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A SUMMARY OF CURRENT STATE
INDUSTRIAL ENERGY CONSERVATION PROGRAMS

by

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May 1980

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prepared for
U.S. DEPARTMENT OF ENERGY
Assistant Secretary for Conservation and Solar Energy
Office of Industrial Programs

*R.W. Anderson and Associates; consultant to Argonne under
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FOREWORD

This technical memorandum reports a preliminary study of industrial energy conservation measures initiated by states under the State Energy Conservation Program. The data gathered and presented here is intended to stimulate further discussions with the states, the U.S. Department of Energy, and other interested parties rather than to represent a complete analysis of the subject.

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1 INTRODUCTION

Under the sponsorship of the U.S. Department of Energy, a preliminary survey was made of all state industrial energy conservation programs. The primary objective of this study was to provide a composite picture of the directions, approaches, and magnitude of efforts to improve the efficiency of industrial energy use. Questions of particular interest were:

- To what degree are the various segments of industry being addressed?
- What are the perceived needs of state energy offices with regard to industrial energy conservation?
- Are there problem areas common to state programs that should be addressed at the federal level?

The national initiative to encourage states to develop energy conservation programs was established by the Energy Policy and Conservation Act of 1975 (P.L. 94-163), which was subsequently amended by the Energy Conservation and Production Act (ECPA) of 1976 (P.L. 94-385). These acts established the State Energy Conservation Program (SECP), administered by the U.S. Department of Energy, in which any state could enter voluntarily into a cooperative effort with the federal government to further that state's energy conservation efforts. Under this program, the state could implement a comprehensive program to achieve an energy conservation goal by 1980. The federal government, in turn, would provide technical and financial support to each participating state. To implement this program, the federal government appropriated funds for fiscal years 1977, 1978, 1979, and 1980.

Every state submitted an energy conservation program by 1977, in accordance with SECP.¹⁻² Although not required under the guidelines of SECP, 48 states initially elected to include plans for industrial energy conservation within their programs. The projected energy savings to be achieved by 1980 as a result of the state industrial energy conservation programs is estimated to be as high as 1.5 quadrillion Btu (1.5 quads), representing 26% of the total savings projected under SECP and approximately 5% of total industrial energy use. Note, however, that this estimate is based on state estimates, which are not always consistently calculated.

Under SECP, each state could design programs in accordance with its perceived needs, ambitions, and resources. The states also could adopt methods of program implementation that best serviced their needs and call upon organizational support from such sources as other state or federal agencies, universities, utilities, industrial groups, or private contractors. Consequently, without any programmatic or organizational constraints set forth in SECP, the SECP program matrix for industrial conservation became diffuse.

Now that the first three years of SECP have been completed, and the states have gained various levels of program success, it seems appropriate to stimulate interstate coordination to increase future effectiveness of various programs. States could benefit through sharing of currently available program materials and proven program approaches and, possibly, through

cooperative development of new program areas. The federal government would benefit from increased cost-effectiveness in the use of SECP funds. Most importantly, private industry would benefit from better programs and greater uniformity among state policies.

2 APPROACH

To meet the goals of this preliminary study, sufficient data and materials were gathered to show magnitude of effort, trends in program directions and approaches, and program areas that would benefit from greater interstate cooperation and coordination. The primary information was obtained directly from each state's energy office by requesting the following information regarding industrial energy conservation programs:

- Program plans, e.g., those submitted for approval under ECPA,
- Annual funding levels,
- Sources of funds,
- Materials and publications used or developed, and
- Comments and recommendations concerning problem areas or improvement of the overall programs.

To identify trends in program approaches and directions, a response from each state was not mandatory; a response rate in excess of 60% of those states having industrial energy conservation programs was considered sufficient. The 30 state energy offices that sent information represented 67% of the programs that included conservation measures, thus providing adequate data for this preliminary study. During the analysis of the information, the following areas were emphasized:

- Program goals,
- Program areas,
- Target industries, by type and size,
- Program budgets,
- Approaches to program development,
- Approaches to program implementation, e.g., passive, active, mandatory, and regulatory,
- Involvement with other organizations or governmental groups,
- Problem areas/recommendations for improvement, and
- Anticipated energy savings.

Supplemental budgetary information for the respective state programs was obtained from the federal SECP data base.³ Since it was expected that the response rate from the states would be less than 100%, the federal data assured identification of all states involved and provided a check on their budget levels.

An evaluation of the quality or effectiveness of specific programs or materials was considered to be outside the scope of this preliminary study. A review of the available information, however, indicates that the significant differences in the levels of managerial and technical sophisti-

cation and expertise among the states can be attributed variously to differences in program maturity, target audiences, program priority, and program budget.

The identification of types of programs to be included in the category of "industrial" is somewhat arbitrary. For example, some states identify "commercial and industrial audits" as a single program area. Others include such items as "reclamation of used motor oil," "combustion of wood products," and "cogeneration" in "waste recovery." For the purposes of this study, all projects identified as "industrial" under the federal SECP data base were included. Although some of these programs are combined with other end-use sectors such as residential and commercial, it is believed their inclusion does not significantly influence the program patterns and conclusions reached in this study.

3 STATE ENERGY USE

The energy conservation potential for a particular state is in part a function of the amount of energy used, methods of consumption, degree of existing conservation, and the price of energy in that state. Variations in energy prices and available energy supply will cause the economically efficient conservation level to differ from state to state. Before looking at what states are currently doing to conserve energy, a brief look at how they consume energy is appropriate. Reference 4 is the main source of data for this section.

In 1975 five states accounted for 41%, and 20 states, 81%, of industrial energy used in the United States (see Fig. 3.1). These 20 states and their energy consumption figures are listed in Table 3.1. Texas, the largest user among the top five, consumed nearly 15% of all purchased energy used for fuel in the manufacturing sector.*

Six energy-intensive industries at the level of two-digit Standard Industrial Classifications accounted for over 80% of industrial energy use in 1975 (see Table 3.2). These industries probably represent the bulk of the energy conservation potential, although significant potential does exist in the remaining industries. Energy use by fuel type is shown in Fig. 3.2. Natural gas and oil make up a majority of the fuel consumed by industry. Increased energy prices make this category of industrial fuel use more and more attractive for energy conservation techniques.

*1 kWh = 3412 Btu. Energy consumption figures were converted to equivalent kilowatt-hours on the basis of the following conversion factors:

Coal - 7677 kWh/short ton
Coke - 7618 kWh/short ton
Distillate oil - 1707 kWh/bbl
Residual oil - 1842 kWh/bbl
Natural gas - 300 kWh/10⁶ ft³

Fig. 3.1. Industrial Energy Use by States (Source: Ref. 4)

Table 3.1. Industrial Energy Use by State

Rank	State	1975 Energy Use (10 ¹² kWh) ^a
1	Texas	526.7
2	Pennsylvania	255.7
3	Ohio	255.6
4	Louisiana	227.3
5	California	181.2
6	Illinois	175.8
7	Michigan	150.4
8	Indiana	134.4
9	New York	128.6
10	Tennessee	94.4
11	New Jersey	93.1
12	Alabama	90.0
13	North Carolina	81.8
14	Wisconsin	71.3
15	Kentucky	68.8
16	Washington	68.2
17	Georgia	67.1
18	West Virginia	60.3
19	South Carolina	60.2
20	Virginia	58.2
Total United States		3528.2

^a1 kWh = 3412 Btu

Source: Ref. 4

Table 3.2. Industrial Energy Use by Industry Category

SIC	Description	1975 Energy Use (10 ¹² kWh)	% of Total Industrial Energy Use
20	Food	268.2	7.6
26	Paper	354.6	10.0
28	Chemicals	814.7	23.1
29	Petroleum	397.8	11.3
32	Stone, clay, and glass	339.8	9.6
33	Primary metals	654.9	18.6
	Subtotal (6 industries)	2830.0	80.2
	Total (all industries)	3528.2	100.0

Source: Ref. 4

Fig. 3.2. Industrial Energy Use by Fuel Type (1 kWh = 3412 Btu; source: Ref. 4)

4 STATE INDUSTRIAL ENERGY CONSERVATION PROGRAMS

4.1 STATE PARTICIPATION

A listing of the states that support industry-related programs under SECP is shown in Appendix A. Although inclusion of industry-related programs was not required under SECP, a total of 49 states included industry-related programs in their initial plans in 1977. During the 1977-1980 period, however, some programs were modified; at the present time, eight states do not include industry programs, although the District of Columbia and two of the U.S. territories have now initiated them.

As a part of this study, supplemental information was requested from each state energy office. Those states responding to this request are also identified in Appendix A. The 30 responses provided valuable information about the approaches, directions, successes, and problems associated with state programs.

The magnitude of the SECP industry programs, in terms of federal funding levels and energy savings, is indicated in Appendix B. In aggregate, a total of almost \$50 million of federal funds has been distributed to the states during 1977-1980. Amounts granted to individual states range from zero to over \$13 million; the programs of those states receiving no federal funds were apparently funded by the states. The distribution and size of grants are shown in Fig. 4.1.

Fig. 4.1. Distribution of Federal Grants to States for Industrial Energy Conservation

The industrial programs were projected to save a total of 1.5 quad by 1980. The reported cumulative energy savings for the 1977-1979 period were 0.8 quad. These estimated energy savings are merely the total of the states' own estimates and are not all based on consistent application of comparable estimation methods. Accordingly, both the magnitudes of the savings for each state and the relative degree of savings among states are subject to question. In particular, the relative success of state programs cannot be based solely on their relative estimated savings shown in Appendix B.

Although neither a detailed validation of estimation methods nor a verification of actual savings has been conducted, a recent brief study for DOE provided an independent estimate of SECP energy savings based on service actually provided.⁵ The study included only two industrial conservation elements, Class A audits and workshops, and reported estimated savings of 4.8×10^{-4} and 3.2×10^{-4} quad, respectively. This total savings of 8×10^{-4} quad was estimated to save \$3.5 million, based on an average industrial fuel cost of \$4.37 per million Btu. Although the actual program elements are broader than the ones in this study, these two can be expected to be the major contributors to energy savings in the short term.

It would appear, therefore, that this estimate of energy savings and the estimate reported in the state program plans vary considerably. Additional DOE validation studies are now under way. Several factors affect the estimation of energy savings:

- Attribution of energy savings to SECP as opposed to other factors,
- Estimation based on projected rather than actual services provided,
- Lack of follow-up data showing conservation measures actually taken,
- Calculations necessarily approximate in computing energy savings per unit of service, and
- Accounting of indirect or delayed benefits of SECP programs.

Using a current estimate of average industrial energy cost of \$4.53 per million Btu,⁶ the projected 1.5-quad energy savings would return to industry \$6.8 billion for the \$50 million federal investment. If the energy savings were equivalent to oil at \$30/barrel, the savings to industry would be \$8.1 billion. This rough estimate exaggerates the actual savings, ignoring the change in fuel price over the 1977-1980 time period. It also ignores any future savings due to programs already completed.

The projected energy savings per dollar of federal funding varies greatly from state to state. Although a detailed analysis of these variations is beyond the scope of this preliminary study, the differences can be reasonably attributed to diversities in (1) program direction, (2) program efficiencies, and (3) methods used to account for savings.

4.2 ELEMENTS OF STATE PROGRAMS

Almost all of the elements of the state industrial programs can be grouped within the following broad categories. The categories are listed in order, based on the number of states having each respective initiative. The ranking does not necessarily reflect either the relative levels of effort or federal funding.

- General information
- Industry audits
- Workshops/seminars
- Recycling of waste oil
- Utilization of waste materials
- Boiler/combustion efficiency
- Cogeneration
- Energy-related regulation
- Fuels management
- Waste heat utilization

The program elements initiated by the respective states are listed in Appendix C.

Within each of the broad program categories are wide variations in the scope of activities implemented by the states. Undoubtedly, in defining their scopes of activities, the states were guided by perceived needs and priorities, technical and financial resources, and overall state policies. The range of scopes within each of the broad program categories is indicated below. Not all programs have been fully implemented; some are in the planning, developmental, or conceptual stages.

4.2.1 General Information

This category was included in most of the state programs to promote the conservation concept and to offer passive and/or active assistance. Although this category may overlap every other category to some degree, the treatment of any given subject is generally superficial and nontechnical. For example, a "general information" brochure may mention the advantages of waste heat recovery, but not be sufficiently detailed to serve the needs of someone wishing to incorporate a waste heat recovery system.

The state programs:

- Develop instructional materials (e.g., brochures and packets),
- Distribute materials generated by the state or others,
- Promote energy conservation in various media,

- Cooperate with promotions by other organizations such as utilities and associations,
- Sponsor energy expositions or energy conferences,
- Promote "case studies" of successful conservation efforts,
- Sponsor awards programs for conservation achievements,
- Provide technical resources or services in response to telephone or letter requests,
- Promote and sponsor energy conservation curriculum in vocational institutes and colleges,
- Promote new energy conservation technologies, and
- Maintain a library of resource materials.

4.2.2 Industry Audits

The objectives of the state audit programs are first to identify energy conservation opportunities and, second, to evaluate the efficiency of implementing energy conservation measures. Industry participation in such an audit program is voluntary. In most cases, the industry audit programs are based on established commercial and institutional building audit programs. Consequently, much more emphasis is placed on building envelopes; heating, ventilating, and air conditioning systems; and lighting than on equipment and manufacturing processes.

The audit programs:

- Develop audit manuals, ranging from simple or generic to highly technical materials,
- Distribute materials on energy auditing,
- Train in-plant auditors,
- Train "qualified" independent auditors,
- Develop educational programs for training auditors,
- Sponsor "mini-audits" (do-it-yourself audits),
- Sponsor "maxi-audits" (detailed audit and evaluation by qualified auditor),
- Monitor and follow up audit programs, and
- Document audit program effectiveness and update programs when required.

4.2.3 Workshops/Seminars

Workshops and seminars generally focus on specific subject areas to identify and resolve problems, share experiences, or provide concentrated information. The states many develop their own program materials and leaders

or utilize expertise from industry, universities, the federal government, or various state agencies. The programs may be individual, repetitive, or continuing, with updated material provided in each successive meeting.

The range of subject areas includes:

- Energy management,
- Energy management through computer control,
- Combustion efficiency,
- Waste heat recovery,
- Energy conservation for small businesses,
- Boilers,
- Cogeneration,
- Industrial HVAC systems,
- Industrial lighting,
- Process conservation in primary metals,
- Process conservation in fabricated metals,
- Operation and maintenance techniques, and
- Life cycle costing.

4.2.4 Recycling of Waste Oil

The recycling of used motor oil and industrial oil for reuse as a lubricant or as a fuel was an initiative in several states. For convenience here, recycling of waste oil will be regarded as an industrial initiative that affects the refining industry and the consuming industry.

The state programs:

- Sponsor feasibility studies,
- Promote recycling and reuse of oil,
- Sponsor demonstration studies, and
- Develop regulations pertaining to motor oil recycling and reuse.

4.2.5 Utilization of Waste Materials

Materials such as glass, aluminum, paper and wood products, and plastics are being considered for use as waste products. The materials would be primarily used to refabricate their respective base materials, to fabricate new materials, or to provide fuel material. A secondary objective of some programs is to reduce the quantities of refuse requiring landfill disposal.

The state programs:

- Sponsor feasibility/economic studies,
- Promote the use of waste materials,
- Sponsor cooperative demonstrations, and
- Plan and develop regulations.

4.2.6 Boilers/Combustion Efficiency

It is recognized that steam boilers and other combustion-fired systems consume large quantities of industrial energy and are therefore excellent energy conservation targets. This category encompasses the burners, the combustion process, the exchange of heat (i.e., heat exchangers), boiler tubes or products, and alternative combustion systems (e.g., direct-fired vs fluidized-bed boilers).

Programs in this category:

- Promote combustion efficiency,
- Sponsor feasibility studies and research and development,
- Sponsor demonstrative projects, and educational programs,
- Write and distribute manuals for operator instruction, and
- Develop efficiency standards and other needed regulations.

4.2.7 Cogeneration

Cogeneration combines the onsite generation of electricity during either the "topping" or "bottoming" cycles of process heat or steam generation systems. The site may use the total generated electricity or may supply electricity to the electric utility system. Significant net energy savings may be realized from cogeneration systems when thermal and electric demands are properly balanced.

The cogeneration programs:

- Promote cogeneration,
- Sponsor policy studies,
- Sponsor technical evaluation of cogeneration technologies,
- Sponsor demonstration projects,
- Cooperate in intergovernmental coordination, and
- Develop needed regulations.

4.2.8 Energy-Related Regulations

This broad category provides for study and review of regulatory actions that may be used to stimulate energy conservation. Regulations to be considered could conceivably apply to the full spectrum of energy-related technologies and industries. Thus far, only a few states have considered or promulgated industrial energy regulations.

The state programs:

- Sponsor policy evaluations,
- Sponsor technological reviews, and
- Develop and enforce regulations.

4.2.9 Fuels Management

Closely related to energy conservation is the short- and long-term management of the supply and demand of fuels. Contingency or emergency planning, forecasting of supplies and demands of specific fuels, forecasting of fuel prices, and availability of alternative fuels (including renewable resources such as wood, agricultural fibers and solar) are included in this category.

The fuels management programs:

- Forecast economic and energy needs,
- Evaluate alternative fuel sources,
- Demonstrate alternative fuel sources,
- Sponsor energy-use reporting programs, and
- Evaluate policy.

4.2.10 Waste Heat Utilization

The potential for increased utilization of waste heat can be found in essentially all industrial endeavors. The uses of waste heat include direct return to the process, supply to other processes, space heating, and cogeneration of electricity.

The state programs:

- Promote waste heat recovery,
- Evaluate technologies,
- Sponsor demonstration projects,
- Develop literature/manuals, and
- Sponsor technology-transfer activities.

4.3 TARGETS OF STATE PROGRAMS

The industrial targets of the state programs vary greatly and have neither an apparent pattern nor a consistent direction. Many states have adopted a "broad-brush" approach with respect to the relative size and types of industries to be served. Others, however, have focused their major activities on specific target industries.

Large firms and energy-intensive industries, usually the predominant industries in a state, are identified as targets in a number of states. The rationale for focusing on these large industries includes their:

- Large potential energy savings,
- Impact on the state energy demand,
- Technical expertise necessary for implementation of conservation measures,
- Access to capital, and
- Management's interest in participating in conservation projects.

In short, many states seem to have reasoned that the large companies require less state effort per incremental Btu saved.

Other states, however, have elected to focus their efforts on a very large number of small businesses. It was believed that most large companies would implement energy-conserving measures, with or without state stimulation, because of their awareness of economic impacts and the availability of technical and financial resources. In contrast, small businesses need explicit information regarding conservation measures and technical support in their implementation. Although the magnitude of potential savings per small business is relatively low, the large number of such businesses provides a significant potential for savings in many states. Also, some states felt that without the cost savings associated with energy conservation, their small businesses would experience a competitive disadvantage.

Some states have identified specific industries as program targets and include within their programs various combinations of the "elements of the state programs" discussed in the previous sections. The relative magnitude of effort applied to the industry-specific programs included distributing brochures, preparing manuals, sponsoring workshop/seminars, conducting extensive technical studies, and funding demonstration programs. Specific industries served by at least one state program include:

- Textiles;
- Stone, clay, and glass;
- Food and food products (including meat processing and cheese manufacturing);
- Mining and milling (for both metals and minerals);
- Lumber;
- Industrial fats and oils;

- Construction machinery fabrication;
- Metal fabrication;
- Primary metals; and
- Rubber and plastics.

4.4 ADMINISTRATION OF STATE PROGRAMS

In implementing their respective programs, states use a number of approaches to augment the capabilities of their program personnel and, in some cases, to extend their financial resources. Wide ranges in technical and financial leverage are achieved. The states have obtained a wide variety of results (both successes and failures) using their various implementation approaches. It should be noted that SECP provided no administrative or implementation guidelines.

To augment the resources of their energy offices, the individual states may:

- Request supplemental funding from the state treasury,
- Develop cooperative programming with other state agencies (e.g., industrial commission, department of environmental protection, or department of natural resources),
- Develop cooperative programming with the U.S. DOE Energy Extension Service or other program offices,
- Cooperate with professional or trade associations and industrial companies,
- Negotiate contracts with consultants,
- Negotiate contracts with industrial companies,
- Cooperate with public, private, and federally owned utilities (e.g., Tennessee Valley Authority),
- Develop programs with vocational institutes, colleges, and universities,
- Use the services of the Service Corps of Retired Executives (SCORE), administered by the U.S. Small Business Administration,
- Use technical information and publications from other sources, and
- Use the services and resources of the DOE regional offices, national laboratories, and research centers.

4.5 COMMENTS RECEIVED FROM STATES CONCERNING SECP

The comments and needs submitted by the state energy offices that responded to the initial phase of this study are presented as they were

received without attempting to judge their appropriateness. The comments and needs have been divided into organizational, financial, and technical categories.

- Organizational comments and concerns:
 - Interest in what other states are doing (this was by far the most frequent comment),
 - Energy impacts of federal regulations and policies,
- Organizational need for:
 - Cross-fertilization of state program ideas through sharing of experiences,
 - Regional cooperative program planning and implementation,
 - Information on new energy-related federal legislation and regulations, and
 - Information on availability of federal support for state programs.
- Financial concerns:
 - Federal "big brother" approach to state programs,
 - Restricted federal funding levels for industrial programs and the unknown federal support after 1980,
- Financial need for:
 - Federal matching funds for industrial audits,
 - Federal funds for small-business-specific audit program, and
 - Federal financial assistance such as grants, low interest loans, or tax credits to help small-business industries implement energy-conserving measures.
- Technical information or support needs:
 - Industry-specific audit manuals,
 - Availability of proceedings of the many state-sponsored workshops and seminars,
 - Information on new energy-conserving technologies,
 - An industrial energy conservation center,
 - Federal demonstration and evaluation of new energy-conserving technologies,
 - A low-cost and universal method for evaluation of competitive energy conserving technologies, providing a basis for business decisions,
 - Detailed studies of energy conservation potential within specific industries,

- An industry program equivalent to the federal/state residential energy conservation service,
- Federal and state policy studies concerning conservation programs of large and small industrial firms,
- Technical assistance to state energy office personnel who are often not qualified to deal with the wide spectrum of high technologies, and
- Federal promotion of industrial energy conservation technologies and policies.

5 DISCUSSION OF FINDINGS

This study has provided an overview of the general magnitude and directions of state industrial energy conservation programs. Although the federal government has distributed approximately \$50 million to the states under EPCA/SECP, the states have had the freedom to develop their programs according to their perceived needs and resources. Based on information developed in the ANL survey of state energy offices, preliminary answers can be given to the three questions posed earlier:

"To what degree are the various segments of industry being addressed?"

- In aggregate, the SECP is providing a valuable service to the industrial sector by stimulating energy conservation.
- The study clearly shows that industries are not being served equally on a state-by-state basis. Significant differences are found with respect to industry type, industry size, and geographic location. Although some states may believe an industrial program is not warranted, the industries in other states are receiving benefits that may be reflected in their interstate competitive positions.
- Many of the state programs have not yet matured and therefore have not achieved their potential.

"What are the perceived needs of state energy offices with regard to industrial energy conservation?"

- It appears that coordination and cooperation in the planning and implementation of state programs would enhance the total SECP effort. This coordination could be usefully extended to other regulatory agencies that impact state energy use. This study also identifies informational needs for organizational matters, financial procedures, and planning.
- Financial assistance from the federal government for specific programs is generally perceived as desirable and required. Also, removal of existing financial uncertainty would improve planning procedures.
- There appears to be a need for technical support to the states in the analysis of energy conservation options and the dissemination of information.

"Are there problem areas common to state programs that should be addressed at the federal level?"

- There appears to be a need for federal stimulation of interstate coordination of state industrial conservation programs. Particular emphasis should be placed on nurturing the state role in individual and mutual programming and management.

- There appears to be a need for federal support of specific state programs to:
 - Assist with technical problems,
 - Evaluate and demonstrate energy conservation measures and technologies,
 - Establish an information and resource center,
 - Promote energy conservation approaches and technologies, and
 - Develop broad-based material and training aids for specific industries.

6 SUMMARY AND CONCLUSIONS

The state industrial energy conservation programs are an important segment of the national effort to conserve energy. However, many of the state programs are not as effective or efficient as they could be. As the results of this study indicate, the states perceive the need for federal assistance in programs to:

- Establish a forum for coordination of state programs and interchange of approaches and program materials,
- Provide to state offices direct technical assistance, including specific program information, training materials and manuals directed toward specific industries, and an energy accounting methodology,
- Promote national industrial energy conservation measures,
- Develop methods for providing financial assistance to companies, especially small business, for incorporating energy conserving measures,
- Devise a plan for coordinating the state energy-related regulatory activities, and
- Disseminate information on federal programs and regulations that may impact energy-related decisions at the state level and within private industry.

Several potential areas for further investigation have been identified in this study. These areas, which are subject to change or refinement after further analysis and discussion, will require studies that:

- Assess program planning, evaluate techniques used by state energy offices participating in SECP, and develop new methods as required,
- Evaluate in detail the effectiveness of specific programs on a state or regional level,
- Analyze additional energy use and conservation potential on a state-by-state basis by making use of existing data bases to determine industrial energy conservation potential for a state or region, and
- Assess possible federal roles in encouraging industrial energy conservation through state energy offices, including consideration of regional and national cooperative approaches.

This report presents only a preliminary investigation of industrial energy conservation programs in the states. A more detailed assessment of the needs of the state energy office, conducted in cooperation with state officials, can further define opportunities to improve these programs. This initial study has, however, pointed out clearly the value of pursuing further efforts to strengthen all state programs by learning from the experiences of each state.

Appendix A. Participation of States in EPCA Industrial Energy Conservation Programs and in This Study

State	Plans for EPCA, 1977	Continuation of Plans for EPCA through 1980	Responsive to This Study
Alabama	X	X	
Alaska	X	X	
Arizona	X	0	X
Arkansas	X	X	X
California	X	X	X
Colorado	X	0	X
Connecticut	X	X	
Delaware	X	X	X
District of Columbia	0	X	
Florida	X	X	
Georgia	X	X	
Hawaii	X	X	
Idaho	X	X	X
Illinois	X	X	X
Indiana	X	X	X
Iowa	X	X	X
Kansas	X	X	
Kentucky	X	X	X
Louisiana	X	X	X
Maine	X	X	X
Maryland	X	X	
Massachusetts	X	0	
Michigan	X	X	X
Minnesota	X	X	X
Mississippi	X	X	
Missouri	X	X	X
Montana	0	0	
Nebraska	X	0	
Nevada	X	X	
New Hampshire	X	X	X
New Jersey	X	X	X
New Mexico	X	0	X
New York	X	X	X
North Carolina	X	X	X
North Dakota	X	X	
Ohio	X	X	X
Oklahoma	X	X	X
Oregon	X	X	X
Pennsylvania	X	X	
Rhode Island	X	X	X
South Carolina	X	X	
South Dakota	X	X	X
Tennessee	X	X	X
Texas	X	X	
Utah	X	X	

Appendix A. (Cont'd)

State	Plans for EPCA, 1977	Continuation of Plans for EPCA through 1980	Responsive to This Study
Vermont	X	X	
Virginia	X	0	X
Washington	X	X	X
West Virginia	X	0	
Wisconsin	X	X	X
Wyoming	X	X	X
American Samoa	0	X	
Guam	0		
Puerto Rico	0	X	
Virgin Islands	0		

Appendix B. Summary of Program Funding and Energy Savings

State	ECPA/Industrial Budget, 1977-1980 ($\$10^3$)	Projected Energy Savings, 1980 (10^{12} Btu)	Projected Energy Savings, 1977-1979 (10^{12} Btu)
Alabama	818	63.1	39.7
Alaska	?	1.2	0
Arizona	--	--	--
Arkansas	515	71.3	57.6
California	463	0.3	0
Colorado	--	--	--
Connecticut	765	0	8.8
Delaware	0	1.2	0
District of Columbia	123	0.07	0.08
Florida	53	39.7	19.5
Georgia	2,150	72.1	23.9
Hawaii	97	1.0	2.5
Idaho	209	5.4	5.2
Illinois	1,344	7.6	0.1
Indiana	433	111.4	131.6
Iowa	140	0	0
Kansas	287	0.1	0
Kentucky	57	66.8	97.6
Louisiana	76	1.1	2.9
Maine	138	8.4	11.9
Maryland	743	4.7	2.4
Massachusetts	--	--	--
Michigan	946	102.3	0.4
Minnesota	182	36.8	20.7
Mississippi	407	18.7	0.5
Missouri	403	27.9	3.3
Montana	--	--	--
Nebraska	--	--	--
Nevada	0	0.06	0
New Hampshire	83	3.2	12.2
New Jersey	245	26.6	36.4
New Mexico	--	--	--
New York	634	16.5	0
North Carolina	668	62.7	27.9
North Dakota	118	1.1	0.05
Ohio	2,756	114.6	0.5
Oklahoma	176	14.1	6.7
Oregon	372	11.2	8.5
Pennsylvania	13,280	158	47
Rhode Island	210	3.6	5.3
South Carolina	1,504	22.6	2
South Dakota	11	0.7	0.06
Tennessee	9,879	40	57.3
Texas	2,149	283	78
Utah	157	14.1	8.6

Appendix B. (Cont'd)

State	ECPA/Industrial Budget, 1977-1980 (\$10 ³)	Projected Energy Savings, 1980 (10 ¹² Btu)	Projected Energy Savings, 1977-1979 (10 ¹² Btu)
Vermont	97	3.3	2.2
Virginia	--	--	--
Washington	287	3.9	0
West Virginia	--	--	--
Wisconsin	1,653	72.7	59.1
Wyoming	155	13	24.6
American Samoa	239	0.03	0
Puerto Rico	2,775	0	0
TOTAL (+Alaska?)	47,797	1,506	805

Source: Ref. 3.

Appendix C. Program Elements Initiated by States

Alabama	Workshops-boiler efficiency and audits Utilization of waste materials Recycle waste oil General information
Alaska	Waste heat utilization-demonstration Workshops General information
Arkansas	General information Workshops/seminars
California	Cogeneration-policy and regulatory Energy planning
Connecticut	Workshops/seminars-large industries General information/award program
Delaware	Recycle waste oil-data collection and regulations General information Utilization of waste materials-construct plant
District of Columbia	Recycle waste oil-study/regulations
Florida	General information
Georgia	Industry audits Workshops/seminars-textiles General information-glass, cement, clay products, stone and minerals, and chemicals Waste heat utilization Industry audits-13 SIC industries Fuel Management-study
Hawaii	General information
Idaho	General information Industry audits Energy-related regulations
Indiana	General information Industry audits
Illinois	General information Industry audits Recycle waste oil-promotions
Kansas	General information Utilization of waste materials
Kentucky	Industry audits General information
Louisiana	Energy-related regulations Utilization of waste materials-promotion

Appendix C. (Cont'd)

Maine	Workshops/Seminars Industrial audits General information
Maryland	Recycle waste oil-implementation
Michigan	General information-small business Industry audits Recycle waste oil-promotion Cogeneration-promotion Utilization of waste promotion
Minnesota	General information Workshops/seminars-boilers and general
Mississippi	General information Industry audits
Missouri	General information Industry audits
Nevada	Cogeneration-promotion and regulation
New Hampshire	Recycle waste oil-promotion Utilization of waste materials-promotion
New Jersey	Energy-related regulations-boilers Industry audits Utilization of waste materials-promotion
New York	Fuels Management-wood demonstration Cogeneration
North Carolina	General information Industry audits Workshops/seminars-energy management
North Dakota	Workshops/seminars General information
Ohio	Waste heat utilization-demonstration Boiler combustion efficiency-demonstration Recycling of waste oil-demonstration Utilization of waste materials General information
Oklahoma	General information Workshops/seminars Industry audits
Oregon	General information-studies Workshops/seminars Energy-related regulations
Pennsylvania	Recycling of waste oil Utilization of waste materials-state-wide program General information-technical assistance and awards program Energy-related regulations-cogeneration

Appendix C. (Cont'd)

Rhode Island	Workshops/seminars-small business
South Carolina	General information-studies on textiles, Fuels management
South Dakota	Energy-related regulations-boilers
Tennessee	General information Industry audits Workshops/seminars
Texas	General information Workshops/seminars-training of auditors, industry specific seminars
Utah	General information Industry audits Recycle waste oil - promotion
Vermont	Fuel management-wood promotion
Washington	General information Workshops/seminars Industry audits
Wisconsin	Recycle of waste oil-demonstration Industry audits Boiler/combustion efficiency-promotion Fuels management Cogeneration-study
Wyoming	Workshops/seminars
American Samoa	Workshops/seminars General information
Puerto Rico	General information Fuels management

^aTitles of program elements may have been changed to correspond to uniform format.

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