data on energy use in a school building or the entire district may be one of the most cost-effective tasks in an energy program. ... monitoring energy-use data is emerging as an essential factor in sound fiscal management.[36]

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[36] Ohio Department of Education, *Energy Management for School Administrators* (Columbus, Ohio, 1980), p. 63.

Monitoring energy use can be achieved through manual procedures involving record keeping by finance, maintenance and operations personnel. A computerized system is another way to control and evaluate school energy use. In the last few years, many computerized monitoring systems have been developed and implemented in school districts throughout the country. According to a report by the Energy Management Information Center, Honeywell Inc., computerized systems have shown energy savings as high as 50 percent, with typical savings ranging from 15 to 30 percent.[37]

Modifying Facility Design Standards

Many schools were built to comply with building codes developed during an era of cheap and plentiful energy. Research has shown, however, that many specifications are more stringent than health and safety needs warrant. Because antiquated ventilation and illumination requirements were not established with energy efficiency in mind, significant energy waste has resulted. Therefore, state and local officials should examine existing requirements to determine whether or not they are in excess of currently acceptable standards.

In planning new school facilities, officials must insist that energy efficiency be a high priority in both building design and siting decisions. Whenever feasible, opportunities for using alternate fuels, such as passive solar, should be considered. The principle of efficiency not only applies to facility energy needs, but also to school transportation requirements, with respect to both maximizing fleet efficiency and minimizing pupil transportation needs.

Retrofitting Existing Buildings

The energy efficiency of school facilities often can be increased through retrofitting, i.e., modifying existing structures or mechanical systems. Retrofits may range from the installation of additional insulation to the construction of active or passive solar heating systems. These measures require careful analyses of the required capital investments in relation to resultant cost savings over time.

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[37] Energy Management Information Center, *Reducing Energy Costs in U.S. Schools With Computerized Energy Management* (Minneapolis, Minn. Honeywell Inc., March 1982), p. 6.

The Department of Energy's Institutional Building Grants Program was designed to upgrade existing school facilities, first through low-cost measures and second through more expensive – yet cost-effective – retrofits of equipment and/or facilities.

School officials need to consider future costs of modifications as well as initial investments. Life cycle costing is an important tool for decision making and can be defined as follows:

> Life cycle costing is an economic assessment of competing design alternatives, considering all "significant" costs of ownership over the economic life of each alternative expressed in equivalent dollars. The total life cycle cost of a facility represents the summation of initial construction costs, utilities or like operations costs, maintenance and, as applicable, repair and replacement costs.[38]

Designating an Energy Coordinator

Central to the effective implementation of any or all of these strategies is the identification of an energy coordinator, at the state and local district levels, to take the lead in developing comprehensive energy management strategies and to help mesh the education sector's concerns with those of other sectors in the development of workable and equitable state and local energy emergency plans. Because the state or local education agency's energy coordinator represents the school community in this broad-based planning process, it is important that he or she be at a decision-making level or have the full commitment of the policy makers being represented.

A state-level energy coordinator can play a leadership role in assisting local districts in their energy management and energy education programs, particularly in those districts lacking a coordinator of their own. The coordinator can also represent education interests in the development of a state energy plan. The assignment of specific duties is largely a function of the extent to which a state has assumed an energy conservation responsibility and possesses centralized energy-related services.

Responsibilities of a local coordinator might include the following: (1) selecting cost-effective energy conservation measures;

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[38]State of Wyoming, *Life Cycle Costing* (Cheyenne, Wyo., 1979), p. 3.

(2) training staff responsible for educational programs, administration, ancillary services, and the maintenance and operation of facilities and school transportation systems regarding efficient energy management practices, (3) monitoring staff's energy-related behavior, (4) acting in a liaison capacity among the education agency, other units of government and the general public regarding energy management practices, (5) developing specifications for contracts with energy suppliers, (6) monitoring supplies and prices of alternate fuels, and (7) analyzing and paying utility bills. In addition, the energy coordinator can work with instructional staff in the implementation of appropriate energy education programs. Often such programs can be strengthened by utilizing energy management plans and practices as instructional material.

Obviously, supporting an energy coordinator costs money. While advocates of the concept can demonstrate that the expense of a good coordinator is offset by resultant energy savings, there is strong opposition to the addition of any staff positions during the current era of fiscal conservatism. If having an energy coordinator is not feasible, then shifting responsibilities among existing personnel (within a state or a local school district or among two or more districts) should be examined in order to gain some of the benefits that the energy coordinating function offers. The important thing is to define the function and ensure that it gets done.

V. School-Related Responses to Energy Shortages and Higher Prices

Prudent fiscal management requires the elimination of energy waste, regardless of energy availability. More and more state and local school administrators, therefore, are considering energy efficiency to be an indispensable component of their total management plans. Increased attention to energy management has been partially due to cost considerations and, in some schools, to the incentives provided by the Institutional Building Grants Program. As reported by DOE in *Energy Efficient Schools*

> Increasing numbers of school administrators are learning that energy efficiency can be improved dramatically through energy-saving operating and maintenance procedures, conservation retrofits, and utilization of renewable energy technologies, automatic controls and other conservation measures. A study conducted by the American Association of School Administrators showed that between 1973 and 1979, schools reduced their energy use by 37 percent.[39]

Clearly, sound energy management is the foundation of a coordinated response to energy price escalations or supply shortages, with or without federal incentives.

Several states have developed their own programs to help schools institute cost-effective energy conservation measures. For example, in 1981 Nebraska enacted LB 257, which allocated a portion of the state's oil and gas severance tax revenues for energy efficiency grants to school districts on a competitive basis. In 1979 Massachusetts enacted legislation establishing an Energy Audit and Energy Conservation Improvement Program and an Alternative Energy Property Program. During 1980, $20 million of bonded state money was allocated to these programs, and additional

[39]Office of Institutional Conservation Programs, *Energy Efficient Schools DOE-Assisted Retrofit Projects* (Washington, D.C. U.S. Department of Energy, September 1981), Introduction.

appropriations were to be considered during the 1982 legislative session. Several other states are considering similar measures.'

An Energy-Use Profile

A profile of energy use by fuel type for school functions, buildings and vehicles is needed to identify those conservation measures that are both cost effective and within budgetary parameters, on an individual and collective basis. As explained by the National Electrical Contractors Association:

> Effective energy management requires that the entire pattern of energy consumption be analyzed so that changes made will be integrated into the system in full light of the interrelationship which exists and the various effects which will occur.[40]

A districtwide energy-use record, specifying the cost and quantity of various energy sources consumed for particular programmatic functions within certain buildings or vehicles, should be kept. Changes over time in such a profile can be used in a public information program to show how conservation measures are helping prevent escalating energy costs from taking a greater share of school budgets. An energy-use record is particularly helpful in targeting effective conservation procedures during a severe energy shortage. This application has been acknowledged in some existing plans. As stated in *Emergency Guidelines for Nebraska School Districts*

> It is very probable that a given energy emergency will place different school buildings on different levels of reduction measures. For instance, a required 30 percent reduction in electrical energy use will place very different constraints on an all electric school than on a fuel oil heated school. Therefore, a determination needs to be made of which level each school would fall into under varying types and degrees of energy curtailment.[41]

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[40] National Electrical Contractors Association, *Total Energy Management*, 2nd Edition (Washington, D.C. The National Electrical Contractors Association, 1976), p. iii.

[41] Nebraska Energy Office and the Nebraska Department of Education, *Emergency Guidelines for Nebraska School Districts* (Lincoln, Neb., January 1982), p. 1.

Categories of Response Options

There are four principal categories of school activities to be examined in developing responses to higher energy costs and possible shortages. physical facilities, building utilization patterns, transportation systems and instructional programs.

School facilities need to be surveyed to identify energy-conserving changes in daily operating and management procedures, such as reducing thermostat settings and illumination levels, fine-tuning furnaces and replacing old filters. These often can be instituted at little cost and can save significant amounts of energy. Facilities also need to be audited or analyzed to discover cost-effective conservation measures applicable to building structural components, including windows, doors and ceilings, and to energy-using equipment, including heating and cooling, lighting and ventilating systems. Energy-conscious landscaping can often provide additional energy savings.

In some cases, buildings may be too inefficient to warrant investment in the conservation measures necessary to reach acceptable efficiency standards. During an energy emergency, closing these buildings may be a wise strategy. If declining enrollments or other factors are necessitating school shutdowns, officials may want to consider the energy efficiency of buildings as an additional criterion in determining which schools to close.

In areas where new education facilities are being built, planners and administrators must consider the energy-efficiency aspects of building design and siting to minimize the energy costs that will occur during the useful life of the facility. The opportunities to incorporate alternate energy sources, such as passive solar, in new construction should also be assessed.

In addition to measures directed at increasing physical plant efficiency, there are also opportunities to lower energy demand by changing patterns of building usage. The location of inside activities can often be grouped to reduce the area requiring heating or cooling. Similarly, the times at which facilities are needed can be consolidated in order to reduce heating or cooling periods. Another alternative is adjusting the school calendar. Several states and local districts are operating on four-day school weeks and experimenting with changes in school vacations so that facilities are used in times of least energy demand. However, in assessing the advantages of these alternatives, care must be taken to consider the instruction repercussions, as well as the economic, social and energy impacts that spill over beyond the education sector. For example, a Colorado study showed the four-day school week to be popular in rural districts, and Monday closures saved more energy than Friday closures, partially due to the scheduling of extra-curricular events.[42] In contrast, an unpublished report from the Massachusetts Office of Energy Resources suggests that a four-day school calendar may cause a net energy loss when factoring in an entire community's energy consumption.[43]

Transportation planning should include energy saving and or emergency response options in the districtwide transporting of students, teachers, administrators and support personnel. Among the many possibilities to consider are the following computerized bus routing or improved manual routing procedures, driver efficiency training, revisions in walking distance boundaries and carpooling policies, and the establishment of mileage ceilings placed on transporting students for field trips and competitive athletic events. In areas where new facilities are being built, officials should include pupil and staff transportation needs and options along with other siting considerations.

In a severe motor fuel shortage, better coordination between school district and community transportation systems may be essential. If this policy contains legal barriers, then legislation to allow greater flexibility must be put in place during the contingency planning process, prior to the existence of actual emergency conditions. As stated by the executive director of the National School Boards Association:

> [School buses] are in fact such a good all around form of transportation that city managers, mayors, public transit authorities, state departments of transportation, and even governors have begun to view

[42]See Paul Bauman, "The Four-Day Calendar. An Energy Saver?" *State education Leader*, vol. 1, no. 1, winter 1982, p. 1 and Robert Richburg and Robert Edelen, *An Evaluation of the Four-Day School Week in Colorado* (Fort Collins, Colo. Colorado State University, 1981).

[43]William Begley, "The Effect of a Four-Day School Week on Energy Use in Massachusetts," Executive Office of Energy Resources, April 1980.

[them] as the only reliable form of mass transportation that is readily available during an emergency.[44]

The third category of school activities is the instructional program and associated services. Energy management is related to the educational program in two ways. it can affect the operation of educational services and it can become part of the instructional program. With respect to the first relationship, when policy makers develop response options to energy shortages or rising prices, they must not lose sight of the importance of education to American society. Educational services should not be needlessly sacrificed. As noted by Governor Richard Lamm of Colorado in his 1982 state-of-the-state address:

> Our education system is the foundation for the future. . . . As a nation, we are not going to remain competitive if Japan continues to graduate more scientists, engineers and technicians than we do. As a state, we will not be able to remain competitive if we do not produce the most highly trained work force within our power. We will become a second-rate economy if we have a second-rate education system

Although this fact may be apparent to school officials, educational programs have been readily sacrificed during energy supply disruptions, and many programs have been eliminated due to fiscal constraints brought on, in part, by higher energy costs.

With respect to the second relationship between energy management and the educational program, conserving energy in the education sector requires the cooperation of administrators, teachers, ancillary service personnel, students and operations staff. Effective participation in the total energy management program depends upon an understanding of the nature and importance of energy, the meaning and purpose of conservation and effective techniques to achieve conservation's benefits. Should the need arise to implement fairly drastic energy-saving measures, it is essential that both pupils and staff know the rationale for resultant disruptions to their normal routines. They should understand changing supply and demand factors for various energy sources, the implications of differing patterns of energy dependency, and the decision-making process as it relates to unstable

[44] Thomas A. Shannon Jr., "Will Your School Buses Rescue Us From the Energy Crisis?" *American School Board Journal*, November 1980, p. 21.

conditions in the energy marketplace. Inservice programs and the incorporation of energy concepts into appropriate curricular settings can achieve these important objectives.[45] The natural relationship between energy education and conservation is explicitly noted in the document entitled *Florida Energy Management Handbook for School Administrators*:

> Energy education is an important part of any energy management program. Increased awareness of the energy issue and greater knowledge of the individual's role in reducing energy consumption is needed to secure the cooperation of administrators, teachers, students, and others required for effective energy management.[46]

One example of a creative instructional program designed to be used both in the classroom and in the community is *The Energy Scorecard* developed by the Colorado Office of Energy Conservation. The program involves the participant in measuring his or her energy consumption patterns in transportation, residential heating and cooling, and the use of energy-consuming appliances.

Outside the formal school setting, public information programs can stress the importance of wise energy use in light of rising energy costs and can also prepare the public for measures that may be necessary during times of severe shortage. Ohio's handbook, entitled *Energy Management for School Administrators*, states that well-planned public relations efforts concerning the schools' energy management programs can restore public confidence in the ability of education officials to plan for society's future needs.[47]

Comprehensive energy contingency plans should address the civic functions that schools can perform during times of an energy-related crisis. Traditionally, during times of energency, schools have been centers for shelter, food, medical care and public information.

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[45] See Paul Bauman and Edith Petrock, *Energy Education Why, What and How?* Report No. 181-1 (Denver Education Commission of the States, October 1981).

[46] Governor's Energy Office, Department of Education and Colony Productions, *Florida Energy Management Handbook for School Administrators,* p. v.

[47] Ohio Department of Education, *Energy Management for School Administration* (Columbus, Ohio, 1980), p. 93.

Plan Implementation

Previous federal programs for energy emergency planning addressed a range of potential supply disruptions. Because the characteristics of an energy emergency cannot be known prior to its occurrence, different scenarios were defined to suggest the need for multilevel response plans.[48]

As noted earlier in this document, state energy emergency plans followed federal guidelines in establishing response options for different degrees of supply disruption. For example, North Carolina's *Emergency Energy Conservation Plan for Gasoline* described three types of shortages

> *Mild shortage* Characterized by scattered local shortages evidenced by occasional queuing at the gas pumps. State response requires voluntary conservation measures primarily, plus increased enforcement of the 55 mph speed limit.
>
> *Moderate shortage* Characterized by intermittent long lines (at gas pumps) in all areas of the state State response requires additional mandatory measures.
>
> *Severe shortage* Characterized by daily long lines at the gas pumps, as well as sharply reduced retail sales, increased absenteeism at work, and or decreased revenues in tourist industry. State response requires more stringent mandatory measures than were included in moderate shortages.[49]

The guidelines for schools issued by the Nebraska Energy Office and the Nebraska Department of Education had a similar three-level breakdown

Phase I	a shortfall of less than 10 percent (of a particular fuel type statewide.
Phase II	a shortfall of 10-20 percent for a particular fuel type.
Phase III	a shortfall of greater than 20 percent.[50]

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[48] This approach is described in *The 1980 Standby Federal Emergency Energy Conservation Plan* (Washington. D.C.. U.S. Department of Energy. March 1980), Sec. III.

[49] North Carolina Department of Commerce, *Emergency Energy Conservation Plan for North Carolina Gasoline*, Third Draft (Raleigh. N.C., August 1980). p. 15.

[50] *Emergency Guidelines for Nebraska School Districts*, Introduction.

Applying the concepts of mild, moderate and severe, or phases I, II and III, can have two complications, however. First, determining exact percentages and/or characteristics of a situation is very difficult. Second, actually arraying a given level of shortage along a continuum from mild to severe depends more on the extent to which normal routines will be disrupted than on the quantification of the shortage. For example, a greater shortfall of a lesser-needed fuel may be more mild to some consumers than a smaller shortfall of a more heavily-utilized fuel source. This situation is particularly important to consider with respect to heating fuels severe shortages of heating oil should not necessitate the imposition of severe building-related reactions for those buildings heated with electricity. Nevertheless, it is useful for energy planners to consider methodically the impact of different levels of shortages for different types of fuels and then to plan a continuum of measures to be selectively applied to particular situations.

Because the three-tiered approach to planning for shortages was associated with a coordinated federal-state system of declaring and responding to energy emergencies, established under legislation that is no longer in effect (LECA and EPAA), the approach now should be viewed only as a general guideline for conceptualizing energy responses. Administrators and planners may, in fact, find it more useful to list conservation options along a continuum, ranging from an efficient operating mode to a severe emergency situation, as suggested above. Many response measures for a mild or even moderate shortage may result in the elimination of waste, without having any serious negative impacts. To the extent that this is true, such energy conservation procedures should be considered part of prudent energy management, regardless of the energy supply situation.

A range of energy conservation measures can be developed from some of the conservation handbooks already developed by state agencies and national organizations. A sampling of these is listed in the annotated bibliography.

VI. Conclusions and Recommendations Made by the ECS Energy and Education Task Force

Conclusions

- Forecasters estimate a 75-80 percent chance of a major energy supply disruption in the 1980s.

- The federal response to an energy supply disruption is to rely on pricing to allocate supply and to enhance domestic production. Federal funding for state energy emergency planning has been eliminated. Therefore, states have a greater responsibility to prepare their citizens for the potential disruptions that can be caused by severe energy curtailments and accompanying cost escalations.

- While additions are being made to the Strategic Petroleum Reserve, no allocation plans have been promulgated.

- Most states do not have a comprehensive contingency plan that specifies actions to be taken by various energy-using and supplying sectors in the advent of varying degrees of supply shortages of major fuel types.

- Few state contingency plans deal effectively with school energy emergency responses, i.e., the provision of education and/or community services.

- Allocation by price will have an immediate and severe economic impact on education budgets which are already tight due to the trends of increasing real energy costs and declining real revenues.

- Natural gas deregulation will hit the education sector disproportionately hard due to the fact that approximately 60 percent of all school buildings are heated with natural gas.

- Effective institutional contingency planning rests on energy management plans that assess the consumption, cost and reduction potential for specific energy sources.

- Conservation is important as a good business practice. An investment in energy efficiency is generally offset by resultant savings.

- Energy management programs provide an energy education opportunity for school personnel, students and community members.

- Local energy plans must be consistent with state plans. Coordinated local contingency planning requires the involvement of education officials.

General Recommendations

- Determine the status and content of your state's energy contingency plan.

- Determine where emergency powers reside.

- Determine the adequacy of provisions regarding education in existing contingency plans.

- Incorporate education-related concerns and responsibilities in state and local contingency plans.

- When developing and implementing contingency planning measures, do not lose sight of education's primary responsibility, i.e., educating students.

- Base contingency plans on accurate information regarding utilization patterns for specific fuels by consuming sectors, taking into account variations among regions and individual facilities.

- The current situation of energy sufficiency presents states and localities with the opportunity to develop contingency plans during noncrisis conditions.

- Wise energy planning and energy management requires an informed citizenry capable of making responsible decisions about the development and use of alternative energy supplies having various economic, political, social and environmental consequences. Such a requirement suggests that energy be considered a basic theme throughout the formal and informal education systems.

Recommendations Directed to Governors' Offices and/or State Energy Offices

- Assume a statewide leadership role in developing contingency plans.

- Determine the adequacy of existing emergency powers and, if necessary, seek legislation to provide for emergency powers.

- Create a broad-based planning group to insure that the resultant plan will be comprehensive and to build citizen support for the plan.

- Involve education officials in the development and operation of contingency plans.

- With help of the chief state school officer, review existing contingency plans to determine if there are adequate provisions for education.

- Work at the federal level for the provision of interstate cooperative mechanisms in state contingency plans. (Interstate communication and cooperation will be essential if the federal government does not allocate scarce fuel among states.)

- Work through the National Governors' Association and the Education Commission of the States to develop a national awareness of (1) the need for energy contingency plans and (2) the importance of including the education sector in those plans.

Recommendations Directed to Chief State School Officers

- Become involved in contingency planning in your state.
- Designate a staff member or members to be responsible for energy management and contingency planning. (Data monitoring should be included in these energy-related responsibilities.)
- Take steps to assure that educational functions are not needlessly sacrificed during an energy crisis.
- Determine if legislation is needed to deal with school energy and financial problems associated with an energy emergency and/or severe price escalations.
- Involve local-level education personnel in the planning and development of a state contingency plan.
- Advocate for the education sector's needs in dealing with the state public utilities commission and with individual energy suppliers.
- Assist local education agencies in developing their own contingency plans.

Recommendations Directed to State Legislators

- Examine your state's legislation regarding contingency planning and emergency powers.
- Identify existing emergency responsibilities or assign such responsibilities.
- Develop guidelines regarding state and local energy emergency planning, including the process, participants and content.
- Allocate necessary funding for contingency planning and possible implementation procedures.
- Insure that state budgetary restrictions do not prevent school districts from being able to pay rising fuel costs.

- Consider incentives, such as small grants, to encourage the development of effective conservation measures and energy emergency response mechanisms.

- Should it be necessary to close schools, consider alternate ways to continue educational services.

February 1982 Meeting of the ECS Energy and Education Task Force

Annotated Bibliography

Energy Data and Analysis

Well-designed energy plans must be based on a wide range of potential energy supply and demand situations. Persons responsible for planning and implementing energy contingency plans must therefore monitor changes in the energy marketplace. The following organizations responsible for information about the production and distribution of petroleum, natural gas and electricity and the principal federal agency for energy information are available to assist in this process. They offer data that describes the current energy picture as well as some general assumptions regarding future energy production and consumption patterns.

American Gas Association (AGA)

The Policy Evaluation and Analysis Group at AGA is responsible for economic forecasting and technical information regarding all gas energy sources. Upon request, AGA will provide free materials and technical reports on specific topics, such as the economics of competing energy sources or projections of natural gas supplies in a particular region. For further information contact:

Policy Evaluation and Analysis Group
American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209
(703) 841-8400

The American Petroleum Institute (API)

API is a trade association representing over 300 oil companies. It is designed to disseminate information about virtually every aspect of the petroleum industry, exploration, production, transportation, refining and marketing.

API's Policy and Analysis Department examines the industry's economic trends. API offers *The Basic Petroleum Data Book* which includes extensive information on oil reserves, pricing, marketing, exploration and production. Interested persons can also subscribe to weekly or monthly statistical bulletins. Free copies of *Publications and Materials 1982*, a catalog that lists all API publications, and further information about other API services can be obtained from:

American Petroleum Institute
Publications and Distribution Section
2101 L Street NW
Washington, D.C. 20037
(202) 457-7160

Edison Electric Institute (EEI)

EEI is the trade association of the investor-owned electric utility companies. Approximately 200 organizations, generating nearly 80 percent of all the electricity of the United States, are members of EEI. EEI is recognized as the central source of information on electricity and the electric utility industry in the United States.

The Conservation and Energy Management Division analyzes trends in the supply and demand of electricity and associated economic factors. The institute's address and phone number are listed below:

Customer Relations
Edison Electric Institute
1111 19th Street NW
Washington, D.C. 20036
(202) 828-7501

Energy Information Administration (EIA)

EIA, a branch of the U.S. Department of Energy, is involved in a long-term information collection, processing and dissemination program related to all aspects of energy. EIA is a forecasting and analysis organization, responsible for energy supply and demand data. This service is available to the government, business and the general public. The *Monthly Energy Review*, available on an annual subscription basis, presents current data and trends for production, consumption, stocks, imports, exports and prices for the principal energy commodities in the United States. For further information on energy statistics or the availability of EIA publications contact:

Energy Information Administration
National Energy Information Center
EI-20, Forrestall Building
Washington, D.C. 20585
(202) 252-8800

Energy Management and Contingency Plans

Several energy management and energy contingency plans developed by states provide detailed listings of school conservation measures targeted at the physical plant, transportation services, instructional programs and related personnel policies. The following list, alphabetized by state, presents several plans and related studies that describe numerous energy-saving response options.

This list is not a complete compendium of resources. Readers are encouraged to examine existing plans in their respective states or localities. State energy offices, partially through experience gained from administering conservation programs for schools and public buildings, are often able to provide information on school district energy programs, projected cost savings, feasibility of specific conservation measures and also the status of their state's energy emergency plans.

Florida Energy Management Handbook for School Administrators, Governor's Energy Office, 1981.

Written in conjunction with the Florida Department of Education, this handbook is designed to help reduce the fiscal impacts of rising energy costs. It offers a step-by-step guide for establishing a comprehensive energy management program, as well as methods for refining and updating existing efforts in local school districts. The handbook also contains chapters on energy education, emergency contingency planning, an extensive appendix with school building audit forms and a listing of energy emergency procedures. For more information contact

Governor's Energy Office
301 Bryant Building
Tallahassee, Florida 32304
(904) 488-2475

Illinois Energy Emergency Contingency Plan, Illinois Department of Business and Economic Development and the Illinois Division of Energy.

Upon the request of Governor James Thompson, the Illinois State Plan was written with the cooperation of 19 state agencies and organizations. The plan was designed to "mitigate the impact of an energy emergency on the living conditions and economy of the state." It describes the probable causes of a statewide energy emergency (1) a prolonged and severe winter, (2) labor disputes affecting energy supply, (3) technical failures in energy supply equipment and (4) an imported oil embargo. The plan includes lines of communication for school officials as well as a list of conservation and emergency measures to be taken by schools in an energy crisis. For more information contact

Illinois Institute of Natural Resources
325 W. Adams Street, Room 300
Springfield, Illinois 63706
(217) 785-3445

Emergency Guidelines for Nebraska School Districts, Nebraska Energy Office and the Nebraska Department of Education, 1982.

This document is intended to encourage school officials to establish, make known and keep on file an energy shortfall plan within their local districts. It further suggests what to consider in formulating emergency plans and measures to take in the event of an energy shortfall greater than 20 percent, such as shutdown procedures to maintain buildings at a minimum temperature. For further information contact

Nebraska Energy Office
P.O. Box 95085
Lincoln, Nebraska 68507
(402) 471-2867

A Study of School Calendars, New York State Education Department, December 1978.

This report describes the results of a study conducted by the Division of Research at the New York State Education Department concerning alternative school calendars. It discusses the effects of nine different schedules designed to conserve energy, foster pupil learning, make maximum use of facilities and provide flexibility in scheduling. The study recommends enabling legislation to allow school districts to further experiment with alternative school calendars. For further information contact

New York State Education Department
Education Building
Albany, New York 12234
(518) 474-5844

Energy Management for School Administrators, Ohio Department of Education, 1980

This handbook is designed to assist education decision makers in managing school energy use. An energy management model is included to provide an administrative foundation for the determination and implementation of conservation measures, energy reduction guidelines and recommended consumption levels. Curricular guides, information on Ohio energy suppliers, environmental standards and public relations strategies are included with references to the various sources of information necessary for successful energy management. For additional information contact.

Energy Assistance Office
Ohio Department of Education
65 S. Front Street, Room 419
Columbus, Ohio 43215
(614) 466-4526

Northwest Energy Education/Management Handbook, Region X, U.S. Department of Education, 1980. An interstate project involving the states of Alaska, Idaho, Montana, Oregon and Washington.

This handbook was adopted as a regional project by the U.S. Department of Education on the recommendation of the Project in Energy and Energy Conservation Education (PEECE) Consortium, whose member states identified such a publication as a primary need in the Northwest. The Oregon State Department of Education provided their state manual to serve as a basis for developing the regional publication.

The handbook addresses "the two important energy-related functions of our schools. the education of students who will inherit the problems related to a decreased availability of energy resources, and the development and application of an effective system of energy management in the day-to-day operation of school buildings, transportation systems and support services." For additional information contact:

Oregon Department of Education
700 Pringle Parkway S.E.
Salem, Oregon 97310
(503) 378-3573
or
Idaho Department of Education
Len B. Jordan Office Building
Boise, Idaho 83720
(208) 334-2281

Electrical Load Management for Educational Administrators, Edmond A. LeBlanc and Carsie K. Denning. 1981.

According to the authors. approximately two-thirds of the total dollars expended for school energy go to pay for electrical power. The authors also state, "more dollars can be saved in electrical load management with less financial and management effort and fewer adverse effects on functional capability than in any other area of educational facility operation." This publication and the accompanying *Technical Template for Project Technicians* and *Administrative Template for Project Coordinators* are designed to cover "the complete spectrum of administrative level electrical load management knowledge requirements." The three publications include descriptions of electrical rate schedules, methods for electrical load management (demand limiters, electronic control devices. clocks), new construction design considerations, lighting and step-by-step administrative planning tools to incorporate electrical load management. For additional information contact.

Carsie K. Denning, P.E.
North Carolina State Board of Education
Office of the Controller
486 Education Building
Raleigh, North Carolina 27611
(919) 733-6618

Additional Resources

Academy for Educational Development, Inc.

The academy provides a variety of services to U.S. colleges and universities and elementary and secondary schools. It is active in promoting the more efficient use of facilities through energy conservation and energy education. *Energy Conservation Idea Handbook* is a compendium of nearly 500 ideas and practices to save energy at colleges and universities. The measures described are relatively inexpensive and designed to recover cash investments in a short period of time. Each idea listed includes the college or university where it is being tried as well as the name, telephone number and address of the person to contact for further information. Copies of the handbook are available from

> Academy for Educational Development, Inc.
> Energy Project
> 680 Fifth Avenue
> New York, New York 10019
> (212) 397-0040

American Association of School Administrators (AASA)

AASA is a nonprofit organization representing superintendents and other school administrators. It has produced a number of pamphlets, articles and reports on school buildings and energy conservation. The 1980 *Energy Use Study* describes the results of a national survey on the consumption of energy by school systems. *School Energy Management* reports on an analysis of energy conservation measures implemented under the federal Schools and Hospitals Program. These publications and other information can be obtained from

> American Association of School Administrators
> 1801 North Moore Street
> Arlington, Virginia 22209
> (703) 528-0700

Educational Facilities Laboratories (EFL)

EFL is a nonprofit organization that researches and provides information on the building and operation of educational and related facilities. EFL has worked directly with a number of states and public utility companies on school energy conservation programs. *The Economy of Energy Conservation in Educational Facilities* is a revised edition of an earlier publication that describes facility conservation measures to help schools avoid higher energy costs and prevent the erosion of educational programs and services. The Public Schools Energy Conservation Service (PSECS) is a building energy audit program developed by EFL available through state energy offices. For further information contact

Educational Facilities Laboratories
850 Third Avenue
New York, New York 10022
(212) 751-6214

Educational Resources Information Center (ERIC)

ERIC is a nationwide network of 16 information clearinghouses under the direction of the National Institute of Education (NIE). The ERIC Clearinghouse for Educational Management has a bibliography of energy management studies and services and can assist in an extensive computer search for information on school energy management. *Energy Conservation Management for School Administrators An Overview* by Bernard Lukco is available through the clearinghouse. It includes a broad range of recommendations for school energy management, conservation planning, building audits, retrofit and operational changes, construction of new facilities and transportation. The appendix lists numerous articles from the ERIC data base which cover all aspects of school energy management. This document and related information can be obtained from

ERIC Clearinghouse for Educational Management
University of Oregon
Eugene, Oregon 97403
(503) 686-5043

The ERIC Clearinghouse for Science, Mathematics and Environmental Education includes materials relevant to energy education curricular considerations. For further information contact the following ERIC center

The Educational Resources Information Center
Science, Mathematics and Environmental Education Clearinghouse
The Ohio State University
1200 Chambers, Road, 3rd Floor
Columbus, Ohio 43212
(614) 422-6717

National School Energy Task Force

The Task Force is a nonprofit organization, funded by private foundations, that has developed a loan program for energy conservation measures for public school districts. Each energy-saving measure must have a payback period of no more than two years, and school districts have two years to return the money to a revolving fund to be used for future loans. Schools ordinarily pay back their loan from resultant energy cost savings gained from conservation measures. In its first phase, the task force awarded $290,000 to 26 school districts for 109 energy conservation projects. The revolving fund and number of loans offered is expected to increase significantly in 1982. For further information contact:

Field School
Bob Pritchard, Chairman
99 School Street
Weston, Massachusetts 02193
(617) 899-5988

U.S. Department of Energy (DOE)

Through several state and local programs, DOE offers technical assistance and direct financial aid to help educational institutions reduce higher energy costs and conserve energy. A publication entitled, *Total School Energy Management Program*, is designed to assist school administrators in establishing energy management, energy education and efficient transportation programs. This booklet includes an appendix of DOE publications on school energy building design, efficiency standards, energy audits and other related areas. For U.S. government publications from DOE and other agencies contact.

U.S. Government Printing Office
Washington, D.C. 20401
(202) 783-3238

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Education Improvement Center
Education Commission of the States

The Education Commission of the States is a nonprofit, nationwide interstate compact formed in 1966. The primary purpose of the Commission is to assist governors, state legislators, state education officials and others to develop policies to improve the quality of education at all levels. Forty-eight states, American Samoa, Puerto Rico and the Virgin Islands are members. This report is an outcome of one of many Commission undertakings at all levels of education. The ECS central offices are at 1860 Lincoln Street, Suite 300, Denver, Colorado 80295. The Washington office is in the Hall of the States, 444 North Capitol Street NW, Suite 248, Washington, D.C. 20001.

It is the policy of the Education Commission of the States to take affirmative action to prevent discrimination in its policies, programs and employment practices.

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