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ABSTRACT

Reported are the proceedings of a conference of practitioners of energy education including classroom teachers, curriculum experts, administrators, and representatives from industry and government. Participants worked in six groups to produce papers and recommendations. Topics addressed by each group included: (1) State-of-the-Art and Needs Assessment in Energy Education; (2) Dissemination, Implementation, and Evaluation; (3) Strategies and Need for Policy Impact; (4) Preservice and Inservice Teacher Training; (5) Energy Education for Special Groups; and (6) Grade Level Articulation. A conference overview, a text of the keynote speech, and a transcript of a panel discussion are included. (RE)

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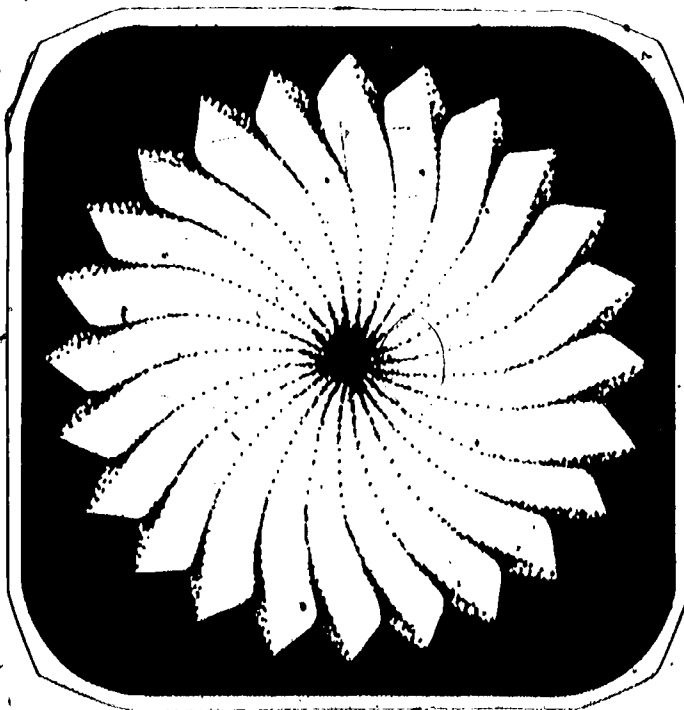
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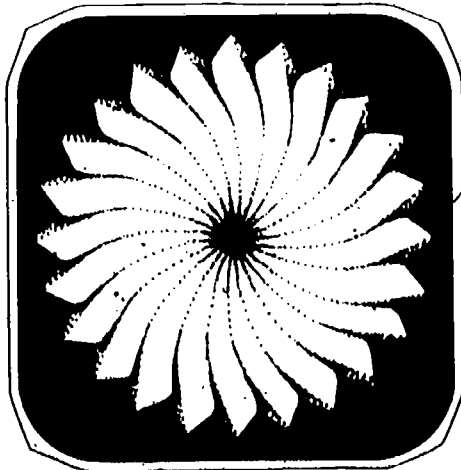
# Second Annual Practitioners Conference On Energy Education



PROCEEDINGS

E 030 890

# Second Annual Practitioners Conference On Energy Education



## PROCEEDINGS

Edited by  
**Helenmarie H. Hofman, Ph.D.**  
Associate Director  
Project for an Energy-Enriched Curriculum  
National Science Teachers Association  
Washington, D.C.

**F. Gene Miller, Ph.D.**  
Professor of Education  
Social Studies Education  
Western Illinois University  
Macomb, Illinois

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# Conference Overview

## Introduction

Energy education is emerging as a recognizable area of educational endeavor. While it is not a discipline and is, in fact, necessarily interdisciplinary, it is being accepted both as a curricular priority and an instructional opportunity by many teachers across the country.

The growing stature of energy education was signaled by the first Practitioners Conference on Energy Education (14-16 December 1978, University of Maryland). The second conference recognized the growth gained in the interim year, and projected strategies and needs for continued growth.

The goals for the 1979 conference were in general the same as those set for the Conference in 1978:

- To enhance communication between the practitioners of energy education.
- To provide a current summary of the state of the art in energy education.
- To develop recommendations for practitioners, for federal and state agencies and for industrial and public interest groups that will further the development and dissemination of appropriate materials and techniques for energy education.

In practice the working groups moved the emphasis away from state-of-the-art description to implementation and evaluation. There were other significant changes in the attitude, priority and structure of the 1979 Conference, indicating a year of growth. The change in sponsorship was one of these. The Department of Energy can take a bow: their seeding of the first conference was successful. But the sponsorship of the 1979 conference by several different groups and agencies indicates a growing sense of the urgency of energy education. The multiple sponsorship also demonstrates the increasing cooperation among those involved in the field. These changes bode well for the future.

The opening remarks by a White House representative indicate the increasing national visibility of energy education. We are assured of the White House's continuing recognition of energy education as a crucial component of any successful National Energy Plan. President Carter's signing on 20 March 1980 of a resolution establishing a National Energy Education Day is concrete evidence of that continuing recognition.

The attitude of the conferees was noticeably different from the previous year. In 1978, the spirit was one of "Gee, there are a lot of us doing things. We need some coordination and support." The 1979 attitude was one of greater confidence: "Of course energy education is important. It's about time to move into a full-scale effort with national support. Give us the tools, and we will do the job."

The hard hitting messages from the panel on the first day set a similar tone. They said, "We've started, we're on the way, but there are some tough tasks ahead." The panel had representatives from all the major organizations involved in energy education. We heard about programs with national impact: the National Science Teachers Association's (NSTA) Project for an Energy-Enriched Curriculum and Energy and Man's Environment. But we also heard from the representatives of those projects and others that it is time to analyze the effects of energy education to find out what is happening in the classrooms and to find out whether infusion is working. We heard it is time to learn how to get all teachers—English and vocational education teachers as well as science and social studies teachers—to approach the educational challenge of the energy crisis.

We heard that federal support for energy education is insufficient. The energy education network that the U.S. Office of Education and the Education Commission of the States started is still frail and undirected; the need for a national clearinghouse of energy education materials and projects is still unmet.

Perhaps the conferees' vigor was best transmitted by their resolutions directed to the federal government. They called for the establishment of a high-level steering committee or task force to work with the private organizations already active in energy education. Such a steering committee would be charged with identifying appropriate national goals in energy education and with assuring that there are mechanisms for reaching those goals.

The conferees recognized the necessity of nationwide inservice training if energy issues and concepts are to pervade the classrooms. Funding, at a level of 0.1¢ on each gallon of gas, will be needed, and such a connection between a gas tax and education would make an important point to the public. The National Science Teachers Association was urged to provide the political leadership needed to transmit the sense of urgency of the conference to Congress and the appropriate federal agencies.

There are two important products from any successful conference: the Proceedings, which carry the written summary to the outside world; and the enthusiasm, personal contact and increased knowledge that the conferees carry away. We feel that this conference was successful. In these Proceedings we report the output of two hard working days of intense small group discussion. We hope that these recommendations can guide the continued growth and development of energy education through 1980.

The second product was there also, attested to by conversations, calls and letters. It will carry the participants forward in what is still a pioneering effort. And we have provided a Participants List in the Proceedings so that the reader can share the enthusiasm and knowledge of neighboring participants.

It now appears certain that there will be a Third Annual Practitioners Conference on Energy Education in 1980. These Proceedings should be a useful baseline for the measurement of the continued and successful growth we all expect.

John M. Fowler  
Director of Special Projects  
National Science Teachers Association



## Conference Summary

The Second Annual Practitioners Conference on Energy Education was held at Rockford College, Rockford, Illinois, December 9-11, 1979. Invited to attend were people actively involved in energy education including outstanding classroom teachers, curriculum experts, administrators, and representatives from private associations and government agencies.

The participants worked in six groups: A. State of the Art and Needs Assessment in Energy Education; B. State of the Art in Dissemination, Implementation, and Evaluation; C. Strategies and Need for Policy Impact; D. Pre and Inservice Teacher Training; E. Energy Education for Special Groups; and F. Grade Level Articulation. Each group assessed the current state of energy education in the assigned field and recommended changes and additions in program and policy.

The White House lent energy education its support. Richard Brancato, chairman of the White House Task Force on Energy Conservation, spoke to the conference Monday morning. "There is an immediate need to develop programs in schools which address both energy awareness and energy efficiency and conservation. The energy issue is here to stay and demands the investment of time and resources now," he said. Mr. Brancato is an assistant to Ann Wexler, President Carter's Assistant for Public Liaison.

Mr. Brancato's talk was followed by a panel discussion on the accomplishments and needs of energy education. There were five panelists. John Fowler, Director, Project for an Energy-Enriched Curriculum, covered the background of the PEEC and spoke of the need for careful evaluation of the infusion technique. James Kellett, Director, Education Division of the U.S. Department of Energy, said that one of the goals of energy education is to change consumer behavior and spoke of the need for energy-literate educators. Edith Petrock, Assistant Director for Programs Development, Education Commission of the States, explained the organization of ECS and spoke of the need for knowledgeable, informed decision- and policymakers. John Jones, President, Energy & Man's Environment, gave a history of EME and pointed out the need for cooperation between groups of energy educators. Walter Purdy, Educational Services Manager, Edison Electric Institute, outlined the corporate role as one of support for educators rather than one of materials development at this point. A question and answer session followed the panel.

Dr. Melvin Gottlieb, Director of the Princeton Plasma Physics Laboratory and a leader in nuclear fusion research, was the keynote speaker. He spoke to the conference on "Energy for the Future," which included an assessment of the unconventional and alternative sources of energy. Resources, technologies, environmental problems and economics were discussed and compared among the solar options, the various synfuels, the new coal burning technologies, and other renewable technologies including wind, biomass and geothermal. He spoke of the need for careful research to select the most viable options since research is the least expensive component of the design, development and production of new energy technologies.

He then turned to the fusion program at Princeton. Research there has been progressing for 25 years, but only recently has fusion actually become an energy option rather than simply a research program. Dr. Gottlieb explained the principles of the fusion reaction very clearly as well as the problems imposed by terrestrial limitations. The resources, techniques and problems of fusion energy were discussed and illustrated by slides and examples from his experience at the Plasma Physics Laboratory.

Dr. Gottlieb was very hopeful about the future for fusion. He indicated that scientific feasibility will probably be demonstrated within two years by reaching breakeven, the point at which as much energy is produced as is needed by the reaction to maintain enough heat to proceed. After this obstacle is surpassed, the practicability of fusion will be enhanced.

The two and a half day conference was opened with a poster session. Participants displayed their projects and materials and a general informal discussion was generated. There were six working group sessions (five hours total working time) including a reporting session at which the groups reported their general progress and gathered comments on their work from the conference as a whole. A general session closed the conference. Recommendations from each group were presented and clarified, and the participants selected and endorsed the priority recommendations of the conference.

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## Conference Schedule

### Second Annual Practitioners Conference On Energy Education

Rockford College  
Rockford, Illinois

December 9-11, 1979

#### Sunday, December 9

Noon - 5:00 p.m.

Registration, Burpee Center

5:00 - 6:00

Buffet Dinner, Burpee Center

7:30 - 8:00

General Session, Severson Auditorium, Scarborough Hall

Welcome: Donald McCurdy, President-Elect, NSTA;  
Fred Zurheide, President, Illinois  
State Science Teachers Association.

Charge to the Conference: John M. Fowler, PEEC.

8:00 - 10:00

Project Presentations, Poster Session, Grace Roper Lounge

#### Monday, December 10

7:15 - 8:00 a.m.

Breakfast, Burpee Center Cafeteria

8:30 - 9:00

Speaker: Richard Brancato, Chair, White House Task Force on Energy Conservation.

Topic: "Education: The Path to a New Energy Ethic," Severson Auditorium

9:00 - 10:30

Panel/Discussion: "Accomplishments and Needs of Energy Education," Severson Auditorium

Panelists: John Fowler, Director, PEEC (NSTA); John Jones, President, Energy & Man's Environment; James Kellett, Director, Education Division (DOE); Edith Petrock, Assistant Director for Programs Development, Education Commission of the States; Walter Purdy, Educational Services Manager, Edison Electric Institute.

10:30 - 10:45 Break (Coffee, Grace Roper Lounge)

10:45 - 11:15 General Discussion

11:15 - Noon Working Groups Meet

- A. State of the Art and Needs Assessment in Energy Education (Grace Roper Lounge)
- B. State of the Art in Implementation, Dissemination and Evaluation (Grace Roper Lounge)
- C. Strategies and Need for Policy Impact at Federal, State and Local Levels (Dining Room A)
- D. Pre and Inservice Teacher Training (Dining Room B)
- E. Energy Education for Special Groups (Handicapped, gifted and talented students, minorities, different geographic and demographic backgrounds) (Founders Room)
- F. Grade Level Articulation (Forest Cool Lounge)

Noon - 1:00 p.m. Lunch, Burpee Center Cafeteria

1:15 - 2:30 Working Groups Continue

2:30 - 2:45 Break (Coffee, hall area near working rooms)

2:45 - 4:30 Working Groups Continue

4:30 Adjourn

5:30 - 6:30 Reception, Colonial Inn Motel (Sponsored by the Silver Burdett Company)

7:00 - 8:00 Banquet, Regents Hall, Burpee Center

8:00 - 9:30 Speaker: Melvin Gottlieb, Director, Plasma Physics Laboratory, Princeton.  
Topic: "Energy for the Future," Regents Hall, Burpee Center

**Tuesday, December 11**

7:15 - 8:00 a.m. Breakfast, Burpee Center Cafeteria

8:30 - 10:00 General Session: Preliminary Working Group Reports and Discussion, Severson Auditorium

10:30 - 10:45 Break (Coffee, Grace Roper Lounge)

10:45 - Noon Working Groups Report Preparation Continues

Noon - 1:00 p.m. Lunch, Burpee Center Cafeteria

1:30 - 3:30 General Session: Working Group Reports and Conference Recommendations, Severson Auditorium

3:30 Conference Adjourns

## State of the Art

At the Second Annual Practitioners Conference, a major portion of time was spent assessing the state of the art and developing recommendations from that needs assessment. A comparison with the 1978 state of the art assessment will show identifiable progress in some areas and obvious gaps in others. Energy education policy is a new area of concern which is included in this description of the state of the art; communication mechanisms, materials, and implementation are continued concerns. The description presented here is based on the experience and expertise of the conference participants and staff.

The major goal of energy education is to produce an energy-informed citizenry. Not to do so is dangerous in light of the ongoing energy problems that exist in this country.

Student-citizens must not only understand the need for wise use of energy but also be equipped to make choices among energy options and be aware of energy career opportunities. The final test of the success of energy education will be the behavior of these student-citizens in the 1980's and beyond.

Energy education has emerged from the movement that began as outdoor education in the 1930's and surged into the 1960's as environmental education. Controversy continues over which area includes the other; however, whether environmental education is the umbrella under which energy education falls or not, energy has become a vital, integral part of the curriculum.

## Policy

A comprehensive national energy education policy has not been developed, although the seeds of such a policy are emerging. The President signed a proclamation designating a National Energy Education Day; the U.S. Department of Energy continues to support energy education (although this support needs to increase); a federal Department of Education has been established and should have a role in energy education; and 15 states have adopted new state policies in support of energy education. Locally, some energy education policies and programs exist that are tailored to fit each particular situation.

## Communication

The dissemination of energy education information through networks or clearinghouses has changed only slightly. The energy education network of the U.S. Office of Education and the Education Commission of the States did not receive the necessary funding to become effective. Networks functioning on the state level include the California Energy Forum and the Northwest Consortium composed of Oregon, Washington, Idaho, Montana and Alaska. The National Science Teachers Association has continued to sponsor a national network consisting of 24 people, 12 in science and 12 in social studies. This Regional Energy Education Network is widespread and active.

The need for a well-funded, easily accessible national clearinghouse to gather and disseminate information on all aspects of energy education still remains. The ERIC Information Analysis Center for Science, Mathematics, and Environmental Education at Ohio State University (Columbus, Ohio), has begun to denote energy in their Environmental Education Section, but this effort must be followed by the development of a more extensive clearinghouse system.

The arrangement of personnel on the state level shows that energy education is beginning to be recognized. In the 50 states there are currently seven people in positions that are concerned only with energy education; five people who deal with energy/environment education; four people whose position is in science education or general education and whose duties include responsibility for energy education; and ten people in other areas of education such as curriculum development and Health and Physical Education who are the designated energy education contact person. In State Energy Offices or Energy Extension Services, there are eight people specifically identified as the energy education person.

## Materials

There is an abundance of energy education materials across the nation. Examples range from national curriculum such as the NSTA's Project for an Energy-Enriched Curriculum, to units developed by individual classroom teachers, such as the six-week unit for ninth grade science developed by Ted Hall in Wayland, Massachusetts. Materials on the national level were represented at the conference by:

- Project Creation, A Title IV environmental curriculum, developed locally, LaSalle, Illinois.
- Solar Energy Education Project, infusable materials for grades 7-12, developed in conjunction with the New York State Education Department.
- "Take That, You Energy Monster," a puppet show produced by the League of Women Voters.

Representing the many materials available from the states were:

- North Carolina Department of Public Instruction, "Energy Wise Program."
- Nebraska Energy Office programs including Basic Teaching Units on Energy for grades 7-12 and Energy Conservation Activity Packets for grades K-6.

Numerous local projects appear in a variety of forms:

- "Energy Education in the Community and Classroom," independent consultant, Sewickly, Pennsylvania.
- "America's Possible Energy Choices," Rockford School District #205.
- "Surface Mining in Southern Illinois," Museum and Art Galleries, Southern Illinois University.

Many of the materials available are not built on a conceptual framework, nor do they carry an indication of where they could fit into the existing curricula. Content has tended to be conservation-oriented. Greater emphasis should be placed on conservation as the efficient use of energy and on the basic laws and principles of science involved in energy. Factual material should be included and mechanisms for updating need to be developed.

However, energy education is more than science. Energy is an interdisciplinary field of study for which materials also exist in social studies, economics, history, and government. There are curricula for which energy materials need to be developed, especially English, the arts, and mathematics. Also, more emphasis needs to be placed on skills in communication, mathematics, quantitative analysis, hypothesizing, and critical thinking.

## Inservice

Nationwide teacher inservice is a necessity if energy issues are to pervade classrooms. The training should be coordinated at the state level like the model efforts in Florida, Michigan, and Nebraska. The inservicing should meet established guidelines and be organized and facilitated by people in local districts. Some regional inservicing has been done by NSTA, U.S. Department of Energy (DOE), individual projects, and Energy and Man's Environment, which has made a major effort in ten states.

Little has been done to evaluate the impact of energy materials on students. It will be necessary to study student behavior as well as to study cognitive and affective outcomes.

In summary, since the current supply of energy materials is large, the next logical step is to increase considerably the number of teacher inservice sessions so that teachers may use these materials effectively or adapt the materials to their needs. Teachers continue to need better access to energy information and materials. The impacts of existing programs and materials have not been assessed. Energy education policy is the most important single need at the federal, state, and local levels.

## Conference Recommendations

- 1 Teachers must be energy-literate if they are to enthusiastically and effectively teach about energy. Therefore, inservice training in energy education is crucial and should be instituted for teachers of all grades and disciplines. An ideal teacher inservice model should include awareness, concepts, application, implementation and evaluation of technical information and energy education materials and methods. Teachers should be familiarized with available energy education materials and methods for local curriculum adaptation and/or infusion into their programs.
- 2 A well-funded, easily accessible national clearinghouse should be established to gather and disseminate information on energy education materials, on groups and individuals that offer support services for energy education, and technical information for energy education practitioners.
- 3 Evaluation of the content, pedagogy, and bias of energy education materials should be published. Professional organizations such as the NSTA and NCSS are urged to be responsible for organizing a broad review group for this purpose.
- 4 Policy strategies of the federal government should include: the formulation of a steering committee on energy education to identify goals and objectives for federal programs and to review federal policies; the continuation or implementation of activities and support for energy education by the U.S. Department of Energy, U.S. Department of Education and the National Science Foundation; and the encouragement of interagency cooperation.
- 5 In each state, representatives of the governor's office, the legislature, state energy office, education agency and/or board of education should develop an energy education policy. In the formulation of that policy, input should be received from interested parties in both energy and education. The policy should specifically address the unique needs of each state. The needs of special groups for energy education should not be overlooked.
- 6 Each local district should be encouraged to develop an energy education action plan. Input from the school board and interested and informed local groups should be sought. The plan should have two components, an instructional component and a building use/conservation component, which must be coordinated.
- 7 Funding for nonformal public education should be increased. In addition to the traditional routes of public education through public service agencies and youth organizations, energy education requirements and opportunities should be a part of programs for special groups (the elderly, the economically disadvantaged, the physically handicapped, etc.). Federally legislated energy-related programs for such groups should include a mandatory educational component.



**Education:  
The Path to a  
New Energy Ethic"**

## **Richard Brancato, Chair White House Task Force on Energy Conservation**

I feel that I'm preaching to the converted in speaking to a group of people that know so much about energy, and are probably more aware of what the situation in the United States has been in the last ten years than the general public. You have probably done more as a group to make that awareness reach the American public than any single effort that we have made either in the federal government or in state and local government.

Americans have always had a plentiful and cheap supply of oil and we, therefore, have wasted an awful lot throughout our past history. The picture has changed dramatically: our supply is limited and our prices have gone up, and as a result we need a change in the way we live, not necessarily in the quality of our life. I'm convinced that that can be done. To make such a change, we need to create an energy ethic. That creation, if it is going to permeate the society, must start with the youth of our country. Considering these changes, I believe there is an immediate need to develop programs in the schools which address both energy awareness and energy efficiency and conservation. I also believe that young people need to understand the energy issues that they will face in the coming years and help us educate the larger community. We need to enlist the support of educational decisionmakers and leaders in this effort. Until we can reduce our dependence on foreign oil, an investment of time and resources is required on all our parts, particularly from educators like yourselves.

■ ... there is an immediate need to develop programs in the schools which address both energy awareness and energy efficiency and conservation.

Americans have typically been very wasteful of the energy that we've had in this country, simply because it has been very plentiful and very cheap. The plentiful supply is no longer available and what oil there is out there is exceedingly high in price and going to be even more expensive. That price increase has not only exacerbated the negative balance of payments situation in the United States, but it has also added to inflation for Americans. To compound the problem, a majority of the American public still feels the energy problem has been and remains a hoax perpetrated by the oil companies and the Organization of Petroleum Exporting Countries. When I say "a majority" of the American people, I mean 83% of the American public still feels that the energy problem has been and remains a hoax, according to DOE surveys. Let me give you some more statistics. 45% believed that we don't have an immediate problem—the good thing about that is 55% do. 33% believe that we won't have a problem even in the next five years. That means that we've got a tremendous educational process to go through in the next few years, in addition to facing the immediate problem.

What's more appalling to me is that only half of the young adults in this country, people in the 25-36 year old range, can answer correctly 50 key energy questions. That statistic comes from the National Assessment of Educational Progress—only 50% of the young adults in this country can answer correctly 50 energy questions. Now, that's not to say that people aren't concerned. People are concerned, but they seem to be concerned only when it immediately affects them—when it affects them directly and perceptibly—through gas lines, large energy bills for the homes, or when factories are closed. We are beginning to see that those things are not short-term effects, but are things that we are going to have to deal with in the coming months and the coming years.

■ ... our attitudes and behavior concerning energy must change.

Put very simply, our attitudes and behavior concerning energy must change. Two-thirds of all energy used in America goes for personal consumption and one-third goes for the manufacture, transportation and processing of the goods and services that we consume. What we have to create, basically, is a change in the way we live and not in the quality of our life. I have found a tremendous amount of pessimism in this country about the energy situation and what it means in terms of the quality of life. I'm rather optimistic about it, because I think the changes can result in increased employment, albeit a shift from the traditional kinds of things that we do. There is a great opportunity that we as Americans will have in the next generation if we can capitalize on and begin to believe that, indeed, there is an energy problem and we need to shift the way in which we live.

In effect we must create a new energy ethic and we must start with the younger generation. Therefore, we must begin to develop programs in our schools which address both energy awareness and energy efficiency and conservation. Energy efficiency and conservation are short term concerns; energy awareness is the long term goal, to prepare the youth of this country to deal with the energy situation in the future. I think that young people need to understand the energy issues that will face them in the coming years and help us educate the larger community.

A group based in Florida has put computer and video screens in schools that are connected through a blackbox to people's homes. They can measure the amounts of energy consumed in an individual home. When the students come in each day they get the prior day's energy usage in the home. These youth, probably in the third or fourth grade, can sit down at a terminal and see when the highest usage of energy in their home occurs. They can look at it and say, "Aha! At 9 o'clock last night my house was using x kilowatts of power." That night they go home and at 9 o'clock they look around the house to see where the energy is being used. They tell their parents, or they can go themselves and turn out the lights or turn off the appliances being used.

■ ... individuals are going to make the difference.

The point is simply this: individuals are going to make the difference. Individuals are motivated largely by the people they live with, whether they be children or other family members. To motivate young people we need to enlist the support of decisionmakers and leaders in education. I hope that this group is going to make some suggestions about how to enlist the support of these people.

John Goodman, Dean of Education at UCLA, suggests that we need to re-examine the premise that education changes when somebody who knows what's good acts on someone else for the latter's good. He feels that education changes only when internal decisionmakers are involved.

Without underestimating the need for good materials and training for teachers, perhaps more effort needs to take place with principals as well as superintendents and school boards, since these people not only set educational priorities,

but make decisions about time and resources. They can set the tone for conservation as well as promote its teaching if their self-interest (in the positive sense) is engaged.

I believe that the educational community incorporates new issues only if these issues are proven to be salient and long-lasting. School systems don't pick up things that are going to be over within the next six months. So energy education seems to meet the kind of criteria that it takes to be placed in the schools. The school system is going to have a long range opportunity for investments in time and resources. How that fits with competing educational priorities, I don't know. School systems, as you are all aware, have dwindling amounts of resources that are available to carry out the mandated reading, writing and arithmetic. To put on top of that a requirement to teach an energy curriculum is something that all of the decisionmakers are going to have to grapple with.

■ ... energy education is something that is in the national interest, and indeed, in their interest.

From my point of view, I certainly intend to convince as many people as I can that energy education is something that is in the national interest, and indeed in their interest, and should be picked up as a concept that needs to be incorporated into the curricula of all schools. I believe it is of utmost importance and tips the balance in terms of what this country is going to be in the coming years.

Our energy problems will be with us for at least the foreseeable future. We need to rely upon the educators of this country to educate and inform the youth of this nation about how to confront these problems. In this way we can hope to increase energy efficiency, move to renewable resources and reduce our dependence on foreign oil. You have the support of the administration to carry out your efforts.

# **“Accomplishments and Needs of Energy Education”**

## **Panelists**

**John M. Fowler**

**John Jones**

**James Kellett**

**Edith Petrock**

**Walter Purdy**

**JOHN M. FOWLER**  
Director, Project for an  
Energy-Enriched Curriculum

I've been trying for several days to do some sort of a needs assessment for this conference, to say, "Where are we and where should we be going now?", but haven't gotten very far. Our personal perspectives will influence us as we look backward and forward from the present to see what we have done and what should be done. As I look, I see so much that the NSTA didn't do and others did that I think I'll be safe from falling into the trap of just giving you a report on NSTA materials.

Energy education started in different places and in different ways around the country. Colorado, Florida, New York, Iowa and California were states which got into the action early with activity guides, concept lists and the like. Four states (Colorado, North Carolina, Massachusetts and Washington) formed the Interstate Energy Conservation Leadership Project (IECL) in 1974 and held a series of regional conferences over a two year period. Although the focus was on conservation in facilities and transportation, there was an important curricular component. That provided early stimulation to energy education. Energy & Man's Environment (EME) was put together earlier that year by David Kennedy and others in Washington. And the NSTA entered energy education at about the same time.

Energy education at NSTA began with money from the U.S. Office of Education's Office of Environmental Education. The NSTA project was first directed at producing background materials because the first step toward solving a problem is to know something about it. We moved from that task to the production of classroom materials and that's been our major focus since. We've had some experience with workshops and, lately, with conferences.

There are sufficient background materials. There are background materials as elaborate and detailed as the *Resources for the Future* book and a host of simpler, less inclusive products. We try to bring you information on those reference documents through the newsletter *Energy & Education*. There is the NSTA *Sourcebook* and the *Factsheets*. I only mention those to tell you that both of those are due for revisions. Saying that reminds me that one of the things requiring a creative mechanism in the educational community is the revising and updating of resource materials. It is very difficult to set up a continuing program and to find the people that can get new information out to the teachers who need that information.

To give you an indication of the amount of national coverage that our materials have provided (I'm sure others of you who have materials can give similar numbers and enable us to get some idea on what kind of national coverage we're getting) the *Factsheets on Alternate Energy Technologies* are now approaching 3,000,000 in total distribution, and the *Sourcebook* is approaching 30,000, so there are a lot of teachers who have that background material in their hands. We don't yet know what they're doing with it, but we know that they have it.

The second product that has been developed in these few years of energy education is classroom materials. Again, I think you are familiar or can easily become familiar with the NSTA materials. There are really only a very few examples of national materials development efforts. Many individual teachers and local groups have been active, however, and so there are lots of examples of local materials development. We have some of those here. So materials development, at least as far as providing examples, now exists. I think that the next push should not be to draw up a whole new set of materials, but to find out how the existing materials are being used and locate the gaps in these materials. If there is need for further materials development, let's base it on what already exists.

One of the areas that needs study is the mechanisms for getting energy education into the classroom. The difficulty of adding another color to the educational "coat of many colors" is well known. As you know, our hope at NSTA has been to infuse energy material into existing curricula; to meet needs that are already there in a different way; for example to teach the legislative process by following an energy bill rather than a bill to change the dress code.

We're beginning to find some support for that approach. One recent civics book which earlier had the Cuban Missile Crisis as its example of administrative policy-making, now has energy policy. As you know, we've produced a packet using that theme. We've tried very hard to establish an example of infusion. Some other groups have also produced excellent materials that were not intended to be infused, but were intended to stand alone as modules. We need to know how these different techniques work and what can be done to improve them. Therefore, I think the challenge in materials development is to find out how the examples that now exist are working.

There is also a need for conferences and workshops. NSTA has done some of both; *Energy & Man's Environment* probably has the most widespread experience with workshops; and the network that Dr. Edith Petrock will talk about has developed some experience. Again, we have several different ways of running and supporting conferences and workshops. We now have to look at our workshop and conference experience to see what can be done in terms of a national program. It is quite clear that if we are really going to move the nation's teachers to use energy examples in a more deliberate way in their classrooms, then we have to get them into workshops. We have to give them the kind of hands-on experience which doesn't come out of journal articles.

We are only at the beginning stage of the necessary development of networks and communication. There is a network that NSTA has sponsored, the Regional Energy Education Network with 24 people, 12 science and 12 social studies, but you can tell from the numbers that it is not a very widespread network. We need to get a network that takes off from that and covers the country much more deeply.

And finally, we have the beginnings of experience in inservice and preservice training. That's probably the weakest area in energy education. We need to take that beginning and move toward deliberate programs, to make sure that teachers

are given from the beginning, in their educational environment, some insight into the importance of and ways to use energy themes in the classroom.

Energy education has matured enormously since the first Practitioners Conference. In 1978 we gloried in finding ourselves alive. At this juncture we feel the exuberance of adolescence but (typical of that age) have problems to solve. This Second Annual Practitioners Conference will move toward solutions but there will still be work for a third one next Fall. I look forward to working with all of you and learning from you.

**JOHN JONES**  
President, Energy &  
Man's Environment

I'm very pleased to have an opportunity to share with you some of the things we've been doing. I say "we" because about a dozen people in this room are actively engaged in the EME program.

Energy & Man's Environment was initiated in Washington, Oregon, Idaho, and western Montana in 1972. That was before the oil embargo and before there was a great deal of motivation for anything called energy education.

As an education program, EME had an unusual beginning. The concept was industry initiated. I would hasten to say that I am not an apologist for that relationship. It has been my experience that the industry persons with whom we have worked have been extraordinarily good citizens. They have accepted and encouraged the creation of a program based upon academic integrity and objectivity. They have, like all those participating in the EME program, adopted the position that everyone can take part, but no one can take over.

The initiating group for EME was the Public Power Council, an organization of publicly owned electric utilities. Motivated by increasingly difficult construction and licensing conditions, the Council members sought to develop an energy education program. After consultation with the Washington State Department of Public Instruction a program was initiated under the title Energy & Man's Environment.

The cooperative effort included a decision that industry would provide technical and professional input and financial assistance, and that the program would be planned, conducted, and managed by educators. The program was initially centered in Washington State with efforts to be focused on Oregon, Idaho and western Montana as well. Today EME also formally serves all or part of California, Montana, Wyoming, Utah, Nevada, Colorado, Iowa, Missouri, Kansas and New Hampshire. Although initial efforts centered on curriculum development, two interrelated program components subsequently evolved—teacher inservice and materials preparation. These two emphases are retained within the present EME program.

EME assumes that programs should be developed and conducted by persons who fully understand the community to be served. Therefore, while the national organization supports and administers the overall effort, each member program is coordinated by a carefully selected educational leader from the area where the EME program is to be conducted. In addition, the Coordinator is supported by a broadly constituted Program Planning and Implementation Committee. Committees often include teachers, administrators, industry people, government representatives, resource management persons. Committees vary in size depending on the size of the geographic area and population to be served. It is the Coordinator and the Program and Planning Implementation Committee who conduct and manage the program.

The programs generally consist of a series of orientation conferences, implementation workshops and follow-up seminars. There is a progression to those three components. We think that there is a tremendous necessity for awareness. We've heard and read the statistics that tell us how much we, as Americans, do not know about the energy situation. Awareness conferences present a first step with key educators (curriculum specialists, lead teachers, administrators). Conferences are designed to introduce the world, national, regional, and in some cases the local energy situation. At these conferences educators have an opportunity to examine with the experts the economics, the state of the art, the pros-



pects for the future, and other essential issues. Thus, the educators can go back to their own school district, not having necessarily talked about curriculum, but with a better understanding of what's going on. With this information they can begin to internalize some of the issues and problems that they've seen in the newspapers and watched on television. We hope, of course, that they will be motivated to take positive action.

Conference participants are told that if they wish to do something in their own district, the EME Coordinator and/or the Committee will help custom-tailor workshops in their district. These programs provide some awareness of energy issues, but focus on curriculum implementation. They are developed on local terms, and at local convenience. Some districts have had 10 or 20 workshops dealing with different parts of their staff including physical plant people, bus drivers, and food service people, as well as the instructional staff and the administrators.

After the workshops the Coordinators and the Committee typically follow up with seminars so the teachers who have initiated energy activities will have an opportunity for follow-up and support; or, a local district may want to deal with a particular kind of project. In this case, EME's job would be to find appropriate resource people and make them available.

We think that EME's effort is resulting in positive change. In 1978, EME ran 437 conferences, workshops and seminars for 15,078 teachers. In 1979, there were 717 programs for 36,300 educators. We are not doing the job as well as we'd like to, but there are 178 of us working hard to bring people together.

One thing that is inhibiting the success of all energy educators is competition. Many of us seem too concerned with doing our own thing. I believe cooperation is most important in energy education. We are still looking for the definitions of energy and conservation ethics, of what students need to know about energy. I hope that through some of these new relationships we can begin to evolve answers to these and the more difficult questions. I believe that our work can best be done if we work together.

**JAMES KELLETT**  
Director, Education Division  
Office of Consumer Affairs  
U.S. Department of Energy

For accomplishments, one thing that hasn't been stressed too much is the fact that today we apparently have the public's attention. Gasoline consumption in the United States is down in some areas as much as 7%, 1979 over '78. In the Washington area alone, heating oil consumption is down 8%, even after a correction for the relatively mild fall that we've had. Now this, may not reflect energy education as you and I as educators may perceive it, but it does represent an important product of education, and that's the change in behavior. It is also a good example of price as a pedagogue, lest we get too infatuated with how important we teachers are in this process.

The good news in that, of course, is that—now that we have the public's attention—we've found them much more receptive to listening to us (and I'm saying "us" as an educator, and not as a representative of the federal government) than we expected.

What are some of the other good things that we have? As I travel around the country I am thoroughly impressed by the abundance of excellent course materials in energy education. I'll not comment on the ones that are not so excellent, but the point is that there are plenty that are good, and they are very adaptable. Certainly this is something that we didn't have three years ago. In regard to materials, I'm impressed with the number that have sprung up as offshoots or byproducts or derivatives of the nationally available materials that reflect leadership and which have inspired some admirable copying.

Another major accomplishment that I find very attractive is the evolution of energy education policies that are clearly in the long-term best interests of the country. An example of policy that has evolved that serves us very well has to do with the concept of infusion. We have, *de facto*, if not by consensus, a substantial body of opinion among educators in the country today that energy is an activity or a topic that deserves to be involved, included, or infused into all areas of

academic life. I think this works, as I mentioned before, entirely to the country's long-term best interests.

A part of this evolution of policy is this grass roots development, too. Energy education has not been handed down from the Feds; it has been generated by hundreds of people scattered like seeds throughout the entire educational establishment. This also promotes a growing consensus among educators and perhaps to a degree among the public, that an informed citizen is indeed the objective that our educational establishment should seek. That sounds simplistic and cliché-ridden, but some people need to go back and look at Horace Mann, and to readapt the philosophies of the ineluctable rightness of knowledge for the public mind today. I don't think anyone is so naive as to assume that knowledge inspires correctness; but certainly the opposite is true. A public that is not informed, a public that is not capable of dealing with facts and complex issues in an area like this, is a public open to tyranny.

Finally, one of the real accomplishments (illustrated by this conference) is that there does exist a core of dedicated, competent and influential educators who are committed to doing something about energy in the classroom. There are a lot of needs to be met. There is a need for plain "nuts and bolts" competence on the part of the students and the teachers. The facts, of course, are slippery—they are subject to change through different perceptions which themselves are subject to change as the state of knowledge advances. An excellent illustration of the latter point is to look at what informed scholars were forecasting as the U.S. energy consumption for the year 2000, or thereabouts, in 1972. One of the craziest estimates in the world was Amory Lovins' at 125 quads. That happens to be in 1978, roughly, the estimate of the Edison Electric Institute! The interesting point is that conventional wisdom now talks about a forecast that was incredibly low in the eyes of most scholars only 6 years ago. (Just because forecasting is an arcane science doesn't mean that it's not important.) So "facts" do change in time.

The next need that can be recognized in this area suggests that we focus on teachers as purveyors of knowledge, both for their own professional development, and to improve their ability to carry out their energy-related missions in the classroom. I was particularly pleased to notice recommendation five in the series of recommendations developed by the Education Commission of the States. Recommendation five encourages the development of energy literate educators. I certainly endorse that to its fullest. I might add that the content of energy issues, the so-called "facts" is an area in which you might very well expect the Department of Energy to place some particular emphasis; certainly not at the expense of other areas, such as behavioral changes or pedagogical improvements, but certainly an area of concentration.

A much more difficult need that is only peripherally related to my personal involvement and my department's direct involvement in this area, is the clarification of the educator's role in the larger society. If energy is an issue that still has credibility problems in some parts of the country, then education, as an establishment or as a profession, is one that has its own problems. These problems include scarce resources, questionable status in comparison to other professionals within our society, and being regarded in some ways as a system in crisis. Lots of us have figures that demonstrate the educational crisis. For example, a Gallup study pointed out that only 3% of 18-year-olds in the country could identify Alaska and Hawaii as the last two states in the union. We're turning people like this loose in the world to make decisions, and in a free society that's hazardous. About half of the people under 25 do not know that you cannot extract all of the energy out of the system to do useful work. We're turning people like that loose on the world to make decisions about energy policy.

Now there's not much that my department can do about this larger role problem, but it's certainly one in which I think we should collaborate with you, and certainly encourage you to pursue while helping us to solve the energy problem.

One last quick point has to do with the role of ethics. As teachers we model ethics. If we are to participate in the creation of new ethical systems in this country, it behoves us to model those ethics and not to be afraid of acknowledging that what we as educators are engaged in is a behavior modification program.

**EDITH PETROCK**  
Assistant Director for  
Programs Development  
Education Commission  
of the States

I've found here as elsewhere that the Education Commission of the States is not yet a household word. So, in my remarks, I would like to discuss three things. First, I will tell you a little about ECS so that you can take advantage of the services it provides; second, I will describe our energy activities, many of which have been alluded to already today; and third, I will mention some of our concerns, most of which have surfaced in earlier presentations.

First, with respect to the Education Commission of the States. In 1965 James Bryant Conant wrote a book called "Shaping Educational Policy." In this book, he made three major points. The first was that educational decisions were made in the political arena, something that may not be a surprise to us, but something which was not admitted out loud at that time. Furthermore, these decisions were not necessarily made by those with the best available information. Second, he acknowledged the fact that education is ultimately a state responsibility, but noted that the states were not necessarily doing their jobs to provide enlightened leadership. Third, he suggested a mechanism through which states might work together to improve their educational decisionmaking.

Conant's book came to the attention of Terry Sanford, the former governor of North Carolina. The two of them worked together to form an inter-state compact organization for the purpose of assisting states in their educational endeavors. Today, 47 states and three territories belong to the Education Commission of the States. Seven representatives from each member state constitute the operating body of the Commission. These Commissioners include the governor, two members of the state legislature selected by their respective houses and four persons selected by the governor who are active in education. All ECS Commissioners meet annually. One Commissioner from each member state serves on the ECS Steering Committee, which is responsible for policy decisions between annual meetings.

The primary purpose of ECS is to further working relationships among educators and political officials for the improvement of education at all levels. In its work with the states, the Commission serves as a forum, a resource and a catalyst. It provides information on state-related educational activities, and, when appropriate, suggests options and alternatives to meet specific state needs. The Commission also serves as a liaison between the states and the federal government. Based in Denver, Colorado, the Commission has a staff of about 170. There are four major program areas: Elementary/Secondary Education, Postsecondary Education, Education Finance and Law, and Assessment and Evaluation.

ECS began its involvement in energy issues in 1973-74, when state-level reactions to energy supply curtailments were surveyed and published in *Education's Response to the Energy Crisis: A Survey of States* (1974). In 1977, the National Assessment of Education Progress (NAEP) administered a well-publicized survey of knowledge and attitudes about energy among 26-35 year old Americans which suggested that young people lack sufficient knowledge to make informed decisions about energy-related issues. Also in 1977, ECS Commissioners identified energy as a priority issue requiring further staff involvement. Based upon this organizational commitment, assistance was solicited from the U.S. Department of Energy for one energy-related project and from the U.S. Office of Education for another.

The Department of Energy supported a project which accomplished two important things. First, we surveyed state agencies, including the governor's offices, state legislatures, state energy offices and state education agencies to determine what they were doing about energy education on the policy or programmatic level. As a result, *The Status of State Energy Education Policy* was published in March, 1979. (While the survey was accurate as of late summer, 1978, I understand that it is probably the most current information available summarizing state initiatives in energy education.) After collecting and analyzing this information, we appointed and convened an eleven member advisory committee, chaired by Governor Richard Lamm of Colorado. The committee used the survey report as the basis for developing a set of policy recommendations, primarily aimed at the state level, but not necessarily confined to that level. *Policy Issues in K-12 Energy Education* was distributed as you registered and I believe that the document will be used in some of the discussion sessions; therefore, I will not discuss the nature

of the recommendations at this time. However, I would encourage you to use them both during and after this conference. Take them home to your states and local districts, but don't think of them as *the* word in energy education; think of them simply as a *first* word. They are to be a foundation for you to build upon if that suits your state and/or local needs.

With the assistance of the U.S. Office of Education's Energy and Education Action Center, we formed an Interstate Energy and Education Network. The impetus for this activity came from our 1978 survey finding that people were working in isolation, with much duplication of effort, both among states and within states. For this reason, we brought together people from energy offices and education agencies to meet in March, 1979. Participants discussed energy issues and education's role in addressing them; conservation plans and programs in school facilities and the relationship between conservation and instructional programs; and communication and cooperation among the various agencies and offices represented, thereby laying the foundation for the Network. In addition, participants made recommendations for appropriate next steps to be taken by local districts, states, and federal government, and ECS.

We are deeply troubled that both of these projects seem to have a far rosier past than present or future. For example, the policy project only runs through January, 1980. [Since December, 1979, ECS has received notification from the U.S. Department of Energy of the intent to fund a new phase of the State Energy Education Policy Project, effective April 30, 1980. The new grant will enable us to provide further energy education policy guidance and to work with a number of pilot states in developing and implementing state-specific energy education policies.] Yet, we see a tremendous surge of interest at the state and local level to work together and with the federal government in taking a more responsive stance in educating the public about energy-related issues. We are dismayed that our constituency (educators, political officials and lay citizens) are caught up in a morass of confusion over programmatic and fiscal responsibilities at the federal level, both in the Department of Energy and the Office of Education. This confusion can potentially cause tremendous retrenchments at the state and local levels as sufficient resources, technical assistance and/or accurate information are not readily available to complement state and local initiatives. Hopefully, an organizational arrangement will be found within the U.S. Department of Energy which will not only continue, but will expand their educational activities.

With respect to the Interstate Energy and Education Network, our contract with the Energy and Education Action Center expired in November, 1979. Meanwhile, we continue to receive letters and phone calls affirming the value of the initial meeting and inquiring about forthcoming network activities. Unfortunately, many of the regional follow-up meetings did not meet expectations of network members who would like to see some form of continuation for the entire interstate network (through newsletters, annual meetings, etc.). Whether due to fiscal restraints or other causes, the great hopes initially placed in the establishment of an Energy and Education Action Center have not materialized. While useful activities have been initiated, follow-through has been limited. We somewhat regret being a partner to developing a viable network whose future is at best questionable at this time.

As an organization which represents you, through your state educational policy leaders, we believe that the federal government has responsibility to work cooperatively with states and local districts to further what we all must assume are joint federal, state and local energy-related concerns. In pursuing this tenet, we will continue to seek opportunities to interact with appropriate officials in an effort to make our governmental agencies more responsive to your energy education needs. I also encourage you to pursue this same objective within your local school districts and your individual states, as well as to urge your political representatives to express your concerns at the federal level.

**WALTER PURDY**  
Educational Services Manager  
Edison Electric Institute

Education and the electric utility industry have many things in common. Up until a few years ago, everybody liked us. Then, rates started to go up and we began to have troubles with the public. When educators' salaries began to rise, they also began to have problems. Schools and utilities are so much a part of every community that they offer the closest targets for the public to express their wrath about the rapid rise in the cost-of-living.

I think both schools and utilities need good communities. We should both be aiming for better educated citizens. To accomplish this goal we need to combine our expertise and utilize all of the resources available to each of us.

Utilities feel energy education is one of the most important issues facing our society. We want to help and we need the assistance of educators in developing our educational services.

Over the past fourteen years I have worked with utilities as they have initiated, expanded and evaluated their educational activities. I have seen many of these companies make a dedicated effort to carry out their corporate citizenship responsibilities in their communities. Many are doing a tremendous job, but too many others still do not understand the value of educational programs in the scope of their corporate goals and objectives. As I proceed I want you to know that I realize a utopia does not exist.

The Edison Electric Institute (EEI) is the association of investor-owned electric utilities of the U.S. Several years ago EEI established an educational committee. The mission of this committee is this: to develop, promote, and foster with educators a climate in which they will be receptive to educational materials which will help create an understanding and acceptance of the problems and requirements of the energy industry. We plan to continue our work to establish the electric industry as a reliable, responsive source of educationally sound classroom materials pertaining to various aspects of electric energy, safety, career opportunities, technology, and environmental impact. In the scope of our educational efforts we also promote and encourage active cooperation and trust between individual member companies and educators in the development and dissemination of energy related educational materials; develop in cooperation with the educational organizations and in educational forums. The intent is not to develop vast numbers of materials inhouse, but to enlist the support of the educational community. Many of our member companies sponsor energy education workshops and programs put on by and for educators.

There is a real need for cooperative arrangements among organizations such as Energy & Man's Environment, which we encourage and support; the Department of Energy, whose materials we urge our members to use; and the NSTA, which we are hopefully assisting in any way we can to make sure their ideas and materials are disseminated. These and other organizations need the help of our government, education, and industry if they are going to effectively convey their message to students.

The key thing that our utility education committee would like to get across to all of our two hundred member companies is the fact that you don't get the support of educators by a hard sell approach. You do it by cooperative arrangements in which the process is probably more important than anything else. Educational activities include cooperative arrangements, balanced programs, and materials evaluated by educators, for educators, to assist educators in their classrooms.

Our education committee would like to see all corporations enlist the support of educators in decisionmaking, in evaluation, and in all other aspects of their educational programs. Many corporate leaders have a difficult time dealing with this approach. Because education is a long term effort and the process is not familiar to them, they cannot fully understand how educational services will operate within the corporate structure. They need your help. If the electric utilities in your area are not providing energy education resources, then push them to do so. Once they join in a cooperative educational effort and get a chance to observe the results, they will recognize the importance of these programs.

# Working Group Reports

## Working Group Recommendations

The recommendations of the Second Practitioners Conference illustrate the growth of energy education. The emphasis on needs and strategies in the areas of policy and dissemination is a logical outgrowth of the concern of the 1978 conference with forming a basic energy education program.

There is an urgent need for energy education policy. The roles of local, state and federal government in encouraging and financially supporting it must be recognized and implemented. At present there are huge gaps in the policy structure; there is not enough governmental leadership nor is there broad enough funding. Policy should include definition of goals. What are the short term, near term, and far term goals of energy education? How is the responsibility for meeting those goals to be shared? The Conference not only calls for a high level review of policy but for input from a broad range of interest groups (which includes the energy industries) in the development and evaluation of programs and policy.

The recommendations pertaining to dissemination emphasize the importance of wider awareness, better cooperation and greater participation by all concerned groups. Two specific strategies for dissemination assume priority. First, a national clearinghouse for energy education is again called for, as it was in 1978. Second, teacher training receives attention, not only from the working group of that title, but from all the other groups, as the most immediate way to get energy into the classroom.

The recommendations fall into six categories: Policy, Materials, Dissemination, Teacher Education, Implementation and Evaluation. The full set of recommendations follows.

## POLICY

The development of a cohesive, coherent and comprehensive policy for energy education must be given urgent priority. The roles of federal, state and local governments must be defined and described. Financial responsibility and funding levels and mechanisms should be addressed. Minimal cognitive and behavioral goals against which to judge student achievement should be suggested, and nationwide target levels of school, district and individual school participation in energy education activities should be set. The working group underlined the following specific recommendations.

### Federal

- A consensus must be reached on at least the skeletal components of a National Energy Policy which energy education can explain, expand and criticize.
- Education concerning energy conservation and concerning the broad and long range energy problems must be given visible and meaningful priority by the federal government.
- Policy for energy education at the federal level should be developed by a steering committee or task force composed of representatives from, for instance, the Office of the President, Council of Economic Advisors, Federal Interagency Committee on Education, U.S. Department of Energy, U.S. Department of Education, business, labor and industry, national education and consumer associations. This group should adopt a statement identifying the goals and objectives of energy education, suggest mechanisms for their accomplishment, and review major federal policies to make certain that they are consistent with these goals and mechanisms.
- A mechanism must be established to insure continuous cooperation and communication between the local, regional, state and federal agencies with energy education responsibilities.
- Federal funding of energy education must be increased, and responsibility for it assigned to a specific agency; at present the Education Division of the Department of Energy would appear the logical lead agency.
- Some federal funding should be directed through state education agencies.
- Such federal/state funding should be related to the energy education (and other energy) plans for the individual states and that relationship should be publicized.
- The federal agency that funds energy education should establish funding for special student groups (gifted and handicapped, college bound and vocational groups, for instance) and for various grade levels (including post secondary), and should define its interests with a series of Requests for Proposals (RFP's).
- Funding for nonformal public education should be increased. In addition to the traditional routes of public education through such groups as the League of Women Voters, the Parent-Teacher Association, the 4-H Club, etc., energy education requirements and opportunities should be a part of programs for special groups (the elderly, the economically disadvantaged, the physically handicapped, etc.). Legislated programs for such groups which indirectly relate to energy (e.g., CETA, Youth Conservation Corps) should have a mandated educational component.



## State

- In each state, representatives of the governor's office, the legislature, state energy office, education agency and/or board of education should develop an energy education policy. In the formulation of that policy, input should be received from all interested parties including public interest groups, business, industry, local education agencies, private school committees, local boards of education, teachers, support personnel, administrators and religious institutions. The policy should address the unique needs of each state. The needs of special groups for energy education should not be overlooked.
- The state energy education policy, when adopted, should be communicated to all schools and school districts.
- A state's commitment to energy education should be reflected in its allocation of funds.
- The responsibility for directing a state's efforts in energy education should be assigned to either the state education agency or the energy office. Mechanisms for coordination between these and other agencies with energy responsibilities should be developed.
- State energy education policy and energy management/conservation policies should be coordinated. Policies in both areas should be reviewed not only to eliminate barriers to effective energy education but also to discover appropriate linkages between energy education and management/conservation.
- One of the responsibilities of the energy education leadership in each state should be to examine existing federal education legislation for possibilities of support for state level energy education programs.

## Local

- The need for energy education must be effectively communicated to school boards as well as to school officials. Resolutions of support for energy education should be solicited from school boards.
- Each local district should be encouraged to develop an energy education action plan. Input from the school board and interested and informed local groups should be sought. It is recommended that the instructional plan and the building use/conservation plan be coordinated.
- Local plans should specifically recognize the instructor's need for freedom to include energy education materials in the curriculum and time to develop or adapt materials.

## MATERIALS

An overarching conceptual framework is needed to link available materials to a comprehensive curriculum. Improvements can be made in existing materials, and materials development for special student populations should begin.

### Content Development

- A conceptual framework such as the one developed by NSTA/PEEC should be a part of all energy education materials development programs.
- Materials should reflect the diversity of issues and multiplicity of viewpoints.
- The interdisciplinary nature of energy education must be made evident. Materials should cover areas such as: mathematics, home economics, industrial arts, consumer education, the political, legal and technical processes, economics, and ethics.
- Materials should cover basic skills such as reading, writing, math, quantitative analysis, hypothesis and critical thinking.
- Basic facts about energy must be taught. To achieve energy literacy, students must understand both the basics of energy and the political, economic, and social issues.

### Immediate Needs

- Existing materials need to be updated; need to be adapted to reflect the local situation; and need to reflect appropriate reading levels.
- More hands-on activities need to be included in energy education materials.
- More quality audio/visual materials are needed in energy education materials.
- Textbook publishers should include energy issues in new texts, and develop guides on energy topics to be used with existing texts.
- Specific and appropriate materials for special groups of students need to be developed or adapted. The PEEC process provides a useful model.
- Short courses in energy should be developed/adapted for several special high school groups to be used as electives and for use outside the classroom.
- To get energy education materials quickly into existing programs for special students, NSTA/PEEC should solicit teachers of special students to field test their materials, and develop a teacher's guide for adapting the existing PEEC materials for use with various groups of special students.
- NSTA/PEEC should publish an annotated list of energy materials for special groups.

## DISSEMINATION

A clearinghouse is called for by five of the six working groups to aid availability and visibility of energy education information. Public awareness that leads to active support is needed and strategies for extending the area of impact of energy education are suggested.

### Awareness

- The President and the Congress should provide leadership in recognizing and publicizing the need for energy education. Appropriate members of both the executive and legislative branches of government should be appraised of energy education needs through briefings by technical specialists, educators, political leaders, and others.
- The Education Commission of the States, Chief State School Officers, and the Governor's Conference should encourage their members to recognize and support energy education.
- Each discipline-specific professional association should assume a major role in familiarizing teacher educators with new energy education materials and encouraging their use.
- State education agencies should make information about successful models for implementation available to schools, districts, and other state agencies and educational organizations.

### Clearinghouse

- There should be a well-funded, easily accessible national clearinghouse to gather and disseminate information on energy education materials, on groups and individuals which offer support services for energy education, and technical information for energy education practitioners. The clearinghouse, which could be part of an existing system such as ERIC, should develop an annotated list of energy education programs and contain information obtained from and pertaining to evaluation instruments.

### Networks

- NSTA/NCSS should publicize and strengthen the Regional Energy Education Network (REEN).
- The U.S. Department of Energy and Department of Education, working jointly, should establish and/or support an effective national network system for persons interested and involved in energy education. This network should include or be an expansion of the existing NSTA/NCSS network.
- The U.S. Department of Education should include energy education programs as a high priority in its national diffusion efforts.

## Special Groups

- REEN should establish contact with state, county and local leaders of education for special groups.
- State agencies for special groups should publicize energy education and should publish specific information about materials, workshops, etc.
- NSTA/PEEC should seek out projects addressed to teachers of special groups and encourage them to include energy education.
- Articles on energy education should be published in special groups journals.
- The 1980 Practitioners Conference should include interaction between energy teachers and special groups teachers.

## Informal Education

- The connection between formal education in the classroom and informal education outside the classroom should be made clear. Energy activities should be encouraged that can be done at home and thereby indirectly educate parents. Energy education done by groups such as 4-H and scouting should be continued and expanded.
- NSTA should contact educational broadcasters and encourage them to include energy in their programming.
- Energy education for adults must be developed. Government should encourage and support civic programs in energy education by furnishing information, providing resource people, and helping with program planning. Such programs should be supported by local utilities, public and private foundations, local industries and civic organizations.

## Proceedings

- These Conference Proceedings should be disseminated to alert the public to the needs of energy education.
- Proceedings should reach: ECS Commissioners; chief state school officers; directors of state energy offices; the President's office; high level U.S. Department of Energy and Department of Education officials; members of congressional committees on energy and/or education; directors of education associations and local superintendents of schools.
- Proceedings should be distributed for publication to leading journals of education organizations as well as those for teachers of special groups.
- Proceedings should be placed in the ERIC system and cross-referenced under Special Education.

## TEACHER EDUCATION

Teacher education is the bridge between dissemination and implementation. It is the quickest way to get energy education concepts and materials into the classroom and, therefore, should be a priority component of energy education.

### Guidelines

- Guidelines need to be developed for pre and inservice teacher training. Guidelines should be made available to all institutions of education and state departments of education.
- Professional education groups should develop general outlines for pre and inservice guidelines.

### Inservice

- Inservice training in energy education should be instituted for teachers of all grades and all disciplines.
- Every local district should be encouraged to identify an energy education committee and to make inservice programs a part of their overall energy education action plan.
- Energy education inservice programs should include: 1) Awareness; 2) Concepts; 3) Application and Implementation; and 4) Evaluation.
- College and inservice credit should be offered for participation by certified educators in training programs sponsored by NSF and/or DOE.
- Inservice for teachers of special groups should include energy education.

### Preservice

- NSTA and other educational organizations should work with universities and other teacher training institutions to get energy education included in their programs.
- General and specific methods courses should include concepts and activities in energy education.
- Appropriate infusion techniques should be identified to be taught in methods courses.
- Preservice programs should emphasize major concepts identified by PEEC.
- Preservice teacher education graduates from all elementary and secondary certification areas should be required to understand energy concepts pertinent to their subject area and be familiar with methods of implementing these concepts in the classroom.
- Preservice for teachers of special groups should include energy education.

## Funding

- The federal government should offer more support for teacher training programs in energy education.
- Funding should be raised by allotting a portion of the federal gasoline tax to energy education training. These funds should be administered by the U.S. Department of Education.
- Workshops and inservices on energy education should be funded by local affiliates of national energy producers, businesses, industries and utilities through state school agencies, school districts and education organizations.
- NSTA should provide materials, consultants and guidelines to state education agencies and educational institutions to train teachers to implement energy education at state and district levels.

## IMPLEMENTATION

State and local situations differ so significantly that a uniform implementation strategy may be neither feasible nor desirable. However, "energy literacy" is the major goal and an important outcome of all strategies. The technique of infusion was chosen as the optimum method of implementation.

### Infusion

- Emphasis should be given to infusing energy into all aspects of the curriculum.
- Appropriate energy topics need to be included in disciplines other than science, such as elementary reading and high school economics.
- To aid infusion, a survey should be developed which compares the scope and sequence of concepts in various subjects (for example, science, social studies, language arts, math, home economics, vocational tech, economics) with the concepts of energy education.
- In some situations, a separate energy course should also be considered as an appropriate method by which to introduce students to energy.
- NSTA should convene a committee of interdisciplinary K-12 teacher education experts to identify infusion techniques to be used in teacher training.

### Strategies

- Each school building should be used as an energy laboratory for instructional purposes. Local data should be collected, and local energy issues should be analyzed.
- The U.S. Department of Energy should provide mobile energy labs to speed energy education by raising student, teacher and public awareness.
- Teachers should consider the viewpoints expressed in materials and strive to present a balanced picture.
- The U.S. Department of Education should provide funding for the identification of successful implementation models of energy education and the distribution of this information to each state education agency.

## EVALUATION

The affective and cognitive impact of energy education on students needs to be evaluated. Energy education materials also need to be continually reviewed. Mechanisms for both kinds of evaluation need to be established.

### Students

- Longitudinal studies are needed to gauge and verify the effectiveness of energy education. The U.S. Department of Education should initiate such studies.
- NSTA should coordinate a study across various academic disciplines to define, list and clarify the concepts required for energy literacy.
- Cognitive, affective and behavioral learning in energy education should be evaluated.
- A national norm-referenced energy test should be used for evaluation of students (such as the Youth Energy Survey, developed by the Michigan Energy Extension Service).

### Materials

- Published evaluation of the content, pedagogy, and bias of energy education materials would be welcomed by teachers. Professional organizations such as the NSTA and NCSS are urged to be responsible for organizing a broad review group for this purpose.
- The development of a mechanism and criteria for a national review of energy education materials should be a charge to the 1980 Practitioners Conference.
- All developers of energy education materials should accept responsibility for the evaluation of their implementation and dissemination mechanisms.



# Working Group Paper: Strategies and Need For Policy Impact

## INTRODUCTION

We concur with all the recommendations of last year's Practitioners Conference and the Education Commission of the States Task Force, except those recommendations dealing with a study of the interdisciplinary nature of energy education. We do not consider this to be a high priority item. In addition, we concur that state and local conditions differ so significantly that a uniform implementation strategy may not be feasible or desirable.

## NEEDS AND STRATEGIES

### Federal Level

Policy for energy education at the federal level should be developed cooperatively by a steering committee composed of high level officials from the Office of the President, the Council of Economic Advisors, the Federal Interagency Committee on Education, the Department of Energy, the Department of Education and representatives of business, labor and industry, and national education and consumer associations. The U.S. Department of Energy and the Department of Education should function as the lead agencies. Their respective responsibilities should be clearly defined through interagency agreement. Such a steering committee should adopt a statement identifying the goals and objectives of energy education and how these may be accomplished. Energy education inside and outside the schools will only be as effective as the priority it is given and the attention it receives.

Federal policies should be reviewed by the steering committee to determine whether current policy adversely affects energy education and management. Examples of negative policies or policy vacuums include:

- There is no comprehensive national energy policy.
- The U.S. Department of Energy seems ambivalent about energy education. The Congress and the Department of Energy need to give energy education priority, and energy education should be part of the National Energy Act.
- There is no statement from the U.S. Department of Education on energy education.
- The "back to basics" movement, "Proposition 13" mentality and similar forces make it difficult to infuse energy into the curriculum.

Key people at the national level must be apprised of the problem through briefings by technical specialists, educators, and political leaders. These key people include the President and his staff, key legislators, and leaders of national organizations with direct interest in energy and education.

The optimum roles of agencies at the federal level are:

- NSF: remain the research organization, but give greater emphasis to energy education research.
- DOE: provide leadership and guidance, serve as an information resource, and provide funding for materials development and demonstration projects such as the current funding for the Energy Extension Service and the Project for an Energy-Enriched Curriculum.
- DOEd: provide leadership, guidance and support for implementation of energy education in schools and continuing education.

The DOE and DOEd should enter into an interagency agreement to delineate their roles. We recommend that federal funding for energy education should be directed through state education offices. Also, the U.S. DOE and DOEd, working jointly, should establish and support effective network systems for people interested and involved in energy education.

The DOE and other federal decisionmakers should:

- Come to a consensus on a comprehensive national energy policy and inform the educational community of this policy.
- Identify energy education and conservation as a priority throughout government and education.
- Identify the problems that hamper and restrict energy education.

Suggested strategies:

- Build teacher content and background, especially at the elementary level, through training programs and summer institutes.
- Disseminate and prepare people to use the materials already produced.
- Inform decisionmakers about what is available.
- Develop an ERIC clearinghouse on energy education.

## State Level

Policy at the state level should reflect a strong state-wide commitment to energy education. A state's energy plan should have an energy education component that reflects that state's commitment.

- The governor, the legislature, state energy office, the education agency and/or the state board of education should develop an energy education policy for that state.
- In the formulation of guiding policies input should be received from all interested parties including special interest groups, business and industry, local education agencies, private school committees, teachers, support personnel, administrators and religious institutions.
- Policies on energy education must address the unique needs of each state.

- Each state should conduct a policy review to determine whether current state level policies adversely affect energy education and energy management.
- There should be active and continuous interaction among local, regional, state and federal agencies to meet shared priorities in energy education.
- Federal funding agencies should consider a state's energy education policy and plans in developing and implementing guidelines for allocating funds.
- A state's commitment to energy education and management must be reflected in its allocation of funds.
- States should consider ways in which energy education efforts can be enhanced and further supported under the authorities of existing federal education legislation.
- State energy education policies and energy management should encourage the coordination of energy education efforts at all levels including early childhood, K-12, higher education, adult and continuing education, and vocational and community education.
- The State Departments of Energy and Education should coordinate their efforts in energy education. One of the two state agencies, the Department of Energy or the Department of Education should assume the major leadership responsibilities for energy education. These agencies must exemplify their commitment to energy education through their actions.

## Local Level

Development of energy education policy at the local level should be formulated cooperatively by the central administration of local educational agencies, local boards of education, local government officials, public service agencies including Parent-Teacher Associations and the League of Women Voters, and public utilities. Appropriate decisions about local energy education policy could be encouraged by soliciting the support of the state legislature through the organizations identified above.

There are few policy provisions or opportunities for energy education at the local level. Local efforts to promote change should be aimed at these key people: the Superintendent of schools; the chairperson and members of the board of education; parent and student representatives; leaders of civic organizations and other civic officials; local public utility officials; and media representatives. Local boards of education should resolve to support energy education as a critical need which has been identified by teachers, laity, local legislature and civic organizations. Local efforts to promote energy education should:

- Encourage and support educators wishing to implement energy education programs.
- Encourage and support teacher training programs in the area of energy.
- Encourage and support civic and lay programs devoted to energy education by providing resource people for programs, and through involvement in program planning and dissemination of information.

In addition, several other strategies are called for.

- Local educational programs for interested citizens should be supported by public utilities, foundations, local industries and civic organizations.
- The Recommendations of the Practitioners Conference on Energy Education should be disseminated locally to educators and lay people.

- College credit educational programs for interested certified educators should be provided at the local level through NSF and USDOE finance and support.
- The U.S. Department of Energy should provide mobile energy laboratories to expedite local energy education through student, teacher and lay training programs.

Several final recommendations follow that are not limited to any one jurisdictional level:

- The conference report should be distributed to ECS Commissioners, chief state school officers, directors of state energy offices, the President's office, high level officials from the U.S. Department of Energy and the U.S. Department of Education, and appropriate congressional committees. Copies should also go to educational associations and to local district superintendents, pending availability.
- The conference report should have an eye-catching cover and binding, in order to attract the attention of federal, state and local policymakers.
- The conference recommendations should be personally presented to congressional committees having jurisdiction over energy and education.

# Working Group Paper: General State of the Art and Needs Assessment in Energy Education

## INTRODUCTION

Many good energy education materials have been developed. Now it is necessary to examine the structure, function, and impact of these materials. Strategies to accomplish these needs are outlined below.

### Materials

- There is a variety of good materials currently available. Many of these materials need to be updated.
- More materials should be developed in conjunction with a conceptual framework such as the conceptual structures used by the Project for an Energy-Enriched Curriculum. Materials developers need to give more emphasis to the scope and sequence of materials. All individual materials should include an overview, objectives (skills, concepts, values), and an indication of where the materials may fit into existing programs.
- More materials need to be developed in areas such as mathematics, home economics, industrial arts and consumer education.
- More emphasis should be placed on basic skills such as reading, writing, quantitative analysis using energy data, hypothesizing, and critical thinking in energy education materials.

### Needs

- Energy education materials need to be regionalized. Local groups should be encouraged to adapt existing materials to local conditions.
- Materials should reflect appropriate reading levels.
- More "hands-on" activities are needed, especially at the elementary level.
- There is a need for more quality audio-visual materials.
- There is a need to evaluate existing materials.

## **Subject Matter**

- Interdisciplinary materials are needed in areas other than science and social studies.
- Materials should reflect the diversity of issues and various points of view.
- Materials should include information on ethics, economics, and political, legal, and technological processes.

## **Courses**

- More emphasis should be given to infusing energy into all aspects of the curriculum.
- In some situations infusion of energy materials into the existing curriculum may not be feasible. In these cases, specific energy courses may be the best method for introducing energy to students.

## **Appropriateness of Materials**

- There is a need to recognize the various viewpoints in materials.
- Teachers should consider the viewpoints reflected in materials and strive to present a balanced account.

## **Review**

- A general mechanism for internal and external review of energy education materials should be established.
- Professional energy educators should develop review guidelines and criteria.
- We recommend that professional associations such as NSTA and NCSS initiate the development of a review process.
- We recommend that a joint committee of energy educators from industry, civic groups, and professional educational associations such as NSTA or NCSS should be established to review educational materials produced by special interest groups. This review process should consider local, state and national concerns.

# **Working Group Paper: State of the Art in Dissemination, Implementation, And Evaluation**

## **INTRODUCTION**

In order for teachers to be effective in defining energy education, they need access to energy education resources. The dissemination of energy education information through networks or clearinghouses has changed only slightly. The following recommendations address the necessary changes.

### **Dissemination**

- NSTA should use and publicize existing networks for the dissemination of materials and information. Such networks should include representatives of professional education associations, community organizations, governmental associations, youth service agencies, and other similar groups.
- NSTA and NCSS should publicize and strengthen the Regional Energy Education Network (REEN).
- There should be a well-funded, easily accessible national clearinghouse to gather and disseminate information on quality energy education materials, on groups and individuals which have support services for energy education, and technical information for energy education practitioners. The responsibility for the operation of the clearinghouse should be clearly defined by the U.S. Department of Energy and Department of Education.
- The U.S. Department of Education should be encouraged to give high priority to including energy education programs in the national diffusion network.

### **Implementation**

- The NSTA should assist universities and other teacher training institutions to recognize the need to include energy education in existing preservice and inservice educational programs and to work toward that goal.
- National energy producers associations, businesses, and industries should encourage local affiliates, business, industry and utilities to assist state school agencies, school districts and other educational organizations to implement energy education programs by providing funding for workshops and inservice training.

- The NSTA should work with other professional education associations to develop and establish guidelines and policy to support energy education programs in local school districts and state education agencies.
- The NSTA should provide support in terms of materials, consulting and guidelines to the state education agencies and educational institutions to assist in the training of local educators as facilitators for implementing energy education programs at the district and state levels.
- The U.S. Department of Energy should provide funding to an appropriate agency or organization for the identification of successful implementation models for energy education and for the distribution of this information to each state education agency.
- State education agencies should make information about successful models for implementation available to schools, districts, and other state agencies and educational organizations.
- The Education Commission of the States, Chief State School Officers, and the Governors Conference should encourage their members to promote recognition of and support for energy education.
- The President and Congress should provide leadership in recognition and publicity of the need for energy education.
- NSTA should take a leadership role in encouraging professional organizations and others to recognize the need for energy education and develop guidelines and policy for implementation of energy education programs.
- NSTA and other educational associations should provide copies of exemplary materials in the energy education field to textbook companies for inclusion/in-fusion in appropriate texts.

## Evaluation

- The U.S. Department of Education should initiate a longitudinal assessment program evaluating the impact of energy education upon students and adults.
- Cognitive, affective and behavioral student changes should be evaluated.
- A national norm-referenced test such as YES (Youth Energy Survey, Michigan Energy Extension Service) should be used to evaluate existing energy education materials and programs.
- The national clearinghouse should use, identify, and publicize information obtained from and pertaining to evaluation instruments.
- Any organization dealing with energy education should evaluate implementation and dissemination mechanisms. A national clearinghouse should disseminate information gathered from the evaluation.
- Professional organizations such as NCSS and NSTA should assist in establishing criteria for evaluating energy education materials. The 1980 Practitioners Conference should then finalize these criteria.



# Working Group Paper: Pre and Inservice Teacher Training

## INTRODUCTION

In order to focus on the significance of energy education, we recommend that a Presidential Task Force on Elementary, Secondary and Adult Education be appointed and charged with specific responsibility to determine the major areas of concern in energy education, to identify sources/programs of support (monetary, materials, personnel) and to recommend a short and long term energy education plan for the 80's.

As a possible mechanism for encouraging pre and inservice teacher education programs to give additional attention to energy education topics, there must be a deliberate attempt on the part of the Project for an Energy-Enriched Curriculum to underscore the importance and crucial nature of energy education.

Inservice education is viewed as the most expeditious means of bringing about a major change in energy awareness on the part of teachers and students in the shortest possible time. Therefore, in order to embark upon a massive nationwide energy inservice education program, some strategies and guidelines are suggested below.

### Inservice

- Inservice programs should involve awareness conferences, infusion workshops, and seminars as minimum components. Awareness conferences should cover an awareness of problem, an understanding of problem, a commitment to resolving problem, and a decision to attend the next session by the participants. Infusion workshops should be preceded by a commitment from participants to put ideas into action, and should include sessions on translating ideas into learning activities and implementing activities in the classroom. Seminars should cover topics such as sharing ideas about "what works", reflection, feedback, and monitoring.
- Every state should have an energy education coordinator with responsibility to hold energy conferences to develop and implement energy activities in the state. Exemplary approaches are the efforts in Florida and Michigan, the multiple state consortium of Oregon, Washington, Idaho, Montana and Alaska, and the California Energy Forum. Such state level conferences would include pre-conference preparation of informational packets, role definitions, suggested goals and potential conference participant list. Included on this list should be school board members, superintendents and administrators.

teachers, industry representatives, students, legislators, state and local education association representatives, media, higher education representatives. These state level conferences should demonstrate how energy education applies to local areas, recognize local resources, develop strategies to be carried back to local areas, obtain written commitments from local representatives on specific action plans, and have participants prepare for local workshops. Available energy education materials should be displayed at such conferences.

- Every local district should identify an energy committee that would have the responsibility for a local energy education program designed to create awareness of energy education problems, provide content information and help teachers infuse energy-related ideas and activities into their existing course structure. Key people to be considered for an energy committee are: classroom teachers committed to energy education, students, school board members, administrators, other school personnel and community resource people. In-service program format should include a preliminary conference in which energy committees and external resource people (energy experts, energy managers and experienced workshop facilitators) should be involved. The preliminary conference should include activities such as: exposure to energy problems at global, national, local levels; examination of energy options; exposure to available energy curriculum materials; examination of implementation strategies; continual dialogue among conference instructors and participants; and important social interactions. The workshops which follow the preliminary conference should include participants from district energy committees, key teachers from each division, key administrators, and resource people. The purposes of a workshop include creating awareness of the energy problem, providing content information, and helping teachers infuse energy concepts and activities into already existing course structures.
- Each local school district should have an energy education action plan that is approved by the school board and is reviewed by that group. This plan should include a building use component complete with consumption goals, and an instructional program component that includes specific content and level objectives. Perhaps each building should have an energy action plan which includes these two components. These energy plans should be reviewed regularly and revised at least annually.
- Each local school building should be used as an energy laboratory for instructional purposes. This lab should use local data to analyze local energy issues.

## Guidelines

- The development of guidelines for pre and inservice teachers by the combined efforts of professional educational organizations (such as the Association for the Education of Teachers of Science, Association for Supervision and Curriculum Development, American Association of School Administrators and others) should be a high priority. These guidelines should be made available to all institutions of education and state departments of education. Ultimately, local education agencies should develop specific guidelines.
- Components of the guidelines for energy literacy should be similar to the Robinson position paper on scientific literacy.

## Preservice

- Preservice teacher education programs should emphasize the major concepts and skills identified by PEEC.
- The NSTA in conjunction with PEEC staff representatives should convene a committee (elementary, secondary, college) of experts from each of the disciplines normally included in public and private K-12 education programs for the explicit purpose of specifying infusion techniques appropriate for teacher education programs. It is the consensus of this group that all methods courses,

both general and specific, should contain concepts and activities in energy education. Preservice teacher education graduates from all elementary-secondary school certification areas should understand the ways energy education concepts can be used in their curricular area and teaching strategies that can be used to develop these concepts. Energy concepts and skills developed by the PEEC can be considered a starting point for appropriate concepts and skills.

- Teacher educators should have access to all energy education materials. Each of the discipline-specific associations/organizations should assume a major role in familiarizing and encouraging teacher educators to use energy education materials in their classes.

As a mechanism to encourage the use of energy oriented materials in methods classes, the PEEC staff should contact the president or executive secretary of each of the discipline-specific associations/organizations (NSTA, NCSS, National Council of Teachers of English, National Council of Teachers of Mathematics, etc.) and offer the assistance of a PEEC staff member in preparing an article for the organization's journal that deals with the teaching of energy in the given discipline.

# Working Group Paper: Energy Education for Special Groups

## DEFINITION

In the general population there are groups with needs that are different from those of the majority of other people. By virtue of these needs we have called these groups special. In order to identify a special group, an educator can look at learners according to the following framework which is divided into two sections: the characteristics of the learner and the characteristics of instruction. Learners can be identified as those with special intellectual needs (for example, educable mentally retarded, learning disabled, gifted); special social needs (for example, racial, ethnic and cultural groups, demographic and geographic groups); and special physical needs (for example, blind, deaf and other physically handicapped people). The needs of each group can be addressed in two instructional ways: through specific information (including the level and content of material); and through specific methods (i.e., strategies for instruction).

## RATIONALE

Everyone must make decisions with energy implications every day. Having identified a special group, the educator must provide the most appropriate setting for the learners to become as aware and as well-informed as possible. Objectives for members of special groups are the same as for other students. The style of instruction may be the only difference.

Because energy education has its basis in everyday life, energy education can facilitate the functioning and contributing of members of special groups to society as a whole. In this way true mainstreaming is accomplished.

## METHODS

Methods have been and are being developed for working with particular special groups. Professionals have their own techniques and practices for use with special groups. These instructional methods can be applied in energy education. For example, energy education is a vehicle for concrete activities which relate to everyone's daily life.

## CONCLUSIONS

Energy education should be a high priority with special groups because it compliments techniques and practices already used in this field and because it can establish a strong bond between a body of knowledge and daily life. Energy education can help incorporate members of special groups into the general population, strengthening the whole by including another diverse segment.

## STRATEGIES

### General

- NSTA/PEEC should establish a mechanism for the review of existing PEEC materials, leading to the development of a teacher's guide for adapting the materials to special groups.
- NSTA/PEEC should utilize their materials development process model to develop specific and appropriate energy activities for special groups.
- NSTA/PEEC should disseminate the proceedings of this conference to a wide spectrum of professional journals of leaders of special groups, requesting inclusion in future issues! (For example, *Exceptional Children*, *Focus on Exceptional Children*, *Teaching Exceptional Children*, *Forum Kappa Delta Pi*.)
- The League of Women Voters should lobby for legislation that includes special groups (i.e., elderly, low income, disabled, etc.) as the recipients of and/or participants in energy-related projects (such as Youth Conservation Corps and CETA), thereby providing a practical education opportunity beyond those existing.

### Materials

- PEEC should solicit teachers of special groups to field test their materials.
- A whole curriculum could be developed around energy especially for low level learners (much like the new BSCS white version).
- A short course in energy for special groups in high school or beyond should be developed for use as an elective with their basic program.
- Some concrete, hands-on activities should be developed (for example, recycling, solar greenhouses).

### Publicity

- Efforts to publicize and promote energy education for special groups should be made both from the top down and from the bottom up. Therefore, the Regional Energy Education Network of NSTA/PEEC should establish contact with state, county and local special groups administrators/teachers/leaders. Local energy education developers/educators should include special groups in the process of development.
- Articles on energy education and on specific energy education programs and materials need to be published in special groups journals.
- State agencies for special groups should publicize energy education and publish specific information about materials, workshops, etc.
- NSTA/PEEC should be sure that the conference proceedings are cross-referenced in the ERIC system under Special Education.
- NSTA and NCSS should publish an annotated list of energy materials for special groups.

## Communication

- NSTA should contact educational broadcasters and encourage them to use energy in their programming. This programming should be aimed at as wide an audience as possible which might include using sign language or subtitles.
- NSTA should offer their expertise in energy content for consultation with the educational broadcasters.

## Workshops

- Existing energy education inservices should include special groups.
- Existing special groups inservices should include energy education.
- To encourage dialogue and interaction between energy educators and special groups leaders, the 1980 Practitioners Conference should be followed by or should include an energy education practitioners and special groups practitioners phase.

## Funding

- Funding agencies (for example, NSF, DOE, DOEd, etc.) should establish an RFP category for energy education for special groups.
- NSTA/PEEC should seek out projects by special groups and get them to include energy education.
- Local educators and NSTA should both seek out funds that could be used for energy education for special groups (for example, from business and industry).
- State agencies should fund projects for energy education for special groups.
- Commitment is needed between those in special groups and those in energy education; therefore, joint grant proposals should be considered.

## Working Group Paper: Grade Level Articulation

### STATE OF THE ART

By articulation, we mean efforts to communicate the concepts and objects of courses and programs that contribute to and affect energy education.

The description of the state of the art of energy education articulation falls into three areas: a) schools represented on this committee, b) government agencies, c) curriculum development groups charged with energy education.

In general teachers define their energy objectives and goals apart from district-wide or even state-wide policies. Efforts are made informally between faculty members to determine what is being done. These efforts are almost always advisory.

One disadvantage of a more centralized policy of articulation is that it implies uniformity of curriculum among all those teaching a certain course.

The committee favors continuing articulation efforts within and among schools and encourages additional efforts in those areas as long as the nature and focus of the articulation are determined by those teachers and administrators directly affected. Programs in energy education available from government or private agencies have been poorly articulated. Therefore, some needs and strategies are outlined below.

### Needs

- Energy education materials need to be made more attractive to the elementary school teacher. We find that energy topics tend to be viewed as pure science and very technical by grade school teachers who are charged with the awesome responsibility of being a jack-of-all-trades. The interdisciplinary nature of energy education needs to be made more evident. In addition, attention should be called to components already in elementary education curricula that involve energy issues.
- Appropriate energy issues need to be included in more disciplines, especially reading at the elementary level and economics at the high school level.
- Instructors need leeway to include additional materials in the teaching of energy topics. We encourage all articulation attempts aimed at broadening the base of information used to examine energy issues. Newspapers, school workshops, television and radio programming should all be used when appropriate.
- Release time is needed for energy curriculum development. We applaud administrative decisions to schedule special times when teachers can examine available energy education resources, write regional materials, or to coordinate their energy education efforts.

- Concrete and definitive government energy goals are needed. It is difficult if not impossible to effectively plan new energy education programs or modify student behavior unless the government states more specifically the objectives for conservation and self-efficiency.
- Energy activities for gifted and other special students need to be developed.
- Topics in energy education need to be related to concepts in curricula. The variety and number of new energy programs is staggering. Each program should articulate its goals and objectives. In turn, all these energy education programs should be compiled with relevant descriptions and indexed so that schools in need of specific types of curricula could be directed to appropriate programs.
- A study of areas such as social studies, science and language arts needs to be developed which compares energy concepts with those of other disciplines. Curriculum writers in energy education should use such a study to identify areas that lack energy activities. Teachers should use such a study as an aid to infusing existing energy education materials in an appropriate manner into their programs.
- Two types of connections need to be made between the articulated program of the school and the community it serves. First, schools need to connect energy lessons taught in the classroom with assigned activities that can be done at home, hopefully with parental involvement. Such programs may indirectly inform parents about energy.  
Secondly, schools need to correlate energy lessons taught today with desired behavior changes in the community tomorrow. There is a lack of longitudinal studies of the effects of energy education on citizen behavior.
- There is a need to broaden the scope of articulation of energy programs. The topic for this group is "Grade Level Articulation." We feel the topic title implies a restriction in the scope of energy education that is quite real. The orderly presentation of energy education objectives after grade twelve is more difficult to control. Adult education must begin to include energy education.
- There is a need for energy literacy. Schools should make sure that basic facts about energy are being taught to students somewhere in their curricula. To achieve energy literacy students must understand both the basics of energy and the situational elements.

## Strategies

- The Energy Practitioners Conference should pass a resolution in support of a communication being sent by the conference, drafted by the PEEC staff, directly to the President of the United States, the Vice President of the United States in his role as President of the Senate, and the Speaker of the House of Representatives, which strongly urges the fast passing of a National Energy Plan. Such an expression of national energy goals is essential in order that the aims of energy education be defined and that appropriate materials for formal and informal education be developed and implemented. We are reminded that the educational consequences of Sputnik were rapid and clear. The energy crisis eclipses Sputnik in seriousness. Yet, since OPEC brought our foreign energy dependence into dramatic focus, for the most part neither the media, the political leadership nor the schools have joined the battle. They suffer from a lack of purpose. Without national commitment, articulation in energy education is meaningless.
- Inservice training should be instituted for teachers of all grade levels and disciplines. Participants would be familiarized with available energy education materials and methods for local curricula development and infusion of energy



education materials into existing programs. Funding for training could be a designated portion of the federal gas tax and administered through the U.S. Department of Education. Workshops and trainings could also be funded by local energy-related industries such as utility companies.

- Textbook publishers should be encouraged to include energy issues in new material and to develop teacher guides with energy topics which can be infused into existing material. If inservice education promotes a greater interest in energy topics, this professional demand should promote the addition of energy topics in texts. Other agencies or organizations could also develop supplementary teacher guides that coordinate existing texts with energy concepts and non-commercial supplementary materials.
- NSTA should establish a steering committee to begin work on a study of academic disciplines which compares energy concepts with concepts of the respective disciplines. Groups included in the steering committee should reflect the perspectives of social science, science, mathematics, vocational tech, home economics, and language arts.
- We echo the strong recommendation of the State of the Art in Implementation group report that effective and cognitive longitudinal studies are needed to verify and gauge the effectiveness of energy education.
- NSTA should coordinate a study by persons in various academic disciplines to define, list, and clarify the concepts necessary for energy literacy.
- Energy education activities used by groups such as Scouts, 4-H, and the League of Women Voters should be continued and expanded. Such groups facilitate connections between academic and community activities in energy.

5

# The Practitioners

## **Conference Planners**

**Richard C. Clark**  
Science Specialist  
Minnesota State Department of Education  
Capitol Square Bldg.  
St. Paul, MN 55101

**Susanne Czerwinski**  
Department of Energy-CORO  
175 W. Jackson, A-1136  
Chicago, IL 60604

**Kristin Dean**  
Institute of Natural Resources  
325 W. Adams  
Springfield, IL 62706

**Kenneth Dowling**  
Department of Public Instruction  
126 Langdon St.  
Madison, WI 53702

**Donald Duggan, Chief**  
Academic Programs Branch  
Education Division  
Office of Consumer Affairs  
U.S. Department of Energy  
Mail Stop 7E054  
Washington, DC 20585

**John M. Fowler**  
Director of Special Projects  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

John Gordon  
Illinois Energy Resource Commission  
2613 Elder Ln.  
Rockford, IL 61107

Helenmarie Hofman  
Associate Project Director  
Project for an Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Patsy Kelly  
Institute of Natural Resources  
23 Pinoak Ln., RR6  
Springfield, IL 62707

Marie Lauricella  
Institute of Natural Resources  
309 W. Washington St.  
Chicago, IL 60606

F. Gene Miller  
Professor of Education/Social Studies  
Education  
Horrabin Hall 47  
Western Illinois University  
Macomb, IL 61455

John Paulk, Program Manager  
Environmental Education  
Recreation Resources Branch  
Division of Forestry, Fisheries,  
and Wildlife Development  
Tennessee Valley Authority  
Norris, TN 37828

Edith Petrock  
Assistant Director for Program Development  
Elementary/Secondary Education  
Department  
Education Commission of the States  
300 Lincoln Tower  
1860 Lincoln St.  
Denver, CO 92095

Don Roderick  
Education Specialist  
Illinois State Board of Education  
100 North First St.  
Springfield, IL 62626

John E. Steinbrink  
Associate Professor of Education  
and Geography  
Co-Director, Energy Awareness Project  
University of Houston at Clear Lake City  
2700 Bay Area Blvd.  
Houston, TX 77058

Don Swanson  
Principal—Director  
Walker Math/Science Center  
1520 Post Ave.  
Rockford, IL 61103

Dale Westcott  
Coordinator, Solar Energy Education Project  
Bureau of Science  
New York State Education Department  
Albany, NY 12234

Sam Yoveff  
Science Chairman, Grades 7-12  
Belvidere High School  
1500 East Ave.  
Belvidere, IL 61008

Fred Zurheide  
President, Illinois Science Teachers  
Association  
Associate Professor of Physics  
Physics Department  
Southern Illinois University  
Edwardsville, IL 62026

## Conference Participants

Richard V. Allenstein  
Associate Professor of Chemistry  
Northern Michigan University  
Marquette, MI 49855

Teaches energy and chemistry, an introductory chemistry course organized around national energy problems; energy curriculum writer for NSTA; runs inservice energy workshops for teachers and administrators; teaches a summer energy course for teachers and administrators; organized a local energy study/action group, Energy Options.

Richard W. Ammentorp  
Program Coordinator  
C.A.R.E. for SPACESHIP EARTH  
Title IV C  
District 54 Nature Center  
320 W. Wise Rd.  
Schaumburg, IL 60193

Teaches fifth grade; coordinated ecology club for 3rd-8th graders, emphasis on Energy Conservation Corps; Chairman-District 54 Conservation Committee under direction of Superintendent of Schools to develop energy awareness activities for classroom implementation and maintenance efforts; presented energy conservation activities at NSTA regional meetings; Energy Education Coordinator for a Title IV C project emphasizing Conservation, Awareness and Responsibility for Energy (C.A.R.E.), emphasis on activity oriented, hands-on lessons for grades 4-6; incorporates resident outdoor program in which students and teachers learn to budget their energy consumption.

Glenn D. Berkheimer  
Professor of Science Education  
Michigan State University  
E-37 McDonel Hall  
East Lansing, MI 48824

Faculty member of the Science and Mathematics Teaching Center; contributed to project funded by the State Energy Office; energy education projects consisted of conducting teacher inservice workshops, writing instructional modules, and developing audio-visual materials.

Stephen L. Canipe  
Supervisor, Educational Services  
Duke Power Company  
General Offices  
P.O. Box 33189  
Charlotte, NC 28242

High school science teacher; high school principal; state science consultant; utility energy consultant; director of federally funded environmental education project; producer of energy filmstrips; member, state task force to develop energy competencies; developer of energy games; doctoral dissertation on impact of energy in schools.

Joseph H. Chadbourne  
President  
Institute for Environmental Education  
8911 Euclid Ave.  
Cleveland, OH 44106

President of a non-profit public foundation offering educational service to Northeast Ohio School districts and to federal, state and other national environmental institutions; designing a layman's publication for the Forest Products Industry, a comprehensive inservice training program for teachers called "Cleveland's Teacher Internship Program" which has 3 components: a paid summer job in local industry, business, government or public agency related to energy; a graduate course in leadership and management based on behavioral competencies; a graduate course on infusion strategies with application to energy.

David Chesebrough  
Teacher-Sewickley Academy  
Director-Conservation Consultants  
417-Thorn St.  
Sewickley, PA 15143.

Implemented energy curriculum and activities at junior high level at Beaver Junior High and now at Sewickley Academy; teaches graduate energy education course at Penn State; teaches adult course on solar energy; Director for Conservation Consultants—facilitates workshops, develops energy curriculum; writes and speaks to community on energy.

Richard C. Clark  
Science Specialist  
Minnesota State  
Department of Education  
Capitol Square Bldg.  
St. Paul, MN 55101

Chairman, Minnesota's Energy Task Force; coordinated energy education within the department and between the department and the Minnesota Energy Agency; chairs Secondary Curriculum Project; chairs Region V OE/DOE Elementary-Secondary Committee (communications network).

Harold L. Crater  
Assistant Professor of Physics  
University of Mississippi  
University, MS 38677

Taught junior and senior high physical science in New York and Texas; subject matter specialty, nuclear science; assisted and encouraged Mississippi teachers in field testing PEEC materials at elementary and intermediate levels; NSTA planning committee and workshop presenter at fall meeting on energy education; teaches physics courses for pre and inservice teachers.

M. Wendy Crater  
Holly Springs Primary School  
South Maury St.  
Holly Springs, MS 38635

Classroom teacher-kindergarten and first grade; pilot tested 1st grade PEEC materials; co-authored journal article *Science and Children*, "Energy Education in First Grade" (March 1978); presented paper on second grade PEEC materials at NSTA regional meeting; conducted a session for NSTA energy education workshop.

Mary Crum  
S.C. State Energy Education  
Advisory Committee  
277 N. Palmetto Ave.  
Denmark, SC 29042

Wrote energy education section, S.C. Environmental Education Handbook for secondary schools; writer for energy sections of South Carolina Instructional Television Environmental Science program for preservice education; writer for NSTA-PEEC for two summers; President, South Carolina Environmental Education Association, which promotes public energy education cooperating with the State Energy Office and the State Department of Education.

Henry Dählberg  
Director  
Energy Programs  
P.O. Box 1231  
Prescott, AZ 86302

Clif Daniels  
Science Consultant  
Educational Improvement Center  
207 Delsea Dr. (Rt. 47)  
RD 4, Box 209  
Sewell, NJ 08080

Involved in energy/environmental education as a classroom teacher; educational consultant for the State of New Jersey; involved in developing resource collections (curricular materials and aids) and in assisting districts and individuals in utilizing the topic and materials in their instruction.

Mark Dinsmore  
Elementary Science Teacher  
707 Holly  
St. Paul, MN 55104

Teaches science in grades 1-6 in the inner city of St. Paul; energy education is infused as an integral part of all science classes.

Mary Duffy  
President, Nebraska State  
Education Association  
605 So. 14th St.  
Lincoln, NE 68509

Teaches in Omaha Public Schools; President, Nebraska State Education Association; member, Instruction and Professional Development Committee, National Education Association.

Art Ellis  
Project Director,  
St. Recker Energy Center  
St. Charles High School  
1020 Dunham Rd.  
St. Charles, IL 60174

Social Studies teacher, junior and senior high school; co-author of *DECISION-MAKING MAN*, a social studies/science curriculum on science, society, technology and environment; member of Community Unit District 303's, Solar Energy Education Council; Project Director-Title IVC Project (ASE), Curriculum for Alternative Sources of Energy, an infusion energy curriculum in science for grades 4 and 8, and in social studies (U.S. History) for grade 11; Director of Energy Center-Exhibits of "hands-on" models for alternative sources of energy—solar/wind model, hydro/OTEC/wave/tidal model, fossil fuels.

Gerald J. Fordham  
Teacher  
Salamanca High School District  
50 Iroquois Dr.  
Salamanca, NY 14779

American Studies teacher, Salamanca School District; attended D.O.E. seminar on Energy, Eisenhower College, Seneca Falls, New York.

Janet M. Fryman  
Environmental Education Consultant  
Museum and Art Galleries  
Southern Illinois University  
Carbondale, IL 62901

Elementary teacher; instructor in Summer Environmental Education Workshop; National Resources Chairman League of Women Voters of Carbondale; produced and presented a slide program, "Surface Mining in Southern Illinois" funded by the Illinois Humanities Council and the SIU Museum, to be shown to local organizations in Southern Illinois this year.

David Gierke  
Department Chairman  
Industrial Arts Education  
West Seneca, East Senior High School  
4760 Seneca St.  
West Seneca, NY 14224

Developed New York state teacher competencies-energy, New York state evaluation criteria; conducted teacher education workshops in New York state, Washington state, New Mexico; students have won many awards in energy education; teaches 8 different energy courses.

Lynn W. Glass  
Associate Professor  
12 Quadrangle  
Iowa State University  
Ames, IA 50011

Associate professor of secondary education; director of energy education programs at Iowa State University; directed National Science Foundation-sponsored energy education projects for elementary and secondary school teachers; directed summer energy research participation projects for high ability high school students.

Edward C. Hall, Jr.  
Science Teacher  
Wayland High School  
Old Connecticut Path  
Wayland, MA 01778

Science teacher, Wayland High School; teaches chemistry and 9th grade science (energy and environment); writer for PEEC; writer for NSF project and the University of Colorado for "Energy and Energy Conservation Activities for High School Students."

Robert Haugen  
Project CREATION  
La Salle-Peru Township High School  
541 Charles St.  
LaSalle, IL 61301

Has worked with Project CREATION, a Title IV, nationally validated environmental curriculum.

Edward Hessler  
Executive Director  
Minnesota Environmental Sciences  
Foundation Institute  
5430 Glenwood  
Minneapolis, MN 55422

Materials development and curriculum planning in energy education; home economics, industrial arts, science, social studies, urban chaos.

Phillip M. Ingber  
Science Department  
C.J. Hooker Middle School  
Lincoln Ave.  
Goshen, NY 10924

Teaches chemistry at the 8th grade level; implemented computers in energy education; completion of solar systems for science rooms built by 8th graders; implementation of an interdisciplinary program in energy education for 8th graders in Goshen; evaluator for the Solar Education Project, State Education Department, Albany, New York.

Kathleen D. Jackson  
Teacher-Grade 6  
Graduate Student-Environmental Science  
Thomas Claggett Elementary  
2001 Addison Rd.  
District Heights, MD

Involved in outdoor educational program, Prince George's County; coordinated trips to outdoor education center; involved in program evaluation; informal energy education instruction in classroom.

Dan James  
Carolina Biological Supply Company  
2700 York  
Burlington, NC 27215

Howard Kimmel  
Professor of Chemistry  
New Jersey Institute of Technology  
323 High St.  
Newark, NJ 07102

Teaching and research in energy/environmental areas; developed and taught courses in college-level physical chemistry with emphasis on energy/environmental topics; teaches courses in air pollution control and atmospheric chemistry; co-directs program for high school students in *Urban Engineering*; wrote and teaches module on energy in the program; developed laboratory experiments and demonstrations on energy for classroom use; developed and direct NSF program for secondary school teachers on *Energy and Environmental Technology*; site leader at J.I.T. and presents D.O.E.'s Citizen's Workshop on Energy and the Environment using the Energy Environmental Simulator; developing in-service workshops in energy education for elementary school teachers.



William G. Lamb  
Science Department Chairman  
Frederica Academy  
Hamilton Rd.  
P.O. Box 1217  
St. Simons Island, GA 31522

Teaches physics; chemistry, physical science at secondary level where implementation of energy education activities occurs; promotes energy education at other levels in K-12 as science department chairman.

Kathleen Lane  
Energy Education Consultant  
Indiana Department of  
Public Instruction  
229 State House  
Indianapolis, IN 46204

Energy education consultant for the state of Indiana; responsible for coordination of development of energy materials, training, dissemination and evaluation for schools K-12 in energy education; former social studies teacher; developed interdisciplinary environmental unit for 10th grade.

Joy Lindbeck  
Associate Professor  
College of Education  
University of Akron  
Akron, OH 44325

Chemist at Coal Research Laboratory (Carnegie Tech) in coal hydrogenation; chemist at Koppers Research Lab in monomer synthesis; teaches chemistry, physics, secondary education and science education at the college level; Director of NSF Academic Year Workshop, "Energy: Alternatives and Political, Social and Economic Ramifications" for secondary science teachers; contributor to energy workshops; evaluated pamphlets and audio-visual energy material for a utility company.

Karen M. Longe  
Energy Education Coordinator  
Michigan Energy Administration  
6520 Mercantile Way  
Lansing, MI 48910

Former teacher; secretary, Michigan Environmental Education Association; coordinated the Michigan Energy Extension Service Pilot Youth Project; currently, Energy Educational Coordinator for Michigan Energy Administration, Department of Commerce.

James R. Luff  
Chairman, Science Department  
Tippecanoe Junior High School  
609 N. 9th St.  
Lafayette, IN 47904

Stressed energy and environmental problems through use of special projects and student cooperative research reports as well as other non-text supplemental materials; involved in a project to get Indiana legislature to authorize a Department of Energy Education which would act, among other things, as a "clearing-house" for energy education information to the state.

James T. Martino  
Department Chairman (Science) & Teacher  
Talawanda High School  
Oxford, Ohio 45056

Science teacher; chairman of K-12 district curriculum committee; writing a 9th grade level energy program for use with low level students.

Claudia Mae McDuffie  
Specialist Energy/Environmental Education  
Oregon Department of Education  
700 Pringle Pkwy., S.E.  
Salem, OR 97310

Responsible for: 1) development and implementation of comprehensive state guidelines for energy education and management for Oregon schools, grades K-community college; 2) the articulation of these guidelines to local school districts; 3) providing the technical assistance necessary for schools to develop and implement local programs; identifying, mobilizing and utilizing resources outside of the formal educational sector to carry out the energy education and management programs on a statewide basis.

Peter M. Metro  
Director, Project CHALLENGE  
Gifted/Talented Education  
21600 Center Ridge  
Rocky River City School District  
Rocky River, OH 44116

Director of Title IV C curriculum development projects in the area of ecology and math/science for gifted students, levels K-12.

Wayne Mikach,  
Executive Secretary,  
Pennsylvania State Teachers Association  
Science Coordinator,  
North Hills School District  
55 Rochester Rd.  
Pittsburgh, PA 15220

Science coordinator of the North Hills School District, a suburb of Pittsburgh; past President of the Pennsylvania Science Teachers Association; Executive Secretary of PSTA; introduced the NSTA energy curriculum guides into the elementary science program at North Hills; teaches nine week unit on energy to senior high school students.

F. Gene Miller  
Professor of Education  
Social Studies Education  
Horabin Hall 47  
Western Illinois University  
Macomb, IL 61455

Instructor in NSF academic year institute on environment/energy education; teaches course for elementary education majors: "Teaching Social Studies for Environmental Understanding"; member of NSTA/NCSS Regional Energy Education Network; cooperating consultant, Illinois State Board of Education.

Herbert Duane Mohn  
Physics Teacher  
11717 S.E. Shaver St.  
Portland, OR 97222

Teaches physics, chemistry, astronomy, physical science, biology, most levels of math; science department chairman.

Karen E. O'Neil  
Math/Science Teacher-Department Head  
Central High School  
E. Corinth, ME 04427

NSTA-PEEC curriculum writer; recipient, State of Maine Energy Mini-Grant; attended Solar Training Institute, Rensselaerville, NY; Northern Maine Solar Energy Education Resource Agent for the Northeast Solar Energy Center; conducted NSTA-PEEC and solar workshops.

Linda B. Oxendine  
Environmental Education Specialist  
Environmental/Energy Education Program  
Tennessee Valley Authority  
Forestry Bldg.  
Norris, TN 37828

Coordinates formal and non-formal energy education program planning, development and implementation within the Tennessee Valley; serves as Tennessee Valley Authority liaison person for energy education between local, state, regional, and national groups and organizations involved in energy education.

Dennis Pack  
Science Teacher  
Woodburn High School  
1785 N. Front  
Woodburn, OR 97071

Science teacher, Woodburn High School; participant, Energy Institute, Portland State University; sole energy educator, Woodburn School District; organizing teacher workshops to add energy to curriculum.

Robert Parker  
Science Department Head  
Haymaker & Old William Penn  
Monroeville Junior High  
Monroeville, PA 15146

Classroom activities: science projects involving alternate energy sources; field trips to local power suppliers (nuclear, fossil); guest lecturers from local research facilities involved with energy production; experiment-lecture on topics of a local interest: insulation, heat flow, rationale for conservation.

Stephen R. Peters  
Social Science Teacher  
1961 Indianola Rd.  
Des Moines, IA 50315

Social science teacher at the Greater Des Moines Education Center; an optional high school; involved in NSF energy education workshop, Iowa State University; modified PEEC and other energy education materials to fit curriculum of individual instruction.

Edith Petrock  
Assistant Director for  
Program Development  
Education Commission of the States  
300 Lincoln Tower  
1860 Lincoln St.  
Denver, CO 80295

Assistant Director of elementary/secondary department, Education Commission of the States; involved in a wide spectrum of educational issues having state level policy implications; directs two energy education projects: 1) Status of State Energy Education Policy Project—surveyed 4 agencies in each state, published results, developed ECS energy education policy statement, "Policy Issues in K-12 Energy Education"; 2) Interstate Energy and Education Network—convened representatives of State Energy Offices and State Education Agencies; published conference proceedings.

Hugh Phillips  
Program Director  
#406 10169-104 St.  
Edmonton, Alberta T5J 1A5

Program Director, S.E.E.D.S. Foundation (Society, Environment & Energy Development Studies); responsibilities include scope and sequence of curricular materials in energy education, design and format of materials, inservice and implementation of curricular materials, evaluation and revision of materials; President of Environmental and Outdoor Education, Council of Alberta Teacher's Association; coordinator of special projects in energy education.

Kathy Puckett  
Education Program Manager  
Idaho Office of Energy  
Statehouse  
Boise, ID 85720

Development and implementation of the education section of the Idaho State Energy Conservation Plan; programs coordinated with the State Department of Education, State Library System, State Department of Parks and Recreation, State Department of Health and Welfare and other formal and non-formal education groups; materials development; workshop participation; now compiling results of a statewide higher education survey.

Walt Purdy  
Manager, Educational Services  
Edison Electric Institute  
1111 19th Street, N.W.  
Washington, D.C. 20036

Elementary and secondary school administration; teaching at the elementary, middle school, high school, adult and university levels; 15 summer sessions at Michigan State University; conducted Community Resources Workshops for educators; assisted companies during the past 14 years to relate more effectively with educational community.

Ron Rainer  
Alternate Energy Science Consultant,  
Assistant Project Director  
St. Charles High School  
1020 Dunham Rd.  
St. Charles, IL 60174

Junior high school science teacher; Assistant Project Director, ESEA Title IVC, Illinois State Board of Education, grant to develop and implement an alternate energy curriculum for grades 4, 8 and 11 and to develop an alternate energy demonstration center, demonstrating fossil, solar, geothermal, wind, hydro, nuclear and other forms of alternate energy using models and graphics; member, St. Charles Solar Education Committee.

Michael Soule  
Director  
Environmental Education Project  
School of Education  
Portland State University  
Portland, OR 97207

Coordinator, Oregon energy education network and cooperative interagency effort to promote energy education in Oregon; Director, Environmental Education Project, a non-profit organization providing support services to Oregon's educators; conducted 2 statewide energy education conferences for the Oregon Department of Education; developed 2 learning centers for K-6 on energy concepts for reading; information dissemination specialist with USDOE energy education grant; wrote *Healthy Seedlings for Healthy Environment*, an environmental education manual for YMCA; published and edited regional magazine for environmental education, *Clearing*; teaches Environmental Education for Teachers course at Portland State University;

John E. Steinbrink  
Associate Professor of  
Education and Geography  
Co-Director, Energy Awareness Project  
University of Houston at Clear Lake City  
2700 Bay Area Blvd.  
Houston, TX 77058

Summer energy workshop director; energy curriculum researcher and writer; D.O.E. Citizen's Workshop on Energy, presenter; curriculum consultant to schools.

David C. Ulmer, Jr.  
Instructor  
214-A Henzlik  
University of Nebraska  
Lincoln, NE 68588

Supervises science/math, student teachers; state training team, Energy and Man's Environment, Colorado; summer writing team, PEEC; published "Using Energy Cartoons in the Classroom," *The Science Teacher*; aid development of AV presentation for Colorado Savings Public Utilities.

Michael Wade  
Math/Physics Teacher  
Lakeland High School  
La Grange, IN 46761

Teacher-chairman, Math/Science department; wrote a 9-week general science section on energy; designed and specified thermal standards for a new middle school; designed and constructed solar heated homes.

Lester Wallinga  
Science Instructor-Junior High  
2500 Newport, S.W.  
Wyoming, MI 49509

Teaches energy education; involved in energy seminar at University of Utah; writer of energy curriculum materials for NSTA at University of Maryland.

Ann Watkins  
Consultant,  
Division of Science Education  
Department of Public Instruction  
Raleigh, NC 27611

Biology teacher; works with energy education program, North Carolina Department of Public Instruction; development of materials K-12, a slide/tape presentation, driver education supplement; state-wide conference on technology of the energy industry; runs workshops for local education agencies upon request.

Dale Westcott  
Coordinator,  
Solar Energy Education Project  
Bureau of Science  
New York State Education Department  
Albany, NY 12234

Coordinator of Solar Energy Education Project for New York State Education Department; organized teacher training workshop for energy education; reviewed NSTA-PEEC energy education materials; coordinated development of school district energy education program.

Frank C. Witt  
Project Coordinator  
America's Possible Energy Choices  
121 South Stanley St.  
Rockford, IL 61102

Chairman, secondary schools, social studies; author, *America's Energy Options*; presenter, color transparency talk entitled "America's Energy Options".

Jenny Younger  
Project Coordinator  
League of Women Voters  
Energy Puppet Show  
5555 Black Bear Rd.  
Bozeman, MT 59715

## Conference Staff

Edward Brattrud, Facilitator/Trainer  
Educational Specialist  
Illinois State Board of Education  
Dekalb Program Services Team  
P.O. Box 625  
Dekalb, IL 60115

Former classroom teacher of K-12 science;  
presently Energy Education Coordinator for  
the Dekalb Program Service Team of the Illi-  
nois State Board of Education.

Helen H. Carey, Recorder  
Senior Editor/Coordinator  
Project for an  
Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Senior Editor/Coordinator for NSTA's Pro-  
ject for an Energy-Enriched Curriculum; co-  
ordinates materials development writing ses-  
sions and production; conducts energy edu-  
cation workshops; former junior high school  
social studies chairperson and Interdiscipli-  
nary Team Leader (Maryland).

James G. Cross, Local Committee  
High School Teacher  
1500 East Ave.  
Belvidere, IL 61008

Teaches biology, chemistry and environmen-  
tal science, grades 9-12, including an 8-9 week  
unit on energy in the environmental science  
class.

Thomas Edwards, Facilitator  
Professor of Science Education  
Illinois State University  
Edwards Hall 300  
Normal, IL 61761

Author, *Elementary Science Learning by Investigation*; college science/science methods instructor; high school science teacher; presenter of approximately 20 science education workshops per year; member, Illinois Energy-Environmental Education Consultant Team; approximately 10 energy education workshops per year.

Julia A. Fellows, Recorder  
Editor/Coordinator  
Project for an  
Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Edits *Energy & Education* newsletter, learning packets and special publications; coordinates curriculum writing workshops; conducts in-service workshops on energy education.

John M. Fowler, Conference Co-Director  
Director of Special Projects  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Currently director of NSTA's energy education projects; author of *Energy and the Environment* and *NSTA Energy-Environment Source Book*; course director for AAAS Chautauqua-type Short Courses on Alternative Energy Technologies; has lectured and written extensively on energy/environment issues; a vice-chairman of Scientists Institute for Public Information.

Helenmarie Hofman  
Associate Project Director  
Project for an  
Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Has taught at all levels, K through graduate school; is a consultant, researcher, editor; has designed and developed energy education programs and materials; has conducted seminars, workshops, and materials development sessions; has published articles and given speeches on energy education.

Delores L. Mason, Office Manager  
Production Manager  
Project for an  
Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Manages curriculum packet and materials production for PEEC.

Donald W. McCurdy  
President-Elect, NSTA  
Professor-Science Education and  
Coordinator of Instruction  
211 Henzlik Hall  
University of Nebraska  
Lincoln, NE 68588

Directed summer institute workshops for secondary teachers of science and social studies, funded by DOE; developed and edited energy education materials produced in these workshop institutes.

F. Gene Miller, Recorder  
Professor of Education  
Social Studies Education  
Horrabin Hall 47  
Western Illinois University  
Macomb, IL 61445

See list of Conference Participants.

Don Roderick, Conference Co-Director  
Educational Specialist  
Illinois State Board of Education  
100 North First St.  
Springfield, IL 62626

State consultant in science, energy, environmental education; was local district science supervisor; high school teacher (physics); taught junior high and piloted ISCS program; taught all subjects in rural elementary school; was an elementary principal.

John D. Shaver, Facilitator  
Professor of Science Education  
49 Horrabin Hall  
Western Illinois University  
Macomb, IL 61455

Teaches undergraduate and graduate courses in environmental/energy education; directed NSF-funded institute in environment/energy education; designed new course, "Energy Education for Elementary Teachers"; conducts in-service sessions and workshops for local area schools; official presenter of energy programs using the energy/environment simulator for the Illinois Office of Education.

John Steinbrink, Recorder  
Associate Professor  
University of Houston at  
Clear Lake City  
2700 Bay Area Blvd.  
Houston, TX 77058

See list of Conference Participants.

Malcolm Swan, Local Committee  
Acting Director/Chairperson  
Lorado Taft Field Campus  
Northern Illinois University  
Oregon, IL 61061

Professor of curriculum and instruction at Northern Illinois University; Secretary, Illinois State Advisory Board on Conservation; editor of *Illinois Environmental Education Update*, a monthly newsletter; science advisor of *Energy and Environment*, a national periodical for high school students; consultant to environmental education and energy education, Title IVC ESEA projects.

Don Swanson, Local Committee  
Principal—Director  
Walker Math/Science Center  
1520 Post Ave.  
Rockford, IL 61103

Teacher, grades 3-6; science consultant, grades K-6, Teacher Development Center, Rockford; principal and director of Walker Math/Science Magnet School, Rockford; science methods professor, Rockford College; K-8 science and energy workshop leader, Rockford and surrounding districts; K-8 science workshop leader for regional office and State Board of Education.

Alan M. Voelker, Facilitator  
Professor of Science Education  
Gabel 102  
Department of Curriculum & Instruction  
Northern Illinois University  
DeKalb, IL 60115

Pre and inservice education of teachers, science-energy education; curriculum consultant to several energy education projects; director and co-director of NSF teacher education grants in science, environmental, and energy education; investigator and co-investigator on NSF grants dealing with interest and attitude development toward science and energy.

Charles Weller, Facilitator  
Associate Professor of  
Secondary Education  
805 W. Pennsylvania  
University of Illinois  
Urbana, IL 61801

Undergraduate and graduate science teacher education with special emphasis on energy/environmental education; special interests in cognition in science and mathematics, with consideration given to cultural influences.

Dale Westcott, Recorder  
Coordinator  
Solar Energy Education Project  
Bureau of Science  
New York State Education Department  
Albany, NY 12234

See list of Conference Participants.

Janet A. White, Recorder  
Research Assistant  
Project for an  
Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., NW.  
Washington, DC 20009

Researches, writes, edits, contributes to production and graphics for PEEC.

Paul Yambert, Facilitator  
Professor  
Southern Illinois University  
Carbondale, IL 62901

Professor, environmental education and environmental interpretation; special interests in energy-efficient home design, energy conservation and ecological lifestyling; research projects: environmental knowledge and awareness testing, evolution of environmental ethic; designed own solar home.

Sam C. Yoveff, Local Chairperson  
Science Chairman—Grades 7-12  
Belvidere High School  
1500 East Ave.  
Belvidere, IL 61008

Science chairman; worked on junior high and high school staff on curriculum units in energy; junior high will have an "Energy Month" during February; will be offering 7th and 9th grade students mini-units on energy; incorporates energy unit within high school environmental course.

Leon J. Zalewski, Facilitator  
University Professor of  
Science Education  
College of Arts and Sciences  
Governors State University  
Park Forest, South, IL 60466

Teacher training, student teaching; inservice training; energy environment simulator presentations; author, *Illinois Plan for Environment Education and Energy Education*; presenter, professional meetings in research about effects of NRG and environment education; attendance at DOE workshops for college teachers on energy issues and biomass.

Fred W. Zurheide, Local Committee  
President,  
Illinois Science Teachers Association  
Associate Professor of Physics  
Physics Department  
Southern Illinois University  
Edwardsville, IL 62026

Science teacher, SIU-E; NSF grants for elementary, junior high, high schools, community college and university teachers; given citizen workshops on energy using own electronic simulator; teaches energy class on campus for non-science majors; public service assignment to tour Illinois and help teachers at all levels.



## **Working Groups**

### **General State of the Art and Needs Assessment in Energy Education**

A. Voelker (Facilitator)  
J. Fellows (Recorder)

M. Dinsmore  
D. Gierke  
E. Hessler  
D. James  
H. Kimmel  
K. Longe  
S. Peters  
M. Soule  
M. Wade

### **State of the Art in Dissemination, Implementation, and Evaluation**

L. Zelewski (Facilitator)  
G. Miller (Recorder)

R. Ammentorp  
D. Chesebrough  
H. Dahlberg  
A. Ellis  
K. Jackson  
K. Lane  
J. Martino  
D. Ulmer  
A. Watkins  
J. Younger

## **Strategies and Need for Policy Impact**

J. Shaver (Facilitator)  
D. Westcott (Recorder)

G. Berkheimer  
M. Crum  
J. Fryman  
P. Metro  
L. Oxendine  
E. Petrock  
K. Puckett  
W. Purdy  
L. Wallinga  
F. Witt

## **Pre and Inservice Teacher Training**

T. Edwards (Facilitator)  
J. Steinbrink (Recorder)

R. Allenstein  
J. Chadbourne  
D. Clark  
H. Crater  
L. Glass  
T. Hall  
P. Ingber  
J. Lindbeck  
C. McDuffie  
K. O'Neil  
R. Parker  
H. Phillips  
R. Ratner

## **Energy Education for Special Groups**

P. Yambert (Facilitator)  
J. White (Recorder)

S. Canipe  
W. Crater  
C. Daniels  
G. Fordham  
D. Pack

## **Grade Level Articulation**

O. Gould (Facilitator)  
H. Carey (Recorder)

M. Duffey  
R. Haugen  
W. Lamb  
J. Luff  
W. Mikach  
H. Mohn  
F. Zurheide

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## Poster Session

The poster session was designed to acquaint the participants with some of the resources, events and programs that exist in energy education. The largest group of presentations was that generated by individual classroom teachers. The projects of private and educational groups were well-represented as were state and federal government programs from the Departments of Energy and Education. The major energy education program of the Canadian government was also represented. A local industry presented a slide show, and the League of Women Voters puppet show closed the session.

## **America's Possible Energy Choices** **Frank C. Witt, Presenter**

Because an understanding of our energy choices is vital to the future, APEC project coordinators Paul Meyers and Frank Witt have developed a high school energy curriculum of 3-6 weeks and an intermediate (grades 5-8) energy curriculum of one week. These curricula have received Illinois state validation.

Prior to teaching the courses, teachers are given a 10 hour training institute by the project staff in which the curriculum is explained and course materials kits are distributed to them. Project-developed pre- and post-tests are included for administration to students to determine how much knowledge is gained from the course.

To date 146 teachers have been instructed in Illinois and well over 10,000 students have taken the course. In the next two years the project directors hope to double the figures for both teachers and students, as well as to achieve national validation.

Additionally, the project directors have developed several unique tools and presentations of vital interest to teachers, students, and citizens:

- A color, sound, 30-minute film with original musical score that explains how to teach a course in energy.
- A 60-minute color slide show that records and explains the building of a typical nuclear plant.
- A 30-minute talk comprising about 100 color transparencies which explains America's Energy Options. (As of December, 1979, this presentation has been made 49 times to 3000 adults.)
- A 79-page, illustrated, paperback book that explains in detail America's energy options.
- Two curriculum packages.

Source of Materials:  
Contact Person:  
Price:  
Grade Level:

APEC  
Frank C. Witt  
"Our Energy Options" energy book, free of charge  
5-12

**D.O.E.'s Solar Energy Project  
and its Dissemination in the Northeast  
Northeast Solar Energy Center  
Karen E. O'Neil, Presenter**

The Solar Energy Project began with 80 N.Y. State teachers writing in conjunction with S.U.N.Y., Albany. Forty three science activities for grades 7-12 were produced along with support materials. The materials have been field tested nationally and revised. In present form the materials are available from U.S.G.P.O. in eight separate booklets: five activity booklets—biology, chemistry and physics, earth science, junior high, and general topics—plus a teacher's guide, text, and reader.

The Northeast Solar Energy Center is disseminating a limited number of free copies of this solar energy curriculum through 30 solar energy education resource agents in the nine northeastern states under its jurisdiction. These 30 educators were trained at a one-week summer institute and are each conducting two workshops in their local areas to introduce science teachers to the materials. Response has been excellent to date. Western Sun in Oregon also plans to disseminate the curriculum at a later date. Educators in other parts of the country can obtain the materials directly from the U.S. Government Printing Office.

Source of Materials:	D.O.E. (U.S.G.P.O.) Washington, DC 20402
Contact Person:	Dr. Jerome Skapof (NESEC, Cambridge, MA), Dave Sutton (Western Sun, Portland, OR)
Price:	\$19.60 (complete set)
Grade Level:	7-12

**Energy Education for the Optional School**  
**Stephen Peters, Presenter**

I have taken some of the PEEC packets, made modifications, and made up my own packets to hand out to students so they could learn about energy as part of a social science course or as a separate course. Individualized instruction allows students to work at their own pace.

Source of Materials: Project for an Energy-Enriched Curriculum  
National Science Teachers Association  
1742 Connecticut Ave., N.W.  
Washington, DC 20009

Contact Person: Stephen Peters

Price: Free

Grade Level: 7-12

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## **Energy Education in the Community and Classroom** **David Chesebrough, Presenter**

My "program" is really a broad based approach to reach the community in as many different ways as possible through various educational channels and public communication avenues. Much of my work is done independently, some through Conservation Consultants, a non-profit energy education group I helped to found, and some through the Western Pennsylvania Solar Energy Association. As briefly outlined below, four different categories are served by various components of my program.

- **Classroom:** My own energy curriculum and student projects at the junior high level.
- **Schools:** Graduate courses and workshops for teachers; resource center; curriculum development.
- **Adult Education:** Community college course on solar energy and conservation.
- **Community Education:** Weekly news column and free-lance features on energy conservation and solar energy; speaking engagements; talk show appearance; and consulting.

After three years of an uphill battle, the impact of these efforts is just beginning to be felt. In all recent courses, classes, and workshops, attitude surveys showed significant positive changes in personal attitudes toward the energy situation and commitments to respond to it.

<b>Source of Materials:</b>	Conservation Consultants 417 Thorn St. Sewickley, PA 15143
<b>Contact Person:</b>	Terry Webb
<b>Price:</b>	Varies—minimal
<b>Grade Level:</b>	K-12

**Energy Education Project  
Portland State University  
Mike Soule, Presenter**

Materials from several different Oregon sources were presented, including two offerings of the Oregon State Department of Education, *Know-Pak* and *Energy Crisis*. The Portland State University Energy Education Project publishes *Clearing Magazine*, and the Lane County School District has produced two Solar Classroom Packets.

Source of Materials:	Environmental Education Project Portland State University P.O. Box 751 Portland, OR 97207
Contact Person:	Mike Soule, Director
Price:	Not listed
Grade Level:	Not listed

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**Energy Extension Service  
Energy Administration,  
Michigan Department of Commerce  
Karen M. Longe, Presenter**

In Michigan, Michigan was one of 10 states to receive an Energy Extension Service grant from the Department of Energy. As part of that grant, Michigan developed a youth project contracted to Michigan State University, Cooperative Extension Service and the Science and Mathematics Teaching Center. The original objective of the project—to develop an energy conservation ethic in high school students—was expanded to include elementary and middle school students.

During the 22 months of the project, various strategies were tried which involved working directly with both students and teachers. Extensive evaluation indicated that teachers who received help—in the form of consultation, energy conservation workshops, or similar instruction—were more likely to provide energy instruction to their students. Further, students who received energy instruction demonstrated more positive attitudes toward energy conservation than students with little formal background in energy matters. Thus, project emphasis involved working with teachers to increase their knowledge and ability to teach energy education.

Source of Materials:	Energy Extension Service 6520 Mercantile Way Suite 1, P.O. Box 30228 Lansing, MI 48909
Contact Person:	Karen M. Longe
Price:	Not listed
Grade Level:	K-8

**Energy Education Programs  
Michael C. Kynell, Presenter**

For the past four years, Energy Education Programs has been working with educators on the development of interdisciplinary approaches to energy at all grade levels throughout Illinois and, on a limited basis, in other states. The inservice sessions focus on energy awareness and available materials with intensive working sessions following for those interested in active involvement.

To date, EEP has had a direct impact on over 20,000 certified teachers. Currently EEP is working through National 4-H, USDOE, the State of Illinois, Commonwealth Edison Company, Central Illinois Public Service Company, Central Illinois Light Company, and Illinois Power Company.

Source of Materials:	Energy Education Programs 205 Dean St. Woodstock, IL 60098
Contact Person:	Mike Kynell, Dennis Gaul
Price:	Not listed
Grade Level:	Professional

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## **Energy Education Programs Nebraska Energy Office**

The Nebraska Energy Office offers seven energy education programs:

- Basic Teaching Units on Energy (grades 7-12)
- Energy Conservation Activity Packets (grades K-6)
- Residential Energy Conservation: A Money-Saving Guide for Nebraskans
- Energy Resources Directory
- Driver Education Energy Efficiency Handbook
- Television Documentaries on Energy
- 4-H Energy Education Program

Source of Materials:

Nebraska Energy Office

P.O. Box 95805

Lincoln, NE 68509

Contact Person:

Gary A. Lay, Educational Coordinator

Price:

Not listed

Grade Level:

K-12, Public

**Idaho Energy Education Materials**  
**Idaho Office of Energy**  
**Kathy Puckett, Presenter**

The Idaho Office of Energy offers Energy Conservation Resource Guides, grades 7-12, in language arts, math, science, career education, environmental education, health education and industrial arts.

Source of Materials:	Idaho Office of Energy
Contact Person:	Kathy Puckett
Price:	Not listed
Grade Level:	7-12

**Indiana Energy Education Curriculum Project**  
**Indiana Department of Public Instruction**  
**Kathleen Lane, Presenter**

At the elementary level, three units for teachers (K-1, 2-3, 4-6) have been developed in a cooperative project of the Department of Public Instruction and the Indiana Department of Commerce Energy Group. Each unit contains 18 lessons, assessments, glossary, and references. Each lesson contains rationale, objectives, social studies/science activities, math and language arts adaptations, and stories, illustrations, or worksheets for students. General objectives for the program include awareness, information, inquiry skills, and participation.

For the middle grades, sample lessons and a student comic book, "Quantum Conserves," are now available. *Energy and Four Cultures* and *Energy and American History* will be available in 1980. Units are designed to be used in social studies classes with adaptations for science, language arts, and practical arts.

Sample lessons are "Energy and Europe" and "Energy and the Post War Period." They include student information and activities and teacher guides. General objectives for the program are in the areas of knowledge, imagination, and participation.

Source of Materials:

Division of Curriculum  
Department of Public Instruction  
229 State House  
Indianapolis, IN 46204

Contact Person:

Kathleen Lane

Price:

Free

Grade Level:

K-1, 2-3, 4-6, 6-9

**North Carolina Department of Public Instruction  
Ann Watkins, Presenter**

Materials in the energy education program in North Carolina include three packets of energy activities for the classroom and one overview packet entitled, "Energy Wise Program."

Source of Materials:	North Carolina Department of Public Instruction Division of Science Education 284 Education Bldg. Raleigh, NC 27611
Contact Person:	Ann Watkins
Price:	Not listed
Grade Level:	K-6

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**Project CREATION**  
**Robert Haugen, Presenter**

The major goal of CREATION is to develop students as citizens who will hold a strong environmental ethic. By this, we mean citizens who will support the values and actions needed to retard people's negative impact on our planet. Such a goal should be the business of educators. The choice is ours.

A student studies one unit in each of these four categories per semester:

- Energy
- Land Use
- Urban Management
- Pollution

Source of Materials:

Project CREATION.

541 Charles St.

LaSalle, IL 61801

Contact Person:

Jean G. Hauser, Barbara Barchi

Price:

\$2.25 each book. Other materials are available;  
please write for price list.

Grade Level:

9-12

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**Project for an Energy-Enriched Curriculum  
National Science Teachers Association  
PEEC staff, Presenters**

Through its Project for an Energy-Enriched Curriculum, sponsored by the U.S. Department of Energy, the National Science Teachers Association has produced a series of energy instructional packets for elementary and secondary schools. Written by social studies and science teachers, these materials are designed for convenient infusion into the existing curriculum. They feature a wide range of activities which encourage direct student participation while introducing basic energy concepts.

Of the total 34 instructional packets, 15 are now available in final form; nine will be available in final form in Summer 1980; and 10 produced during summer of 1979 are being field tested and revised.

Nineteen *Fact Sheets on Alternative Energy Technologies* are also available. They cover bioconversion, wind, solar, geothermal, conservation, nuclear, coal, storage, fuel cells, appropriate technology, and environmental impacts.

NSTA also publishes *Energy & Education*, a bimonthly newsletter serving the growing number of teachers, administrators and civic groups involved in energy education. Regular features include editorials by outstanding authorities in the fields of energy and education, listings of new free and inexpensive materials, book reviews, current data on the energy situation, and a calendar of coming events. *Energy & Education* is available free of charge from NSTA.

Source of Materials: DOE-Technical Information Center  
P.O. Box 62  
Oak Ridge, TN 37830  
Price: Free  
Grade Level: K-adult



## **Science, Energy and Environmental Change**

**James T. Martino, Presenter**

This project represents one unit of a five unit course in energy. From this unit students should learn about heat values of various types of wood. They should also learn the advantages and disadvantages of biological fuels and some of the methods being proposed for use of biomass fuels.

Processes explored are the burning of cured and uncured woods; burning of other wastes such as straw, corn cobs, and paper; and other topics that may be suggested. Students should learn that smoke and ashes are disadvantages of these fuels. Also explored is material on the fermentation, distillation, and combustion of alcohol as fuel.

Other units in this course allow students to explore methods of heat transfer, heat conductivity of various substances, heat losses from homes, collection of radiant energy and nuclear half life. Additional unit topics include an introduction to energy, an explanation of why there is an energy problem, solar energy, and nuclear energy.

The course is lab oriented but uses standard laboratory apparatus or simple home built apparatus. The reading and math levels are such that most students can succeed. The emphases of the course center on areas of student concern.

Source of Materials:	James T. Martino Talawanda High School Oxford, OH 45056
Contact Person:	James T. Martino
Price:	Not listed
Grade Level:	Junior High

**S.E.E.D.S. Foundation**  
**Hugh Phillips, Presenter**

S.E.E.D.S. (Society, Environment and Energy Development Studies) is a federally chartered non-profit foundation established in September of 1976. S.E.E.D.S. has developed individually packaged, grade level materials for grades 1 to 12. Utilizing the themes energy, environment and society, complete lessons have been designed for teachers to infuse into the social studies and science curricula.

During the '78-79 school year, all grade level materials were piloted with over 4000 students and 150 pilot teachers. Formal and informal evaluations led to materials being revised and rewritten. Materials are now being forwarded to S.R.A. for publication and distribution. An inservice program will accompany the delivery of materials. Published materials will be available during the '80-81 school year.

Source of Materials:	S.E.E.D.S. writing teams
Contact Person:	Hugh Phillips, Program Director
Price:	T.B.A.
Grade Level:	1-12

## **A Six Week Energy Unit for Ninth Grade Science** **Ted Hall, Presenter**

This unit is an introduction to energy use for ninth grade science. Included are five basic ideas:

- Energy—What Is It?
- Energy-How Much?
- Energy Conversion
- How Do We Obtain Energy?
- What Are the Costs?

The unit combines worksheets, field trips, experiments, and home activities in developing the ideas of energy. Included in the unit are a pretest, general and specific objectives, and student sheets.

Source of Materials:	Ted Hall
Contact Person:	Ted Hall
Price:	\$5.00 for copy costs
Grade Level:	9

**Solar Energy Education Project  
New York State Education Department  
Dale Westcott, Presenter**

The Solar Energy Education Project consists of a varied set of materials to teach solar concepts in secondary science classes. The materials are intended to be infused into existing courses of study. The core of the materials is a set of 43 activities intended for use in grades 7-12. A teacher's guide, text and reader are also available.

Source of Materials:	Solar Energy Education Project New York State Education Department Bureau of Science Albany, NY 12234
Contact Person:	Dr. Dale Westcott
Price:	\$19.00
Grade Level:	7-12

**Surface Mining in Southern Illinois  
Museum and Art Galleries, Southern Illinois University  
Janet Fryman, Presenter**

What is man's relationship to his earth? Using the topic of surface mining, this slide program illustrates one aspect of the present situation at the same time it employs examples of Renaissance and ancient Chinese art to show how past civilizations viewed their relationship to the earth. The program discusses surface mining history, methods, and reclamation laws. Although with present technology and laws surface mining leaves no scars upon the land, new problems arise to replace the old. For instance, the slide program discusses how difficult it is for people to agree on the use that should be made of reclaimed land.

The Federal Surface Mining Act of 1977 is presented in the program. The federal law reflects how our country values its land resources. Different opinions of the law and the effects the law will have on southern Illinois are also presented.

"Surface Mining in Southern Illinois" consists of slides showing:

- Maps of Illinois coal resources.
- The giant machines used in surface mining.
- Stark scenes of land stripped and abandoned.
- Lush green land reclaimed to parks, forests, and pasture.
- Scenes of beautiful southern Illinois.

**Source of Materials:**

Southwestern Illinois Coal Corporation  
Peabody Coal Co.  
Illinois Geological Survey  
Illinois Department of Mines and Minerals  
Jackson County Soil and Water Conservation District  
Janet Fryman, Gerry Kelley

**Contact Person:**

**Price:**

**Grade Level:**

Free in southern Illinois  
High school-Adult

**"Take That, You Energy Monster"  
League of Women Voters  
Jenny Younger, Presenter**

The League of Women Voters of Montana has developed an energy puppet drama entitled "Take That, You Energy Monster." The puppet show is designed to teach young children (K-6) some basic facts about energy, energy conservation, and alternative energy resources. Although the puppet show was developed to teach rural school children in Montana about energy, it is now being used in rural and urban settings in twenty states and Canada.

The Energy Monster and his puppet friends Insulator Man and the Sun Princess are extremely successful in teaching children and adults energy facts and conservation. The puppet show is entertaining and simple in a subject area where many things are quite dull and complex. The natural charm of puppetry lends an interest factor that is hard to duplicate in other energy teaching tools.

Large production-size puppet sets, energy puppet teacher's kits, and videotapes of the puppet show are available from the League of Women Voters of Montana.

Source of Materials:	League of Women Voters of Montana 5555 Black Bear Rd. Bozeman, MT 59715
Contact Person:	Jenny Younger, Project Coordinator
Price:	Not listed
Grade Level:	K-6

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