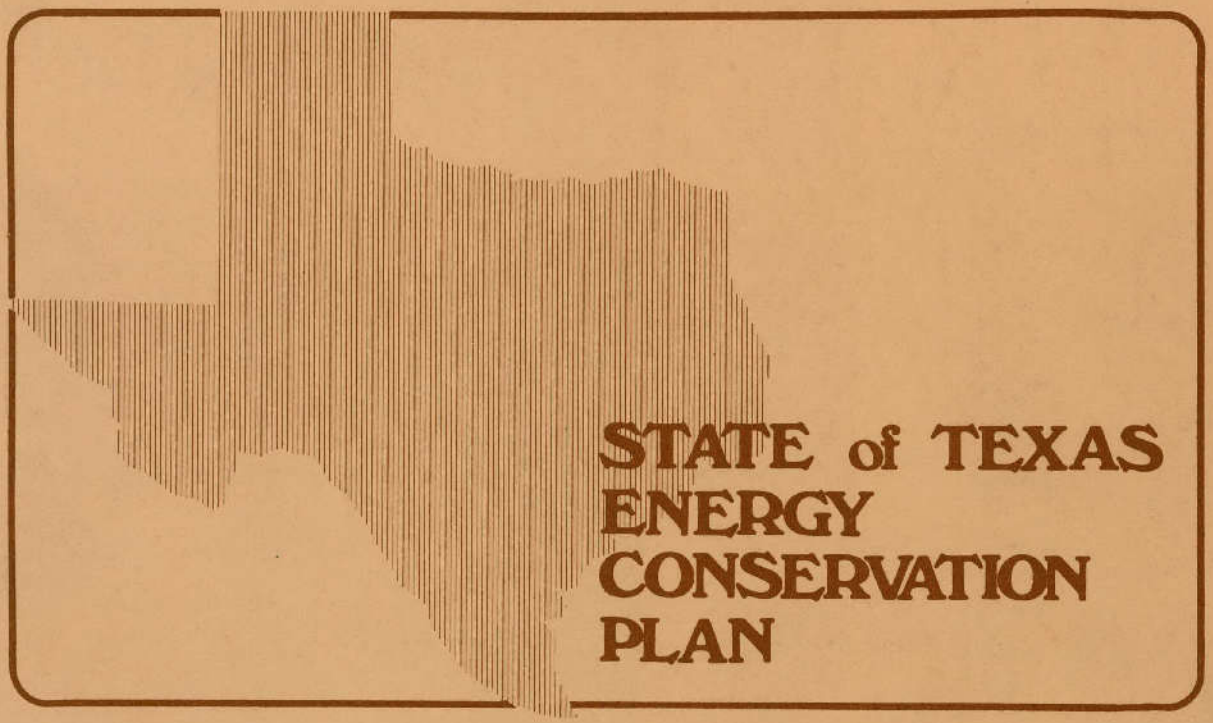

STATE of TEXAS ENERGY CONSERVATION PLAN

VOLUME II - PLAN REPORT

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STATE of TEXAS
Energy Conservation Plan

JUNE 1977

VOLUME II - PLAN REPORT

THE GOVERNOR'S OFFICE OF ENERGY RESOURCES

Dolph Briscoe, Governor

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STATE of TEXAS

Energy Conservation Plan

JUNE 1977

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Advisory Committee

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Introduction

INTRODUCTION

For many, the State of Texas used to bring to mind images of oil wells pumping an endless supply of "black gold." It was the land of cheap and abundant energy -- enough for all, forever.

But those images are now a thing of the past. Domestic oil and gas supplies have been steadily declining at about six (6) percent a year and estimates indicate that this resource will be largely depleted by the turn of the century.

These once cheap and abundant resources now have turned expensive and scarce at a time when the nation relies on them for more than seventy-five (75) percent of its energy needs.

In Texas, the reliance is much greater. Oil and gas supply over ninety-five (95) percent of our energy. Even more critical is the dependence of electric utilities in the state on natural gas for more than ninety (90) percent of their fuel. These dwindling resources are the mainstay of the State's economy. One out of every eighteen (18) Texas workers is directly employed by the petroleum industry, and the industry pays about twenty-one (21) percent of all state taxes.

Faced with oil and gas production declines, the state has begun a rapid conversion program to coal. The Texas Railroad Commission has ordered that the use of natural gas as a boiler fuel be substantially curtailed by 1985.

Conversion on such a vast scale will require time and money. The capital requirements, though greater by several orders of magnitude than historic investment trends, could be generated over a period of time. Unfortunately, even if unlimited resources were available, conversion would still require many years.

To a significant extent, the time needed to develop and convert to alternate energies can be provided by conservation strategies.

Conservation does not mean doing without, a regression to a spartan existence. As conceived in its relation to the Texas plan, conservation refers to an increase in productive output per unit of energy consumed, or simply an increase in the efficiency of energy use. According to the Federal Energy Administration (FEA), Texas consumed more than seven (7) quadrillion BTU's (quads) in 1975. If historic growth trends continue and efficiencies are not improved, FEA estimates that Texas' consumption could surpass 9.4 quads in 1980.

In Texas there is a large potential for energy saving. Energy costs have risen sharply in the last few years, spurring some conservation efforts, but much remains to be done. Table 1 summarizes current energy consumption patterns and potentials for conservation.

TABLE 1

ENERGY CONSUMPTION AND CONSERVATION POTENTIAL
(1975)

CONSUMER	% OF TOTAL	POTENTIAL SAVING (% of Sector)
Industry	46.0	10-20
Agriculture	2.3	15-20
Transportation	26.3	25-35
Residential	16.9	20-30
Commercial	8.5	30-40

It should be noted that the figures given in Table 1 are theoretical maximums and do not necessarily apply to the limited time frame addressed in this plan (1977-80). In fact, Congress recognized this when it set the goal for an overall national improvement of five (5) percent by 1980.

To accomplish this task, it asked each state to develop its own conservation plan so that unique economic, regional and climatic differences among the states could be addressed and resolved.

To achieve its portion of the national saving, Texas proposes to develop and implement programs dealing with industry, agriculture, transportation, commercial and residential users, purchasing policies, local governments, and the public schools. The savings and costs of program measures are outlined in Table 2.

TABLE 2

ESTIMATED SAVINGS AND COSTS OF PROGRAM MEASURES

PROGRAM MEASURE	ESTIMATED SAVINGS (Trillion BTU)	(%)	ESTIMATED COST ($ million)	COST-BENEFIT ($/million BTU)
Thermal and lighting standards	5.66	0.06	11.9	2.10
Vanpool-carpool	0.42	0.00	0.2	0.48
Government purchasing	0.18	0.00	0.1	0.56
Industrial processes	271.69	3.04	2.2	0.01
New commercial buildings	9.11	0.10	0.7	0.08
Existing commercial buildings	48.33	0.54	1.0	0.02
New residential buildings	7.93	0.09	0.6	0.08
Existing residential buildings	104.25	1.17	6.5	0.06
Agriculture	10.95	0.12	0.4	0.04
Local energy conservation	12.12	0.14	1.7	0.14
Public schools	22.05	0.25	1.8	0.08
Coordination and monitoring	-	-	1.2	-
	492.69	5.51	28.3	0.06

In general, programs proposed under this plan take the form of encouraging a voluntary improvement in efficiency rather than mandatory requirements for conservation.

First, Texans have historically relied on individual initiative and free market economics to effect needed changes. Conservation of energy is particularly suited to this approach. Virtually all conservation decisions require analysis of the individual energy application. Individual initiative rather than government regulation is, therefore, both the most desirable and the most cost effective method of insuring that the maximum amount of energy is conserved. To assist in this process, the State has a responsibility to insure that these individual energy use decisions are based upon sound technical and economic grounds. Many of the

program measures outlined in the plan endeavor to provide the energy user with factual, current information on which to base his decisions.

A second and more pragmatic reason for leaning toward voluntary energy conservation programs is the simple fact that the Texas Legislature will not meet again until 1979. As an initial step in the planning process, mandatory elements were considered. Upon examination of these elements, it was determined that even if many mandatory requirements were enacted in 1979 (measures enacted by the 1979 Legislature would become law in September, 1979), the brief time for implementation (1½ years) would preclude any significant energy savings before the end of this program. Consequently, legislated programs other than the required lighting and thermal efficiency standards are not proposed under this plan.

The designation of a lead agency responsible for the implementation of each program element was made after a careful review of each agency's legislated authority and technical capability to oversee a given program. Much of the responsibility for implementation has been assigned to the Governor's Office of Energy Resources primarily because of the flexibility and latitude of that office. However, the lead agency is responsible for overseeing a program measure, and not for performing all the tasks involved. Therefore, state universities, professional organizations, and agencies not specifically listed will play a significant role in technical and advisory capacities.

If the Texas economy is to continue to grow and prosper, energy conservation - especially conservation of oil and gas - is vital. The incentives to conserve already exist. When combined with a vigorous effort to provide users with concise and meaningful information, these incentives should cause the citizenry of the state to meet the goals outlined in the State Energy Conservation Plan.

Budget

BUDGET SUMMARY

	SECP FUNDS					
	1977	1978	1979	1980	SECP TOTAL	OTHER TOTAL
Thermal	87,100	33,000	98,070	15,400	233,570	5,600,000
Lighting	87,650	63,000	166,425	118,800	435,875	5,600,000
Vanpools	17,300	68,700	32,655	11,660	130,315	79,400
Purchasing	43,800	32,800	12,285	16,720	105,605	4,800
Industry	198,000	556,000	408,425	421,800	1,584,225	536,950
New Commercial	60,400	168,550	115,190	65,380	409,520	280,500
Existing Commercial	52,950	203,750	182,450	159,600	598,750	401,400
New Residences	56,000	189,250	137,825	144,375	527,450	112,500
Existing Residences	138,550	809,750	829,140	832,260	2,609,700	3,866,600
Agriculture	55,000	90,000	94,500	99,000	338,500	35,000
Local	261,000	320,000	336,000	352,000	1,269,000	403,900
School	264,000	261,700	332,535	419,320	1,277,555	537,100
Coordination	146,000	267,000	280,350	315,700	1,009,050	214,000
TOTAL	1,467,750	3,063,500	3,025,850	2,972,015	10,529,115	17,722,150

Required Programs

THERMAL STANDARDS

Objective

To conserve 4.29 trillion BTU's of energy in 1980 (0.05 % of Texas' 1980 projected consumption) through mandatory thermal efficiency standards for new and renovated buildings.

Narrative

Historically, buildings designed and built in the United States have given minimum attention to energy considerations.

In the past energy costs associated with building operation could be relegated to a position of secondary importance.

Today, however, rising energy costs dictate that energy considerations play a more important role in building design.

One method of insuring that buildings become more "energy conscious" is to impose minimum thermal efficiency standards for new construction.

At the national level, several efforts are underway to promote such standards. Texas, however, does not currently have such a standard on a statewide basis. Instead, cities in Texas have been delegated the authority to regulate construction standards. Currently, approximately ninety (90) percent of the 1,034 incorporated cities in Texas have some form of local building code. Texas law allows cities to include thermal efficiency standards as a part of their locally adopted code. This same article also directs the State Building Commission to prepare a model standard for consideration by local authorities.

In addition to the model code language being prepared by the State Building Commission, several national and regional code organizations have prepared model code language.

The National Conference of States on Building Codes and Standards (NCSBCS) has published a "Model Code for Energy Conservation in New Building

Construction." This draft document is currently being reviewed. Both the International Conference of Building Code Officials and the Southern Building Code Congress have included thermal efficiency language as an appendix to their model codes. The Building Officials and Code Administrators International has included thermal efficiency language as a part of its model code.

The federal government has also shown recent interest in this area. The Energy Policy and Conservation Act (PL 94-163) encourages states to adopt statewide thermal efficiency standards for new and renovated buildings. In addition, the Energy Conservation and Production Act (PL 94-385) directs the Department of Housing and Urban Development to work with the Energy Research and Development Administration to develop a performance standard approach to regulation of thermal efficiency in new building construction.

In addition to activities to develop model codes, there are also several efforts to train local personnel in the enforcement of the new codes. NCSBCS is currently developing a four day training course. When fully developed in late 1977, NCSBCS intends to train one person from each state in the conduct of its course. Texas A&M's Engineering Extension Service has an on-going program to train local code enforcement personnel across the State.

To effectively implement this program measure, the state must complete three major tasks:

1. Pilot test available code language in Texas cities,

2. Select the best single code or portions of several codes for adoption statewide, and

3. Effectively train local enforcement personnel in the use of the state standard.

Since the Legislature will not meet again until 1979, activities during 1977 and 1978 would be limited to those that can be conducted with existing authority. The Governor's Office of Energy Resources, as the lead agency, would work with local governments to pilot test mandatory thermal efficiency standards, evaluate the success/usefulness of the various mechanisms tested and of other programs conducted nationwide, draft necessary implementing legislation for presentation to the 66th Legislature, and train local personnel to enforce the standards.

Pilot Tests

The Governor's Office of Energy Resources would collect and evaluate existing thermal efficiency standards. The results of this evaluation would be presented to local officials in a series of twenty-four (24) regional meetings. From cities expressing interest in adopting local thermal efficiency

standards, the Governor's Office would select six (6) cities of various sizes to work with the state in the pilot test program.* Local code officials in these cities would receive instruction on the enforcement of the model code. In return, the locality would provide the state with information on the effectiveness of the code and on any problems with its interpretation or enforcement.

State Standards

As a result of the experiences of the pilot test cities and the experiences of other localities and states, the Governor's Office would draft state standards for presentation to the 66th Legislature. It should be noted that such standards would not necessarily be enforced by the state government, but could be enforced at a more local level.

Education and Training

Once the state standards are adopted, the Governor's Office would host another series of twenty-four (24) regional meetings to inform local officials of their role in the enforcement of the new standards. It would also develop and implement a systematic training program to insure that local code personnel are thoroughly familiar with the standard. This training program would be coordinated with the NCSBCS and Texas A&M programs.

The Texas Department of Community Affairs would act in a support role by insuring that the Governor's Office is kept informed of the activities of the national model code organizations.

This program measure would be monitored by comparing the number of cities participating in the pilot tests with program milestones.

Advisory Committee

To assist the Governor's Office in the evaluation of thermal standards and implementation of this program measure, a technical advisory committee representing the various affected parties would be established.

Milestones

3rd Quarter, 1977

Collect and publish information on the current status of "off the shelf" thermal efficiency codes. (This activity should be done in conjunction with a similar activity for lighting standards.)

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* In addition to the six pilot test cities, all cities would be encouraged to adopt thermal standards. Implementation of the standards would be monitored but no special funding would be available for training of enforcement personnel.

Appoint advisory committee.

4th Quarter, 1977

Evaluate any code language currently available for compatibility with ASHRAE 90-75 Sections 4-9, and relevance to Texas conditions.

Develop the agenda, set the locations, prepare materials and invitations for local meetings and training courses to be held during 1978.

1st Quarter, 1978

Host a series of twenty-four (24) meetings with local officials.

Select six (6) cities for pilot testing of available thermal efficiency standards.

2nd Quarter, 1978

Conduct six (6) training sessions* of approximately one week for code officials in cities selected as pilot test sites.

Work with local officials to insure the adoption of the selected thermal efficiency standards.

3rd Quarter, 1978

Monitor pilot projects.

4th Quarter, 1978

Collect additional data on effectiveness of any national efforts and evaluate the effectiveness of the various approaches tested in Texas.

Draft necessary implementing legislation.

1979

Develop and host a second series of twenty-four (24) meetings with local officials to apprise them of legislative action, and of their options as to local thermal efficiency standards.

Develop and host a program to train local code enforcement officials.*

1980

Continue the training and monitoring program.

Draft any necessary amendments to the standards for presentation to the 67th Legislature.

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* This activity would be coordinated with NCSBCS training program currently under development and with Texas A&M's short course for local code enforcement personnel.

Budget

Year	SECP Funds	Other Funds	Total
1977	$ 87,100	$ -0-	$ 87,100
1978	33,000	-0-	33,000
1979	98,070	-0-	98,070
1980	15,400	5,600,000	5,615,400
	$233,570	$5,600,000	$5,829,570

1977 — TOTAL $87,100

Standards Development

Collect and evaluate existing standards - 6 man months	21,000
Set up advisory group	0*
Schedule meetings with local officials	0*
Prepare materials for meetings, $15/person x 100 persons/meeting x 24 meetings	36,000
	57,000

Training of Enforcement Personnel

Collect and evaluate materials 2 man months	7,000
Develop course and materials 6 man months	21,000
Produce materials for pilot program - $35/person x 10 persons/course x 6 courses	2,100
	$30,100

1978 — TOTAL $33,000

Standards Development

Staff for 24 meetings	0*
Travel for 24 meetings	0*
Speaker fees @ $100/meeting x 24 meetings	2,400

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* Included in lighting standards budget.

Travel for follow-up @ $300/trip x 12	3,600
Pilot project evaluation and legislative drafting 3 man months	10,500
Local reporting	3,000
	19,500

Training for Enforcement Personnel

Staff for 6 courses 3 man months	10,500
Travel for 6 courses @500/course	3,000
	13,500

1979 TOTAL $98,070

Standards Development

Schedule 2nd series of meetings	0*
Prepare materials for meetings $15/person x 100 person/meeting x 24 meetings	36,000
Staff for 24 meetings	0*
Travel for 24 meetings	0*
	36,000
	x 1.05 (inflation)
	37,800

Training of Enforcement Personnel

Evaluation and revision of pilot courses - 2 man months	7,000
Preparation of materials for 1979 and 1980 training courses - $35/person x 20 persons/course x 72 courses	50,400
Scheduling of courses for 1979/80 - 2 man months	0*

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* Included in lighting standards budget.

Staff for 1979 courses - 12 man months	0*
Travel for 1979 courses @ $500/course x 24	0*
Coordination and monitoring 3 man months @ $3,500	
	57,400
	x 1.05 (inflation)
	60,270

1980 TOTAL $15,400

Standards Development

Monitor program and draft amendments for presentation to 67th Legislature - 4 man months	14,000
	x 1.1 (inflation)
	15,400

Training of Enforcement Personnel

Staff for 1980 courses - 24 man months	0*
Travel for 1980 courses @ $500/course x 48	0*

Enforcement of Standards

Local Inspection fees @ (0.1% of construction value)	(5,600,000)
	0

Energy Savings

FEA methodology has been used to calculate energy savings due to the thermal efficiency standards program. This program is estimated to save 4.29 trillion BTU's representing 0.05 percent of projected 1980 consumption.

* Included in lighting standards.

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LIGHTING STANDARDS

Objective

To conserve 1.37 trillion BTU's of energy in 1980 (0.02 % of Texas' 1980 projected consumption) through mandatory lighting standards for new public buildings.

Narrative

Lighting is a significant energy consumer that is common to nearly all sectors of our society. In the past, matching lighting levels to the amount necessary for the task was, like increasing thermal efficiency, not considered to be an area of great concern. Energy was cheap, and the cost of improved design was not economic. Today of course, energy considerations must play a more important role in building design.

Adoption of lighting standards for all newly constructed buildings is one method of insuring that more attention be given to this area.

For very large buildings, there may be justification for requiring upgrading of lighting to the new standards.

Like thermal standards, lighting standards have received attention at the national level. National code organizations and federal agencies are working to develop model lighting codes.

The Energy Policy and Conservation Act (PL94-163) encourages states to adopt lighting standards for public buildings.*

Since Texas does not currently have a statewide lighting standard, the major tasks required to implement this program measure are essentially the same as those required for the Thermal Efficiency

* Includes all buildings open to the public, not just publicly owned buildings.

Standards Program. There are, however, two additional considerations:

1. Model lighting standards are not as advanced as model thermal standards, and

2. Lighting standards must apply to existing as well as new buildings.*

Since the Texas Legislature will not meet until 1979, activities during 1977 and 1978 would be limited to those that can be conducted under existing authority.

Lead responsibility for implementation of this program measure would be assigned to the Governor's Office of Energy Resources. As lead agency, the Governor's Office would work with cities to pilot test the various approaches to implementing lighting standards, evaluate the effectiveness of these programs and of other programs conducted nationwide, draft the necessary implementing legislation for presentation to the 66th Legislature, and train local personnel to enforce the standards.

Pilot Tests

The Governor's Office of Energy Resources would collect and evaluate existing materials dealing with lighting standards. If necessary, it would develop model code language for lighting standards, and would prepare an analysis of methods of applying standards to existing public buildings.

This material would be presented to cities in a series of twenty-four (24) regional meetings (these meetings would be held concurrently with the thermal standards meetings). Six (6) cities would be selected to work with the Governor's Office in pilot testing lighting standards.** Cities would be provided with training for code officials and with technical assistance in implementing the standards. In return, the cities would provide the Governor's Office with information as to the standards' effectiveness and on any difficulties encountered in enforcing the standards. Special attention would be given to the problem of applying such a standard to existing buildings.

State Standards

After evaluating the experience of the pilot tests and of other cities and states in the area of lighting standards, the Governor's Office of Energy Resources would develop state lighting standards for presentation to the 66th Legislature. Like the thermal standards, these could include a local enforcement option.

* Requirement of PL94-163.

** In addition to the six pilot test cities, all cities would be encouraged to adopt local lighting standards. Implementation of the standards would be monitored, but no special funding would be available for training enforcement personnel.

Education and Training

Once the State Standards are adopted, the Governor's Office would develop and implement a second series of twenty-four (24) regional meetings. The meetings, which would be held in conjunction with the thermal efficiency standards meetings, would provide local officials with the current status of state lighting standards and would explain their role in the implementation of the standards. The Governor's Office would also develop and implement a systematic training program for standards enforcement personnel. This program would run concurrently with the thermal standards training programs and would be coordinated with the National Conference of States on Building Codes and Standards (NCSBCS) and Texas A&M training programs.

Support for this program measure would primarily involve two additional agencies - the Texas Department of Community Affairs and the Public Utilities Commission. Community Affairs would insure that the Governor's Office remain apprised of the activities of the National Conference of States on Building Codes and Standards. The Public Utilities Commission would insure that the Governor's Office be kept informed of changes to utility rate designs which would affect the implementation of lighting standards.

Advisory Committee

To assist the Governor's Office in the evaluation of lighting standards and implementation of this program measure, a technical advisory committee representing the various affected parties would be established.

Milestones

3rd Quarter, 1977

Collect information on "off the shelf" lighting standards that are currently available and identify standards under development.

Begin development of an approximately four-day training course for local enforcement personnel.

Appoint advisory committee.

4th Quarter, 1977

Evaluate available standards for consistency with ASHRAE 90-75 Section 9, and relevance to Texas conditions (if necessary, develop model code language).

Finalize the agendas, invitation lists, locations and materials for a series of local information meetings and for the initial training courses.

1st Quarter, 1978

Host a series of twenty-four (24) meetings with local officials.

Select six (6) cities for pilot testing of lighting standards.

2nd Quarter, 1978

Work with the selected pilot cities to adopt lighting standards.

Conduct training sessions for code enforcement personnel in the six (6) pilot cities.

3rd Quarter, 1978

Monitor implementation of the pilot city programs.

Resurvey national efforts in the area of lighting reduction.

4th Quarter, 1978

Complete evaluation of the pilot city programs.

Draft the State Code for presentation to the 66th Legislature.

1979

Develop and host a second series of twenty-four (24) meetings to inform local officials of legislative actions and of their options as to local lighting standards.

Conduct twenty-four (24) training programs for enforcement officials.

1980

Continue training of local code enforcement personnel (host forty-eight courses).

Draft any necessary amendments to the code for presentation to the 67th Legislature.

Budget

Year	SECP Funds	Other Funds	
1977	87,650	-0-	87,650
1978	63,000	-0-	63,000
1979	166,425	-0-	166,425
1980	118,800	5,600,000	5,718,800
TOTAL	435,875	5,600,000	6,035,875

1977 TOTAL $87,650

Standards Development

Data collection and evaluation 6 man months	21,000
Establish advisory group - ½ man month	1,750
Schedule meetings - 1 man month	3,500
Prepare materials for meeting $15/person x 100 persons/ meeting x 24 meetings	36,000
	62,250

Training of Enforcement Personnel

Collect and evaluate materials 2 man months	7,000
Develop course and materials - 5 man months	17,500
Prepare materials for pilot training program - $15/person x 10 persons/course x 6 courses	900
	25,400

1978 TOTAL $63,000

Standards Development

Staff for 24 meetings - 6 man months	21,000
Travel for 24 meetings @ $350/meeting	8,400
Speaker fees @ $100/meeting x 24	2,400
Travel for follow-up @ $350/ trip x 12	4,200
Pilot project evaluation and legislative drafting - 3 man months	10,500
Local reporting 6 @ $500	3,000
	49,500

Training of Enforcement Personnel

Staff for 6 courses - 3 man months	10,500
Travel for 6 courses @ $500/ course	3,000
	13,500

1979 TOTAL $166,425

Standards Development

Schedule 2nd series of meetings 1 man month	3,500
Prepare materials for meetings $15/person x 100 persons/ meeting x 24 meetings	36,000
Staff for 24 meetings - 6 man months	21,000
Travel for meetings @ $350/ meeting x 24 meetings	8,400
	68,900
	x 1.05 (inflation)
	72,345

Training of Enforcement Personnel

Evaluation of pilot courses and revision - 2 man months	7,000
Preparation of materials for 1979 and 1980 courses - $15/person x 20 persons/course x 72 courses	21,600
Scheduling of courses for 1979/ 80 - 2 man months	7,000
Staff for courses in 1979 - 12 man months	42,000
Travel for courses in 1979 @ $500/course x 24	12,000
	89,600
	x 1.05 (inflation)
	94,080

1980 TOTAL $118,800

Training of Enforcement Personnel

Staff for courses in 1980 - 24 man months	84,000
Travel for courses in 1980 @ $500/course x 48	24,000
Enforcement of Standards (local inspection fees @ 0.1% of construction value)	(5,600,000)
	108,000
	x 1.1 (inflation)
	118,800

Energy Savings

FEA methodology has been used to calculate energy savings due to the mandatory lighting standards program measure. The methodology was applied only to buildings constructed after this program measure goes into effect. Credit for energy savings in buildings existing as of the end of 1977 has been taken under the optional program measure for existing commercial and residential structures. This program will save 1.37 trillion BTU's, which represents 0.02 percent of projected consumption in 1980.

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VANPOOL - CARPOOL

Objective

To conserve 0.42 trillion BTU's of energy in 1980 (less than 0.01 % of Texas' 1980 projected consumption) by promoting the increased use of vanpools/carpools.

Narrative

Conservation efforts in the transportation sector have been underway in Texas for several years. Carpool promotion efforts began in early 1974 in the state's major metropolitan areas, San Antonio, Fort Worth, Houston and Dallas, and these efforts are being continued. Vanpool programs of large corporations such as Conoco and Texas Instruments are quite successful. Park and ride lots have already been established in several metropolitan areas. A contraflow lane for buses is to begin operation on an eight mile freeway corridor in Houston by early summer. Mass transit services have been upgraded by state funds. Federal programs and requirements such as those of the Department of Transportation and the Environmental Protection Agency continue to assist the conservation effort. The Community Services Administration, municipal governments, metropolitan planning organizations, and other public as well as private groups have encouraged energy conservation in transportation.

The SECP does not need to duplicate conscientious and effective transportation conservation efforts already underway. In the areas of carpooling and vanpooling, however, a significantly greater savings can be realized by a statewide effort. Carpooling efforts in metropolitan areas other than those with existing carpool programs will not likely yield savings commensurate with effort as a metropolitan, centrally coordinated independent program. The carpool effort will consequently be coordinated with the vanpool program.

Vanpooling is a ride-sharing concept pioneered by the 3M Company in St. Paul, Minnesota. Vanpooling is an extension of the carpooling concept in

that carpools can accommodate up to five (5) passengers whereas vans accommodate from eight to fifteen (8-15). Carpools often alternate drivers and cars, but a vanpool has a designated driver responsible for keeping records, charging passengers, and maintaining the van. The practice of vanpooling has greatest promise with establishments having a large number of employees.

The vanpool-carpool program measure would be implemented by voluntary participation of commuters in vanpools and carpools promoted and coordinated through the Governor's Office of Energy Resources, with assistance from the Texas Department of Highways and Public Transportation. The program measure would be coordinated with the Federal Energy Administration vanpool workshop efforts and the metropolitan carpool programs in operation in order to avoid repetition or overlapping of efforts. The vanpool operating experience of large and small organizations in the state will be reviewed as possible models of vanpool implementation. The experience of metropolitan carpool organizers will be drawn upon to aid the carpool program development.

The Governor's Office of Energy Resources, as lead agency, would be responsible for developing three series of twenty-four (24) workshops each, co-hosted by the state's twenty-three (23) Metropolitan Planning Organizations. (The Houston-Galveston area MPO will host two workshops.) The first series of workshops would involve municipal, civic, community, public interest, and state groups representing all local interests.

The purposes of the first workshop series are (1) to review briefly the State Energy Conservation Program, (2) to enlist the participation of local groups in the implementation of the vanpool-carpool program, (3) to select a local program coordinator, and (4) to identify all major employers, industries, manufacturers, and facilities in the area. The real success and continuation of vanpool-carpool efforts is strongly dependent on local participation and involvement.

In the second series of twenty-four (24) workshops, organized and scheduled in cooperation with local program coordinators, management and financial representatives from all major employers, state agencies and universities, and large facilities will be invited. The experience and materials developed by the Federal Energy Administration for vanpool workshops will be drawn upon, as will the carpooling efforts and experience of the state's major metropolitan areas.

Topics covered in the workshop will be:

Vanpool Methods

1) Vanpool definition
2) Vehicle type and characteristics
3) Vehicle ownership
4) Special service vanpool operations
5) Multiple employers/drivers

Vanpool Costs and Benefits
1) Van costs
2) Benefits
   a) Social
   b) Recreational
   c) Environmental
   d) Community
   e) Employer

Vanpool Problems and Solutions
1) Organization and management
2) Routing and scheduling
3) Driver selection
4) Records and fare collection
5) Legal problems
6) Insurance problems

Carpool Matching Methods
1) Collecting information
2) Matching data
   a) Manual
   b) Computerized
3) Distributing information

Carpool Cost-related Incentives
1) Parking costs
2) Automobile ownership cost
3) Automobile operating costs

Convenience Incentives
1) Preferential parking space allocation
2) Facilities for carpoolers
3) Adjustments to working hours
4) Vehicle restriction
5) Parking restriction
6) Legislative

In addition to the workshops, the Governor's Office of Energy Resources would host two seminars at the end of the second and third workshop series, in 1979 and 1980. The seminars will enable program coordinators to compare the relative effectiveness of local programs, and to share the experience of each year's efforts. Program materials and implementation strategy will be revised as necessary.

The goal of the vanpool program is to establish 1,500 vanpools in the state by 1980. The carpool program goal is to effect a .2% increase in carpooling by 1980 in those areas not currently served by the metropolitan carpool programs.

Monitoring of program effectiveness will be accomplished through summary reports submitted by local program coordinators.

Milestones

3rd Quarter, 1977

Collect and evaluate existing materials.

Investigate legal, regulatory, and insurance considerations.

Develop agenda, identify participants, print materials, and schedule workshops (series IW).

4th Quarter, 1977

Co-host the first eight (8) workshops (IW) with MPO's.

1st Quarter, 1978

Schedule and co-host sixteen (16) workshops (IW) with MPO's.

2nd Quarter, 1978

Identify participants and schedule second workshop series (IIW).

Co-host eight (8) workshops (IIW).

3rd Quarter, 1978

Co-host eight (8) workshops (IIW).

4th Quarter, 1978

Co-host eight (8) workshops (IIW).

1979

Host seminar for local program coordinators.

Schedule and co-host third series (IIIW) of workshops.

1980

Host seminar for local program coordinators.

Final program evaluation.

Budget

Year	SECP Funds	Other Funds	Total
1977	$ 17,300	$ 800	$ 18,100
1978	68,700	28,200	96,900
1979	32,655	26,400	59,055
1980	11,660	24,000	35,660
TOTAL	$130,315	$79,400	$209,715

1977 TOTAL $1 ,300

Collect and evaluate data, prepare materials, schedule workshops (IW) - 3 man months 10,500

Materials production for 8 workshops (IW) @ $20/person x 25 participants 4,000

Travel @ $350/workshop x 8 workshops (IW)	2,800
Meeting rooms (local donation)	(800)
	10,300

1978	TOTAL	$68,700
Schedule remaining 18 workshops (IW) - 3 man months		10,500
Materials production for 18 workshops (IW) @ $20/person x 25 participants		9,000
Travel @ $350/workshop x 18 workshops (IW)		6,300
Prepare materials, schedule workshops series II (IIW) - 3 man months		10,500
Materials production for 24 workshops (IIW) @ $20/person x 50 participants		24,000
Travel @ $350/workshop x 24 workshops (IIW)		8,400
Meeting rooms (local donation)		(4,200)
Program coordination - 24 man months (local donation)		(24,000)
		68,700

1979	TOTAL	$32,655
Schedule series III workshops, seminar for local coordinators - 1 man month		3,500
Travel to seminar @ $150 x 24 participants		3,600
Materials production for 24 workshops @ $20/person x 50 participants		24,000
Program coordination - 24 man months (local donation)		(24,000)
Meeting rooms (local donation)		(2,400)
		31,000
		x 1.05 (inflation)
		32,655

1980	TOTAL	$11,660
Schedule seminar for local coordinators - 1 man month		3,500
Travel for 24 coordinators @ $150/ person		3,600
Preparation of final report, program evaluation - 1 man month		3,500
Program coordination (local donation)		(24,000)
		10,600
		x 1.1
		11,660

Energy Savings

Data for the FEA methodology for computing energy savings due to vanpools could not be obtained, so a slightly different methodology has been developed. The basic FEA formula has been used; however, different approaches have been used to estimate the necessary parameters. The required parameters are the number of vanpools, number of autos replaced by one vanpool, gallons per day used by the average auto, average trip length and a factor from Table A of the Sourcebook vanpool methodology.

The number of autos replaced by one vanpool was calculated by dividing the number of commuters per van by average auto occupancy. Gallons per day used by an average auto was calculated as the weighted average trip length in cities of various sizes divided by miles per gallon for an average automobile. The number of vanpools was determined by multiplying the number of firms in each of two size categories by estimated compliance ratio by the estimated average number of vanpools formed per firm. This gave 1,500 vanpools saving 7,950 gallons per day. This represents 0.25 trillion BTU's per year.

Data for the FEA methodology for computing energy savings due to carpools could not be obtained, so a slightly modified methodology has been developed. This methodology is described in detail in the appendix. Very generally, the approach consists of computing the gallons of gasoline saved per day in cities in two size categories (250,000-500,000 population and those under 250,000). Gallons saved per day is equal to the number of carpools formed multiplied by the gallons saved per carpool per day. Gallons saved per carpool per day is the difference of the gallons consumed without the carpool and gallons consumed with the carpool. Gallons consumed with the carpool is given by

$$\frac{\text{distance driven with carpool}}{\text{miles per gallon with carpool}} + \text{gallons consumed by cars left at home.}$$

Gallons that would be consumed without the carpool is given by

$$\frac{\text{(trips driven without carpool) x (average distance per trip)}}{\text{miles per gallon without carpool}}$$

For the most part FEA or DOT data were used to make these calculations.

Assuming that on the average 0.2 percent of the worktrips in the 20 SMSA's affected could be captured, 2,748 carpools would be formed saving 5,502 gallons per day. This represents 0.17 trillion BTU's per year. Together the carpool and vanpool programs are expected to save 0.42 trillion BTU's which is slightly less than 0.01 percent of 1980 projected consumption.

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GOVERNMENT PURCHASING

Objective

To conserve 0.18 trillion BTU's of energy in 1980 (less than 0.01 % of Texas' 1980 projected consumption) through the procurement of energy efficient goods and services at the state and local levels.

Narrative

State and local purchasing has as its central purpose the providing of government with equipment, materials, and supplies at the greatest possible economy. In the past, purchasing was generally done on the lowest bid basis, but a number of new procurement practices could have a greater impact on cost reduction and could result in the acquisition of more energy efficient products as well. Among the more energy approaches are life cycle costing, value incentive clauses, performance specification and multiple-year contracts.

State and local laws governing purchasing by jurisdictions are stated broadly and appear to be designed to give the jurisdiction maximum discretionary power to structure purchasing to meet local needs; therefore, the adoption of procurement practices which would affect energy conservation has no severe legal or institutional constraint. The primary barrier facing Texas jurisdictions that wish to buy more energy efficient items is the lack of data on the actual efficiencies of many common use products. In addition, when such efficiency data does exist, it is often incomplete or subject to variation depending on local conditions. Therefore, one immediate goal is to increase the available data base concerning the actual energy utilization patterns of selected items.

The first need is to create a list of the purchase items which offers the greatest potential for energy savings. This can be done by drawing up a list of commonly purchased items for each level of government and then eliminating the following types of commodities from consideration:

1. Items which are purchased in insignificant quantities,

2. Items which use very little energy in their operation, and

3. Items for which there are no more energy efficient product substitutes currently available.

This process should reduce the original list of commodities to more manageable proportions and allow for an in depth analysis to be done on the remaining products. The energy analysis would basically consist of performing life cycle costing on these items. Of course, energy efficiency would only be one factor considered in the analysis. Other factors will include durability, trade-in value, and maintenance with the calculations resulting in a total cost figure for each product. Since these early product analyses are likely to be lengthy and expensive, researchers should be careful to choose items where significant energy savings appear possible.

Lead Agency

The task of compiling commodity lists and performing product analysis should be primarily delegated to the Board of Control. Although product information could also be obtained from localities, the Board is the logical agency to do the energy analysis for the following reasons. First, the Board already has staff involved in product performance evaluation. Second, the Board can incorporate any new performance data into new standard specifications very rapidly. Third, because of the very central nature of the state system, once more energy efficient items are adopted they can be automatically passed on to departments and resultant energy savings can be monitored.

Of course, the Board cannot be expected to commit an entire division to energy analysis. Thus, the analysis will be limited by staff time and cost. Therefore, the Board should closely monitor similar product analyses being done by the Federal Supply Service or the National Bureau of Standards to avoid duplication of effort.

Information Transfer to Local Governmental Units

Although the state has the most adequate institutional machinery for doing preliminary product analysis, the ultimate success of the program necessitates the involvement of local units of government. Not only is local involvement mandated by law, but the volume of their purchases offers even greater potential than the state inventory for reduction of energy consumption. Therefore, once the state has done the product research and made specification modification, the main task is to bring that information to the local governments. Assuming that the state research has demonstrated clearly that there are economic and energy savings to be gleaned from using certain products, information alone should provide all the incentive localities need to become involved in the program.

Of course, it will be necessary to find a way to package that basic information so it will be of use to local agencies. The first concern is to be sure that the product information covers items that are significant purchases for localities. For instance, it may be in the state's interest to test widgets if it buys thousands of them each year. However, such data may be irrelevant to a city that only buys 10 or 20. Therefore, before any energy analysis is done, the list of commodities must be modified to include items of particular importance to cities, counties, and school districts. The selection of such products can be easily done by a statewide survey of a purchasing official at the local level.

After the data is compiled, it can be mailed out to localities in the form of a newsletter. The first issue would serve as an information package that would contain a description of the state conservation program, an explanation of the techniques used in making the energy analysis, a general description of life cycle costing, and a bibliography on energy and procurement. In designing the first program packet, it would be wise to contact representatives from various governmental units to be sure that the data adequately covered any unique local government purchasing problems. Such representatives could come from the Texas Municipal League, the Texas Association of Counties, and the Texas Education Agency as well as purchasing officials from cities, counties, and school districts. These representatives would provide useful information to ensure that all interested parties received the first information letter.

Once the first newsletter brought the program to the attention of localities, subsequent issues would provide listings of all items which had been subjected to the energy analysis. Beyond a description of the item including general specifications, the listings would include the estimated energy and cost savings. Savings should be calculated in both dollars per year and BTU's per year to emphasize both the economic and energy savings potential. In addition, these newsletters should indicate where localities could find technical information on any item which had been subjected to an analysis. Publication of the newsletter could be a joint responsibility of the State Board and the advocacy organizations listed above (TML, TAC, and TEA).

Continuing to Service Local Agency Requests

If the newsletter is successful, local agencies may well respond with additional information requests. Such assistance can be supplied most expediently by maintaining product records centrally at the State Board and then simply providing specification data and other technical information upon request. However, most of the data would be contained in the newsletters, thus eliminating the need to create a large information clearinghouse at the state level.

Program Management Structure

The success of this program depends in large part on intergovernmental cooperation. Under this proposal, the State Board of Control will take the dominant roll. They will compile product lists, perform product analyses, and serve local governments' requests for data via a newsletter. They will be aided by a voluntary task force comprised of representatives from localities and statewide research and advocacy groups such as TML. The voluntary task force will help in determining product selection for energy testing, in informing local jurisdictions of the program, and in preparing and distributing the newsletter to localities.

Milestones

3rd Quarter, 1977

Establish an advisory committee from the Texas Municipal League (1), the Texas Association of Counties (1), the Texas Education Agency (1) and purchasing officials from cities (3), counties (3) and school districts (3).

Develop a list of the most commonly purchased energy consuming items.

Make recommendations on policy which could effect energy conservation in purchasing.

4th Quarter, 1977

Gather all data relevant to the life cycle cost of commonly purchased items.

Develop life cycle cost data for those items which have no acceptable published data.

Monitor product analyses of the Federal Supply Service and the National Bureau of Standards to avoid duplication of effort.

Report summary of 1977 efforts to Governor's Office.

1st Quarter, 1978

Publish and distribute to all state, municipal, county, and school district purchasing offices or agents, a newsletter explaining the state conservation plan as it relates to purchasing, describing life cycle costing and the techniques used in energy analysis, and containing a bibliography on energy and procurement.

2nd Quarter, 1978

Review with advisory committee legal barriers to centralized and/or cooperative purchasing.

Draft enabling legislation if statutory changes are required for increasing the economy and efficiency of purchasing.

Publish a second newsletter containing the list of items developed by the advisory committee and life cycle cost analyses for each item.

3rd Quarter, 1978

Circulate draft legislation for review and comment by affected municipalities, counties, and school districts.

Answer questions occasioned by the newsletters, and add additional items to the list.

4th Quarter, 1978

Publish newsletter. Include discussion of the proposed statutory changes, along with new product analyses and new items added to the product list.

Submit annual report to Governor's Office.

1979

Add new products to the list and note specification changes of existing products. Circulate purchasing

Circulate purchasing newsletter.

Introduce proposed statutory changes in purchasing procedures into the 66th Legislature.

Submit report to Governor's Office.

1980

Publish final newsletter.

Attach survey of program impact to the newsletter to be returned by all purchasing offices/agents.

Calculate energy savings and prepare final report.

Budget

Year	SECP Funds	Other Funds	Total
1977	$ 43,800	$2,400	$ 46,200
1978	32,800	2,400	35,200
1979	12,285	-0-	12,285
1980	16,720	-0-	16,720
TOTAL	$105,605	$4,800	$110,405

1977

	TOTAL	$43,800
Advisory committee meeting, 12 members @ $150/member	1,800	
Advisory committee member time (donated)	(2,400)	

Data gathering, life cycle cost analyses, 2 staff x 3 months	21,000	
Coordination, planning, 2 staff x 3 months	21,000	
	43,800	

1978	TOTAL	$32,800
Newsletter publication (2), draft legislation (1) .40 x 3,000 x 2 = 2,400 .20 x 3,000 = 600	3,000	
Advisory Committee meeting, 12 members @ $150/member	1,800	
Advisory Committee member time (donated)	(2,400)	
Staff x 8 months	28,000	
	32,800	

1979	TOTAL	$12,285
Newsletter publication	1,200	
Staff x 3 months	10,500	
	11,700 x 1.05	
	12,285	

1980	TOTAL	$16,720
Newsletter publication	1,200	
Staff x 4 months	14,000	
	15,200 x 1.1	
	16,720	

Energy Savings

With the available data it has been possible to compute energy savings due to energy-conscious procurement for three major items in the state's budget: incandescent light bulbs, fluorescent tubes and autos (other than highway patrol vehicles). Assuming that only 25 percent of the 100 watt

incandescent bulbs purchased in 1975 could be replaced by 60 watt bulbs, and that 25 percent of the 40 watt fluorescent tubes could be replaced by 30 watt fluorescent tubes, 0.03 trillion BTU's of energy could be saved.

Excluding highway patrol vehicles, the state purchased 1,036 automobiles in fiscal year 1976. Assuming that this rate of purchase remains constant and that careful procurement practices can result in average auto efficiency improving from 12 mpg in 1977 to 15 mpg in 1978, 18 mpg in 1979 and 20 mpg in 1980 (as required by federal regulations), 0.15 trillion BTU's can be saved.

This gives a total savings of 0.18 trillion BTU's through state procurement representing less than 0.01 percent of total 1980 projected consumption.

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RIGHT TURN ON RED

The State of Texas has already met the mandatory program requirement of a right-turn-on-red law by the following statute, effective August 27, 1973.

> Vehicular traffic facing a steady red signal alone shall stop at a clearly marked stop line, but, if none, before entering the crosswalk on the near side of the intersection, and may then turn right or, if the intersecting streets are both one-way streets and left turns are permissible, may turn left, after standing until the intersection may be entered safely, yielding right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection. Traffic not so turning shall remain standing until an indication to proceed is shown. The State Highway Commission, municipal authorities, and Commissioners Courts, within their respective jurisdictions, may prohibit such turns on a steady red signal by posting a notice that turns of that type are prohibited. Such notice shall be erected at such intersection giving notice thereof.*

*Vernon's Annotated Revised Civil Statutes of the State of Texas, Vol. 19½. Articles 6663-6701. Roads, Bridges, and Ferries. 1975-1976 Pamphlet Supplement. (West Publishing Co.: St. Paul, Minnesota) 1975. p. 178.

Optional Programs

INDUSTRIAL PROCESSES

Objective

To conserve 271.69 trillion BTU's of energy in 1980 (3.04 % of Texas' 1980 projected consumption) by increasing the efficiency of industrial processes in Texas

Narrative

As a whole, the industrial sector has historically practiced "energy conservation."* This, of course, should not be surprising since minimizing cost of production is a primary goal of industrial plant management.

Industry is Texas' largest consumer of energy (46% of total), and while industry's overall record of conservation may be good, such a large consumer must receive serious attention in any plan aimed at improving the overall efficiency of energy use in the state.

In order to understand what opportunities exist for conservation in the industrial sector, it is first necessary to examine how the sector's total consumption is divided among its components, the level of technical sophistication of each component, and the level of economic incentive currently existing to spur conservation within the individual component.

Data on gross energy consumption by industry group is collected and published by the U.S. Bureau of the Census. Information extracted from this data is displayed in Table 1.

The level of energy consumption is one gauge of the necessity of state intervention into the private sector; another is the level of technical sophistication currently existing in industry. Experience has shown that large high-technology industrial operations have generally undertaken energy conserva-

* Attempting to minimize the amount of energy consumed per unit of output.

tion projects more readily than smaller, less technologically sophisticated ones. The method outlined below is an attempt to divide industry into three broad levels of technical sophistication and in turn to further divide each group into sub-groups by size. This method should assist in the rational assessment of potential energy savings.

Category A: High energy technology industries

Processes utilizing complex non-standard energy intensive equipment, specially designed for each particular plant site. Most small plants (under 50 employees) will have a graduate engineer in-house who, while not necessarily an energy specialist, can utilize technical materials independently. Moderate sized plants (50 to 250 employees) may have a part-time energy specialist (e.g., a process engineer assigned as chairman of an energy conservation committee), and large plants (over 250 employees) will have one or more engineers assigned to energy management on a full-time basis. (Example: Industrial Organic Chemicals.)

Category B: Medium energy technology industries

Processes utilizing some specially designed equipment but primarily standard off-the-shelf design. Most small plants (under 50 employees) will not have a graduate engineer in-house, all equipment-related problems being handled by a maintenance foreman or plant supervisor. Moderate-sized plants (50 to 250 employees) may have a graduate plant engineer who is not an energy specialist and generally will not be able to use energy-oriented technical materials without some training. Large plants (over 250 employees) may have an energy specialist part-time, or at least an engineer with sufficient energy-related background to use technical materials independently. (Example: Iron Foundries.)

Category C: Low energy technology industries

Processes utilizing little non-standard energy-using equipment. Small-to-moderate size plants (under 250 employees) will not have a graduate plant engineer. Large plants (over 250 employees) may have a graduate plant engineer who is not an energy specialist and generally will not be able to use technical materials without additional training. (Example: Textile Mills.)

Technology/Size Rating System

Category A	A-1	Under 50 employees
	A-2	50-250 employees
	A-3	Over 250 employees
Category B	B-1	Under 50 employees
	B-2	50-250 employees
	B-3	Over 250 employees
Category C	C-1	Under 50 employees
	C-2	50-250 employees
	C-3	Over 250 employees

A third measure of need for industrial programs is the magnitude of economic incentive. Obviously industries where energy costs account for a large percentage of production costs have a great incentive to increase efficiency, while those industries whose energy costs are low have less. Table 1 displays the industry groups energy cost as a percent of value added. This figure would provide a rough gauge of the relative levels of economic incentive to conserve.

Based on the information displayed in Table 3, 11 industry groups have been selected for special attention. These groups are listed in Table 4.

Based on the diversity of technological sophistication of the selected industry groups, the states' efforts in the industrial sector would involve two major types of activity:

1. Promotion of the exchange of technical information both within industry groups and among the groups, and

2. Direct outreach programs to provide low technology industry with information related to its specific processes and information on improving efficiency of particular end uses which are common to several industrial groups.

TABLE 3

INDUSTRY GROUP	SIC	% of Total State Consumption in 1974	Technology Category	Energy % of Value Added 1972*
Food and kindred products	20	1.2	C	2.3
Textile mill products	22	0.1	C	4.5
Apparel, other textile products	23	0.1	C	1.1
Lumber and wood products	24	0.3	C	4.1
Furniture and fixtures	25	0.1	C	1.4
Paper and allied products	26	1.2	-	7.7
Paperboard mills	263	(0.5)	A	-
Misc. converted paper products	264	(0.0)	C	-
Building paper and board mills	266	(0.0)	C	-
Printing and publishing	27	0.2	C	1.0
Chemicals and allied products	28	21.7	-	10.5
Industrial inorganics	281	(2.6)	A	-
Plastics synthethics	282	(3.0)	A	-
Soaps, cleaners, toilet goods	284	(0.1)	B	-
Paints and allied products	285	(0.0)	B	-
Industrial organics	286	(14.3)	A	-
Agricultural chemicals	287	(1.2)	B	-
Misc. chemical products	289	(0.4)	A&B	-
Petroleum and coal products	29	18.0	-	19.5
Petroleum refining	291	(17.9)	A	-
Rubber and misc. plastics products	30	0.3	B	2.9
Stone, clay and glass products	32	2.6	B	8.7
Primary metal industries	33	5.9	-	14.9
Blast furnace, basic steel production	331	(1.8)	A	-
Iron and steel foundries	332	(0.2)	B	-
Primary non-ferrous metals	333	(3.8)	A	-
Secondary non-ferrous metal	334	(0.0)	B	-
Non-ferrous rolling and drawing	335	(0.1)	B	-
Fabricated metal products	34	0.7	C	2.1
Machinery except electrical	35	0.7	B	1.4
Electronic equipment	36	0.2	B	1.0
Transportation equipment	37	0.4	B	1.2
Instruments, related products	38	0.0	B	0.8
Misc. manufacturing industries	39	0.0	C	1.4

*It should be noted that since 1972 energy costs as a % of value added have risen by a factor of 2 to 3.

Sources: Energy consumption - Annual Survey of Manufacturers, 1974: Fuels and Electricity Consumed, U.S. Bureau of the Census.
Technology category - Planergy estimates.
Energy % of product value - Census of Manufacturing, 1972, U.S. Bureau of the Census.

TABLE 4

SELECTED INDUSTRY TARGET GROUPS

SIC Code		No. of Establishments*		
		Small	Medium	Large
20	Food and Kindred Products	1104	321	68
22	Textiles	51	19	5
24	Lumber and Wood Products	1042	150	16
26	Paper and Allied Products	119	67	11
28	Chemicals and Allied Products	580	110	50
29	Petroleum and Coal Products	98	31	26
30	Rubber and Misc. Plastics	305	65	9
32	Stone, Clay & Glass Products	731	130	21
33	Primary Metals	172	50	28
34	Fabricated Metal Products	1161	232	50
35	Machinery	1745	166	58

* Small - Under 50 employees
Medium - 50-250 employees
Large - Over 250 employees

Source: U.S. Census of Manufacturing 1974, U.S. Bureau of the Census.

In general, the states' program in the industrial area will expand on several existing national and state level programs.

National Programs

At the national level, both federal government and private trade associations are engaged in activities to promote energy conservation.

The Federal Energy Administration has worked with major industries to set voluntary efficiency goals for 1980. Through its voluntary reporting system, it collects information on progress toward the goals. In addition, FEA has funded several studies to determine potential savings by major industry sector. Through its "Big 3" program, FEA provides major industry with information on potential efficiency improvements.

The Office of Energy Programs of the U.S. Department of Commerce, through its Energy Efficiency Sharing Program, works within the

industrial sector to promote voluntary sharing of information related to successful energy saving projects. In addition, the Commerce Department has prepared several documents aimed at providing the medium and small industry with assistance in establishing energy management programs.

The Energy Research and Development Administration has funded a number of projects directed toward the improvement of industrial energy efficiency. Information on these projects is made available through ERDA's Washington Office and through its pilot energy extension programs.

Private organizations, especially trade and professional organizations, have also been active at the national level in both developing and disseminating information related to increased industrial efficiency.

State Programs

At the state level, both state governmental and educational bodies and private groups have been active in promoting industrial conservation.

State agencies have sponsored industrial meetings on energy conservation and have developed materials keyed to Texas industry. State universities have also been active in promoting industrial conservation.

State funded energy centers at the University of Texas, Texas A&M, and the University of Houston have compiled extensive technical materials. They have also developed and initiated outreach programs to provide industry with assistance.

The primary task of the industrial program measure is to attempt to work to supplement existing programs in order to reach a larger audience and to produce a higher degree of implementation.

As mentioned previously, implementation of this program measure will require completion of two major activities:

1. Technical information exchange, and

2. Direct outreach to small and low technology industry.

Technical Information Exchange

This program is directed toward enhancing and extending the exchange of technical information between industrial firms. Significant progress is being made in the large industry sector, as evidenced by the gains reported through the FEA voluntary reporting system. Lines of technical communication within single-industry groups are well established for some industries (the chemical industry for example), but less effective for others. Technical communication between industry groups, and between large centralized industries

and smaller, more fragmented ones, are poor. While FEA and ERDA are taking some actions to improve this situation on a national basis, there is need for a regionalized program for several reasons.

Because of the time and expense involved in travel, many companies, particularly smaller ones, are unable to participate fully in national workshops and conferences. Further, industry in Texas is faced with certain more or less unique problems, such as an unusually heavy commitment to natural gas for steam generation and process heat. This, coupled with the fact that most natural gas used by Texas industry is not price regulated by the FPC, makes the economics of process changes different than in many other regions of the country. Thirdly, information acquired from other companies in the same region naturally carries a somewhat greater credibility with the industrial manager, since he is more likely to respect decisions made by others under circumstances similar to his own. This program will aim at maximizing the interchange of technical and business information of energy conservation in Texas industry by providing information retrieval services, by publishing a periodic industrial energy news bulletin, and by sponsoring or cosponsoring technical conferences within the state.

A number of state agencies, state universities, and regional offices of federal agencies already provide some form of energy conservation information service to Texas industry. For the most part, these services are of an information nature, and consist of publication of general interest articles and preparation of research reports. While this type of information is useful to the industrial manager, it is generally not the kind of data required to effect an investment decision or other direct energy conservation action. This program will be directed at expanding the information retrieval and dissemination services available in the state so as to provide specific data for industry through a combined effort of the state energy agencies and the universities.

As lead agency for this program, the Texas Industrial Commission would be responsible for

1. Establishment and operation of a State Industrial Information Center.
2. Developing and hosting an annual Technical Conference for Texas Industries.
3. Assisting in the establishment of regional energy conservation groups.

Industrial Information Center

The Texas Industrial Commission would establish a state Industrial Energy Information Center.* The

*The center would primarily concentrate on collecting and disseminating information relating to those industries listed in Table 2.

purpose of the center would be to provide users with a central point from which they could gain access to information on the location and extent of existing technical energy conservation reports and articles. Initially state universities would be surveyed to determine location and extent of available technical energy conservation information. This base information would be continually updated as participating universities collect new information.

In addition technical journals would be monitored for appropriate articles of interest. Also included in the data base would be information related to operator training.

As a part of the center, a computerized data retrieval system would be established. Documents would be classified by general subject and by applicability to particular industries. Periodic abstract bulletins would be provided to companies throughout the state. A toll-free "hot line" would be provided to the center and a copy of any article abstracted would be provided, at cost, upon request. This service, in essence, would open the facilities of all Texas university technical libraries to industry throughout the state.

The Industrial Commission would also maintain a file of contributed case reports on energy savings projects carried out by companies throughout the state. Reports would be prepared on standard forms which would include such data as the total cost of the project, the energy savings effected, the estimated payout time, and the name and telephone number of a contact person within the company from whom additional reports would be solicited on a statewide basis; companies submitting case reports would automatically receive a year's free subscription to all other case reports in that particular industrial sector. Case reports that are of interest to more than one sector, or of general interest, would be distributed accordingly to subscribers.

The industrial information center would also publish a quarterly industrial energy conservation newsletter. The newsletter could contain such items as the most recent updates of the Texas energy price and availability forecasts, updated FEA energy forecasts, a calendar of national and regional conferences on industrial energy conservation, and other pertinent information of special interest to industrial managers and technical personnel. Also included would be selected case studies of interest to a broad industry segment. These studies would be drawn from the files of case reports described above. Special citations from the Governor for outstanding and innovative energy conservation programs could be publicized and announced in the letter.

The Center would also have trained technical staff to respond to questions generated by the outreach program.

Technical Conference

A major annual technical conference for industrial managers and technical personnel would be sponsored by the Industrial Commission. The purposes of the conference would be to bring nationally recognized energy and financial experts to Texas, and to bring industrialists into contact with these experts and with each other in an atmosphere of constructive interaction. The conference would feature events oriented toward energy conservation decision-making.

About twenty-five (25) invited technical presentations would be drawn from outstanding papers presented at various national conferences during the year. Nominations for these invited presentations would be solicited through the newsletter described above. Thus, individuals in the state who have heard an outstanding presentation at a national conference or workshop could recommend that this presentation be brought to Texas, where it would be accessible to a larger segment of the state's industrial population. In addition to these technical presentations, a series of one-half day "mini-courses" could be presented in a variety of topic areas of interest to industry (and particularly to small industry). Such areas might include boiler performance measurement, principles of industrial insulation, waste heat recovery, and energy conservation via improved boiler control. One technique that has been very successful in certain professional areas, such as medicine and dentistry, has been the concept of "table clinics," in which individuals who have been successful in putting new ideas into practice are given space and facilities to explain the methods to their colleagues. This concept would be implemented in the energy conservation conference by providing space and facilities for individuals to present and discuss the case reports described above.

Associated with the conference would be a commercial exposition of equipment and services for industrial energy conservation. The exposition would attract sales and technical representatives from Texas, and would provide an excellent opportunity for the conference participants to discuss costs and other important implementation considerations.

In addition to technical information, at least one session of the conference would be devoted to a briefing by government energy officials on the status of current and prospective legislation which would directly impact the industrial sector in Texas.

Regional Energy Conservation Groups

In 1973, a group of energy conservation coordinators for several large petroleum refining and petrochemical corporations formed an informal association called the Gulf Coast Energy Conservation Society. This group meets bi-monthly for luncheon

meetings at various plant sites. One member of the group is invited to speak at each meeting about energy conservation programs in his company. These meetings have met with excellent success.

This element of the technical interchange program would attempt to extend this experience to other regional areas in the state, and particularly to encourage smaller companies to participate in the programs. The state would provide assistance to regional groups to help underwrite the cost of publicity and clerical expenses, and to provide travel honoraria for speakers from other regions of the state and from outside the state. As well as providing direct monetary assistance, a listing of suggested speakers and their topics will be prepared and distributed to the program chairman of each group. The lead agency would assist in the formation of these conferences.

Outreach

While most large technically-based industries have already begun to make significant strides toward energy conservation in their plants, progress in the small industry sector and in the low-technology industries (categories B and C) has been much slower. One major reason for this difference is that high technology corporations have extension staff resources for evaluating the technical and economic feasibility of possible energy savings projects. Industrial investment decisions must be made on the criterion, "Will it make money?" Technically-based calculations of estimated energy savings and economic payout are routine elements in analyzing new projects for large plants. Decisions are thus made on fairly firm grounds. The plant manager who does not have access to the professional resources of the large corporation must either make these expensive decisions on risky "seat-of-the-pants" grounds, or maintain the status quo by making no decision at all. While the economic driving force for energy savings investments is certainly present, inertia in the small and low-technology industry sectors can largely be traced to a lack of definitive quantitative information specific to particular industries and plants.

This program is aimed at "selling" the wisdom of energy conservation investments to industry having little or no in-house technical expertise in energy analysis by providing materials and instruction in analyzing energy savings projects to non-specialists such as plant managers and production supervisors.

As lead agency for this program the Texas Industrial Commission would be responsible for:

1. Developing and implementing a series of workshops designed to inform specific industrial groups of the methods and potentials of energy management, and

2. Developing and implementing a series of workshops designed to inform the users of specific processes and items of equipment of the methods of and potentials for increasing the energy efficiency of the process or item of equipment.

3. Developing a training program for industrial energy auditors.

4. Coordinating the state's workshop program with those of FEA, ERDA, the Department of Commerce and other public and private groups.

Industry Specific Workshops

The Industrial Commission would be responsible for the development and implementation of a series of workshops for low technology industries (see Table 3 for industry group breakdown). The purpose of the workshops would be to provide the plant manager with information on potential savings in his type operation. This information would be keyed to specific systematic energy audit materials prepared for the target industry group. The audit materials would take the form of a workbook that the auditor could use to audit the energy use in his plant. Workbooks would provide sufficient information to allow a trained user to calculate the plant energy balance, establish conservation potentials, and estimate financial returns. Each audit workbook would be developed for a specific industry group (see Table 5). Audit workbooks would be based on pilot audits conducted in Texas plants. In addition, the participants would be provided with a listing of certified energy auditors and with a copy of the Energy Conservation Yellow Pages. The yellow pages would provide a categorical compilation of energy conservation services available in Texas. The yellow pages would also be made available through the state Industrial Energy Information Center. Workshops would be limited to twenty-five (25) attendees and would be no longer than one day in length.

Process Equipment/Specific Workshops

The Industrial Commission would also be responsible for the development and implementation of a series of 75 workshops to provide plant personnel with technical information related to common items of equipment. Essentially, this second group of workshops would be directed toward more technically sophisticated methods of energy savings while the first group of workshops would aim at "housekeeping" type savings.

Each process specific workshop would center on a specific common item of equipment or process, i.e., electric motor efficiency (a listing of equipment/process workshops is provided in Table 6).

Target Industries for Energy Audit Workshops

TABLE 5

SIC Code(s)	Description	Target Group	No. of Estab. in Target Group	% Texas Energy in Target Groups (1974)
201	Meat Products	C 1,2,3	290	0.2%
204	Grain Products	C 1,2,3	210	0.2%
207	Fats and oils	C 1,2,3	75	0.2%
26	Paper and allied products	B 1,2	190	0.6%
28	Chemicals and allied products	A 1	580	2.2%
291	Petroleum refining	A 1	15	0.7%
30	Rubber and plastic products	B 1,2	370	0.2%
324	Hydraulic cement	B 1,2	20	1.1%
325 327 329	Structural clay, cement, and misc. mineral products	B 1,2	175	.7%
33	Primary metals	B 1,2	222	1.3%
34	Fabricated structural metal products	C 1,2,3	1450	0.2%
353	Construction-related machinery	B 1,2	250	0.2%
37	Transportation equipment	B 1,2	515	0.1%

Topics for Industrial Workshops

TABLE 6

Boiler and Process Heater Efficiency

Industrial Insulation

Waste Heat Recovery

On-Site Power Generation, co-generation, and Total Energy Systems

Electric Motor Efficiency and Peak Load Control

Steam and Condensate System Operations

Distillation Column Operations

Drying Operations

Heat Treating

Questions concerning use of the materials would be handled by the technical staff at the state Industrial Energy Information Center.

In addition to the materials and discussions related to the specific workshop topic, participants would be provided with a listing of certified Industrial Energy Auditors and with a copy of the Energy Conservation Yellow Pages.

Coordination with Federal Programs

The Industrial Commission would also work with FEA, the Department of Commerce, and ERDA to assist in the promotion of their programs. Staff would assist in coordinating these efforts with other elements of the state conservation program.

State assistance can be very effective in helping to publicize these programs. For example, the University of Texas Bureau of Business Research maintains an up-to-date computer tape of the Texas Directory of Manufacturers, which permits selected sortings by company size, SIC code, or location. Other agencies which can be of assistance are the Industrial Commission, the Department of Community Affairs, and the Public Utilities Commission.

Training Program

The Industrial Commission would develop and implement a voluntary training and certification program for industrial energy auditors.

There is at present no mechanism for assuring the competence of any individual or company advertising itself as an energy audit service. This uncertainity has discouraged many industrial managers from obtaining energy conservation assistance and acting on it. The purpose of this program element is to provide a mechanism for training and certifying professional energy auditors.

A committee of professional energy experts from industry and engineering faculty of the major universities in the state would be appointed by the Governor's Office to develop a standard curriculum for training professional industrial energy auditors. The curriculum would include, for example, a review of basic process thermodynamics, combustion analysis and combustion testing methods, heat loss and insulation analysis, energy measurements and instrumentation, financial analysis techniques, and other topics directly involved in energy auditing of industrial plants. The course will be structured on a forty-five (45) class-hour base, the standard length of a three semester-credit hour graduate engineering course. The course material would be directed toward the graduate engineering level, and it would be submitted to all universities offering graduate engineering programs for accreditation as a regular Master's level course. The 45 class-hour format is suitable for presentation

either in a regular semester-long university course or in an intensive two-week short course. A degree in engineering or equivalent experience would be required as a prerequisite for registration in the course.

Upon completion of the course, registrants would take a comprehensive standard examination covering the principles of energy auditing. A passing score on the examination would qualify the applicant for certification as a Professional Energy Auditor. Individuals wishing to take the examination without taking the training course may apply to the course committee. They would be allowed to waive completion of the course if they can show sufficient background in energy audit related areas.

A listing of certified Professional Energy Auditors would be placed on file in the various state and federal service agencies.

The procedure described above would not restrict non-certified individuals from conducting energy audit services. However, it is expected that once the existence of a list of professionally certified auditors is on file with the various agencies, companies desiring audit assistance would use this information before contracting for energy conservation services.

While the voluntary program is in effect, the desirability and feasibility of drafting mandatory certification legislation for the 1979 legislative session would be investigated. Experience with the voluntary system may prove that such legislation is unnecessary, in which case it would not be pursued.

Milestones

3rd Quarter, 1977

Survey the existing materials for the workshop programs.
Begin development of the Information Center.

4th Quarter, 1977

Schedule 1978 workshops.
Begin development of the training/certification programs.
Provide the Governor's Office with a year-end status report.

1st Quarter, 1978

Open the state Industrial Energy Information Center.
Complete data collection for workshop materials.
Begin planning for annual technical conference.
Begin pilot audits.

Develop guidelines for regional conservation groups.

2nd Quarter, 1978

Complete materials for process/equipment workshops.
Begin newsletter.
Distribute invitations for technical conference.
Review proposals for regional conservation groups and select participants.

3rd Quarter, 1978

Complete materials for industry specific workshops.
Host 5 process/equipment specific workshops.
Begin training and certification program.
Host technical conference.

4th Quarter, 1978

Host 10 industry specific workshops and 10 process/equipment specific workshops.
Submit annual progress report to the Governor's Office.

1979

Continue operation of Information Center.
Host 20 industrial specific and 30 process/equipment specific workshops.
Host annual technical conference.
Continue regional conservation group project.
Prepare the annual status report.

1980

Continue operation of the Information Center.
Host 20 industry specific and 30 process/equipment specific workshops.
Host the annual technical conference.
Continue regional conservation group project.
Prepare the annual status report.

Budget

Year	SECP Funds	Other Funds	
1977	198,000	-0-	198,000
1978	556,000	239,450	795,450
1979	408,425	173,750	582,175
1980	421,800	173,750	595,550
TOTAL	1,584,225	586,950	2,171,175

1977 TOTAL $198,000

INDUSTRIAL ENERGY INFORMATION CENTER

Collect Information
18 man months 63,000

Design, program, & load Data System
21 man months 73,500

Computer terminal	6,000
Computer time	10,000
	152,500

Industry Specific Workshops

Collect & evaluate existing materials 2 man months	7,000
Select plants for pilot audits 2 man months	7,000
	14,000

Process/Equipment Workshops

Collect & evaluate existing materials 2 man months	7,000
Develop workshop materials 6 man months	21,000
Schedule first 30 workshops 1 man month	3,500
	31,500

1978 $556,000

Industrial Energy Information Center

Staff for Center - 60 man months	210,000
Telephone @ 3,500/mo.	42,000
Computer time	42,000
Newsletter 40,000 @ .25 ea.	10,000
Case Studies 2,000 @ 1.50 ea.	3,000
Energy conservation yellow pages 1,000 @ 2.00	2,000
	309,000

Technical Conference

Develop & schedule conference - 6 man months	21,000
Prepare & mail invitations 10,000 @ .30 ea.	3,000
Travel	2,000

Speaker fees	5,000
Conference exhibit (industry donation)	(50,000)
Conference facilities (local donation)	(1,500)
	31,000

Industry Specific Workshops

Pilot Audits 30 @ $4,000 ea.	120,000
Industry match for pilot audits	(120,000)
Develop workshop materials - 6 man months	21,000
Schedule first 10 workshops - 1 man month	3,500
Produce materials for first 10 workshops $30/person x 25 persons/ workshop x 10	7,500
Instructor for workshops - 2 man months	7,000
Travel @ 350/workshop	3,500
Meeting room & invitations (local donation)	(2,500)
Schedule 2nd 20 workshops - 1 man month	3,500
	166,000
Less registration fee @ $50/person	12,500
	153,500

Process/Equipment Workshops

Produce materials for first 15 workshops $30/person x 60 persons/ workshop x 15	27,000
Instructors for workshops - 3 man months	10,500
Travel @ $350/workshop	5,250
Schedule 2nd 30 workshops - 2 man month	7,000
Meeting room & invitations (local donation)	(3,500)
	49,750
Less registration fee @ $50/person	45,000
	4,750

Training Program

Select & appoint advisory committee - 1/2 man month	1,750
Collect & evaluate existing materials - 1 man months	3,500
Design course-3 man months	10,500
Advisory committee travel @ $1,000/meeting	4,000
Advisory committee time (donation)	(3,200)
Produce & distribute materials	15,000
	34,750

Regional Energy Conservation Groups

Develop program guidelines - 1 man month	3,500
Request proposals - 1 man month	3,500
Review proposals and select recipients - 1 man month	3,500
Grants to 5 groups at $2,500 each	12,500
Local Matching	(1,250)
	23,000

1979 TOTAL 408,425

Industrial Energy Information Center

Staff for Center - 60 man months	210,000
Telephone @ $3,500/mo.	42,000
Computer time	42,000
Newsletter 40,000 @ $ .25 ea.	10,000
Case studies 2,000 @ $ 1.50 ea	3,000
Energy conservation yellow pages 1,000 @ $2.00	2,000
	309,000
x	1.05 (inflation)
	324,450

Technical Conference	
Develop & schedule conference 6 man months	21,000
Prepare & mail invitations 10,000 @ $.30 ea	3,000
Travel	2,000
Speaker fees	5,000
Conference exhibit (industry donation)	(50,000)
Conference facilities (local donation)	(1,500)
	31,000
	x 1.05 (inflation)
	32,550
Industry Specific Workshops	
Material Review & Update - 2 man months	7,000
Produce materials $30/person x 25 persons/workshop x 20	15,000
Instructors - 4 man months	14,000
Travel @ $350/workshop	7,000
Meeting room & invitations (local donation)	(2,500)
Schedule last 20 workshops - 1 man month	3,500
	46,500
	x 1.05 (inflation)
	48,825
Less registration fees @ $50/person	25,000
	23,825
Process/Equipment Workshops	
Review and Update Materials - 2 man months	7,000
Produce materials $30/person x 60 persons/workshop x 30	54,000
Instructors - 6 man months	21,000
Travel @ $350/workshop	10,500

Schedule last 30 workshops - 2 man month	7,000
Meeting room and invitations (local donation)	(3,500)
	99,500
	x 1.05 (inflation)
	104,475
Less registration fees @ $50/person	90,000
	14,475

Regional Energy Conservation Groups

Grants to 5 groups @ $2,500	12,500
Local matching	(1,250)
	12,500
	x 1.05 (inflation)
	13,125

1980 TOTAL $421,800

Industrial Energy Information Center

Staff for Center - 60 man months	210,000
Telephone @ 3,500/mo.	42,000
Computer time	42,000
Newsletter 40,000 @ $ .25 ea.	10,000
Case studies 2,000 @ $1.50 ea.	3,000
Energy conservation yellow pages 1,000 @ $2.00	2,000
	309,000
	x 1.1 (inflation)
	339,900

Technical Conference

Develop & Schedule Conference - 6 man months	21,000
Prepare & mail invitations 10,000 @ $ .30 ea.	3,000
Travel	2,000
Speaker fees	5,000
Conference exhibit (industry donation)	(50,000)

Conference facilities (local donation)	(1,500)
	31,000
	x 1.1 (inflation)
	34,100
Industry Specific Workshops	
Material Review & Update 2 man months	7,000
Produce materials $30/person x 25 persons/workshop x 20	15,000
Instructors - 4 man months	14,000
Travel @ $350/workshop	7,000
Meeting rooms & invitations (local donation)	(2,500)
	43,000
	x 1.1 (inflation)
	47,300
Less registration fees @ $50/ person	25,000
	22,300
Process/Equipment Workshops	
Review & Update Materials - 2 man months	7,000
Produce materials $30/person x 60 persons/workshop x 30	54,000
Instructor - 6 man months	21,000
Travel @ $350/workshop	10,500
Meeting rooms & invitations (local donation)	(3,500)
	92,500
	x 1.1 (inflation)
	101,750
Less registration fees @ $50/ person	90,000
	11,750
Regional Energy Conservation Groups	
Grants to 5 groups @ $2,500	12,500
Local matching	(1,250)
	12,500
	x 1.1 (inflation)
	13,750

Energy Savings

Since industry accounts for almost half of the energy consumption in Texas and represents a large market for savings, a great deal of care has been taken to assure accuracy in the energy savings calculations for the industrial processes program measure. Calculations have been made for the program elements relating to technical information exchange, industry outreach, and audit assistance. Since consumption data for individual industrial units could not be obtained, calculations were based on estimated percent savings for relevant Standard Industrial Code classifications and were further broken down by the technology categories in Table 1. Very generally the computations can be described by the formula

$$\text{Percent Savings} = \text{Fraction of energy consumption} \times \text{Savings coefficient} \times \text{Compliance fraction}$$

The compliance fraction is based on the number of units contacted and the proportion of those contacted which are expected to actually implement savings measures.

These calculations resulted in the following energy savings estimates:

Program Element	% Savings	BTU's Saved (10^{12})
Technical Interchange	1.24	110.82
Industry Outreach	1.05	93.84
Audit Assistance	0.75	67.03
TOTAL	3.04	271.69

Thus, this program measure is estimated to save a total of 271.69 trillion BTU's representing 3.04% of 1980 projected total consumption.

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NEW COMMERCIAL

Objective

To conserve 9.11 trillion BTU's of energy in 1980 (0.10 % of Texas' 1980 projected consumption) by increasing the efficiency of new commercial facilities and associated equipment.

Narrative

There are a number of voluntary actions that could be undertaken to improve the energy use efficiency of new buildings beyond that accomplished by the implementation of thermal standards. This program measure is directed toward informing the owner, designer and builder of new facilities of the opportunities energy conservative design provide for increasing a building's profitability. These activities will motivate the owners/designers/builders to utilize innovative approaches and exceed the requirements of mandatory standards.

By their nature, standards and codes are intended to establish a minimum level of acceptable performance. Standards cannot be punitive and therefore cannot require the ultimate in "state-of-the-art" design. Thus voluntary programs to encourage better than standard performance must be established to achieve the full potential for energy conservation in new commercial facilities.

As commercial enterprises are by their nature profit oriented, the prospect of improving profits is the primary motivation which will be employed in this program measure. As energy costs have not been a significant part of operating costs until the past three years, building owners and operators and financial institutions have not included them in the evaluation of building projects. The consideration of these costs in planning new facilities is now necessary as they will have a significant impact on profit. It also seems to be a common assumption that an energy conserving building will be significantly more expensive. This is not necessarily true. In fact the FEA sponsored A.D. Little evaluation of ASHRAE 90-75 indicates a building constructed in conformance with that standard will not cost more than one built to current

practice and will use approximately thirty (30) percent less energy. It is important that similar information, specific to Texas, be developed and disseminated throughout the state.

This program measure will concentrate on providing information, education and training assistance to the various components of the building industry and on coordinating state activities with federal programs and related programs within professional, industry, and trade associations.

It would be implemented by voluntary action of building owners, managers, designers, financiers and contractors.

The Governor's Office of Energy Resources would, as lead agency, be responsible for developing and co-hosting a series of ninety-six (96) workshops for builders, designers, financiers and purchasers of new commercial facilities.* It would also work in conjunction with the appropriate State Boards of Registration and Professional societies to develop and implement a program for training professionals in the techniques of efficient design.

Workshops

The purpose of the workshop project is two-fold--first, to bring the individual parties involved in the design, construction, financing, and operation of a new commercial building to a single location. There they would discuss energy conservation as it relates to new buildings, identify problems and impediments, and suggest solutions. The workshops would also provide participants with information on the current "state of the art" in their particular field, and inform them of the location/schedule of more in-depth educational programs and materials. Workshops would be held statewide, co-hosted by a local group, limited to not more than one and one-half days each, and limited to fifty (50) participants each. A portion of the workshop would be devoted to design of specific types of commercial facilities, i.e., hotels/motels. Another portion would be devoted to functional areas, i.e., financial considerations. In addition to the discussion sessions, participants would receive detailed written materials.

Training

The purpose of the training project is to provide members of the design professions with an opportunity to further develop their skills through participation in more formalized courses in energy conservation

* Commercial facilities would include office buildings (high and low rise), supermarkets, restaurants, hospitals, hotels/motels, retail shops and industrial buildings.

design. There would be two types of training courses offered---one emphasizing the building shell and the other the building's equipment. Each course would be approximately forty (40) instructional hours.

Courses would be conducted locally using materials provided by the Governor's Office. The Governor's Office would also conduct training sessions for course instructors and would provide standardized testing materials for student evaluation. The courses would be aimed at professional level building designers/ engineers.

The training sessions for course instructors would be open to university faculty and to members of professional organizations. In return for the training and materials, the participating university and/or professional group would agree to offer the class at least once annually in its local area, and to provide the Governor's Office with data on course attendance and completion. Universities and professional groups would be allowed to collect fees to cover the instructor's time. Basic materials would be provided by the Governor's Office. The instructor training sessions would be limited to ten (10) participants and would last about three days.

These forums would also act as a feedback mechanism so that the Governor's Office could identify potential problems and opportunities as they relate to national programs to upgrade building standards and to possible state level intervention to require considerations of life cycle costs more fully in the financing of new commercial structures.

As support agencies, the Boards of Registration would work with the Governor's Office to develop and co-host the professional training programs and would evaluate their existing requirements for certification to determine if the additional training should be required.

Milestones

3rd Quarter, 1977

Collect and evaluate existing materials for the workshops and training courses.
Develop the agenda for the workshops.

4th Quarter, 1977

Contact local groups and establish a workshop and training course schedule for 1978.
Develop any needed new materials for the workshops and training course.
Complete development of the training course outline.

1st Quarter, 1978

Host the first eight (8) workshops.

Host two (2) training courses.
Evaluate the training courses and prepare the materials for the rest of 1978.

2nd Quarter, 1978

Host eight (8) workshops and five (5) instructor training sessions.

3rd Quarter, 1978

Host eight (8) workshops.
Begin training courses in local areas.

4th Quarter, 1978

Host eight (8) workshops.
Compile information collected through the workshops.
Prepare the materials and schedule the workshops to be held in 1979.
Evaluate the need for state intervention in the lending process.
If necessary, draft legislation for presentation to the 66th Legislature.
Evaluate comments related to mandatory lighting and thermal efficiency standards.
The Boards of Registration would evaluate the effectiveness of the training program and, if necessary, draft changes in the rules and/or legislation to make the training a mandatory requirement for registration.
Complete one hundred (100) training courses.

1979

Host thirty-two (32) workshops.
Prepare materials and schedules for 1980.
Complete one hundred (100) additional training courses.

1980

Host thirty-two (32) workshops.
Prepare final program evaluation.
Complete one hundred (100) additional training courses.

Budget

Year	SECP FUNDS	OTHER FUNDS	TOTAL
1977	60,400	-0-	60,400
1978	168,550	93,500	262,050
1979	115,190	93,500	208,690
1980	65,380	93,500	158,880
TOTAL	409,520	280,500	690,020

1977 TOTAL $60,400

Workshops

Collect and evaluate materials 2 man months	7,000
Develop new materials - 4 man months	14,000
Develop agenda and schedule workshops - 1 man month	3,500
	24,500

Training Program

Collect and evaluate materials - 2 man months	7,000
Develop additional materials - 2 man months	7,000
Develop course outlines and schedule - 6 man months	21,000
Materials production for 1st 2 courses - $30/person x 15 persons/course x 2 courses	900
	35,900

1978 TOTAL $168,550

Workshops

Produce materials for workshops - $25/person x 50 persons/meeting x 32 meetings	40,000
Instructors - 10 man months	35,000
Special speakers - $300/workshop x 32 workshops	9,600
Travel - $350/workshop x 32 workshops	11,200
Invitations and meeting rooms (local donation)	(3,500)
Update materials and schedule 1979 workshops - 1 man month	3,500
	99,300
Less registration fee @ $25/person	40,000
	59,300

Training Program

Initial project evaluation and course revision - 1 man month	3,500
Materials for instructor training sessions - $35/instructor x 10 instructors/session x 5 sessions	1,750.
Staffing instructor training sessions - 3 man months	10,500
Materials for courses to be given in 1978 - $30/student x 15 students/course x 100 courses	45,000
Instructor time (local donation)	(50,000)
Update course materials for 1979 - 1 man month	3,500
Materials for courses to be given in 1979 - $30/student x 15 students/course x 100 courses	45,000
	109,250

1979 TOTAL $115,190

Workshops

Produce materials for workshops - $25/person x 50 persons/meeting x 32	40,000
Instructors - 10 man months	35,000
Special speakers - $300/workshop x 32 workshops	9,600
Travel - $350/workshop x 32 workshops	11,200
Meeting room & invitation (local donation)	(3,500)
Update materials and schedule 1980 workshops - 1 man month	3,500
	99,300
	x 1.05 (inflation)
	104,265
Less registration fee @ $25/person	40,000
	64,265

Training Program		
Instructor time (local donation)	(50,000)	
Update course materials for 1980 - 1 man month	3,500	
Materials for courses to be given in 1980 - $30/student x 15 students/course x 100 courses	45,000	
	48,500	
x	1.05	(inflation)
	50,925	
1980	TOTAL	$65,380
Workshops		
Produce materials for workshops - $25/person x 50 persons/workshop x 32	40,000	
Instructors - 10 man months	35,000	
Special speakers - $300/workshop x 32 workshops	9,600	
Travel - $350/workshop x 32 workshops	11,200	
Meeting room & invitations (local donation)	(3,500)	
	95,800	
x	1.1	(inflation)
	105,380	
Less registration fee @ $25/person	40,000	
	65,380	
Training Program		
Instructor time (local donation)	(50,000)	

Energy Savings

Estimation of energy savings associated with the new commercial buildings program were based on the following general formula:

savings = square feet of space x BTU savings per square feet per year x compliance ratio.

Square feet of space for offices, retail stores, hospitals and miscellaneous buildings was estimated using data from the Project Independence Task Force Report. Potential reductions in energy consumption were determined primarily from the Impact Assessment of ASHRAE 90-75 by A. D. Little, Inc. Compliance ratios are subjective estimates, but are expected to be rather high since the program is quite ambitious. Assuming that only twenty-five (25) percent of new space in 1978, sixty (60) percent in 1979 and ninety-five (95) percent in 1980 can be affected results in an average compliance of sixty (60) percent. The amount of savings attributable to this program has been reduced by savings due to lighting and thermal standards for commercial buildings because these programs overlap to a great extent. The net result is estimated savings of 9.11 trillion BTU's which is 0.10 percent of projected 1980 consumption.

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EXISTING COMMERCIAL

Objective

To conserve 48.33 trillion BTU's of energy in 1980 (0.54 % of Texas' 1980 projected consumption) by improving the operation and efficiency of existing commercial facilities and associated equipment.

Narrative

Conservation activities in existing facilities are difficult as there is no established regulatory procedure nor is there the involvement of trained professionals to the same extent there is with new buildings. Program measures must be voluntary and the background and experience of those to be reached vary widely. The program elements must therefore be geared to a variety of individual needs. Existing federal programs (such as the FEA Energy Conservation Manuals) have had only limited success to date. The impact of such programs could be increased by state involvement. Although there is a demonstrated concern arising from increased energy costs, Texas building owners and operators have not yet translated this concern into constructive action.

This program measure will concentrate on providing information to interested parties as to what can be done, how it can be accomplished, what avenues are available for financing conservation activities, and where information and assistance may be obtained.

This program measure would be accomplished through the voluntary action of building owners and managers.

As lead agency for this program, the Governor's Office would develop and co-host a series of workshops for the owners and managers of existing commercial facilities.* It would also work with the State Boards of Registration and Professional Societies to develop and implement a program to train professionals to audit and evaluate existing

*Includes office buildings (high and low rise), supermarkets, restaurants, hospitals, hotels/motels, retail stores and industrial buildings.

commercial facilities.

Workshops

The purpose of the workshops is to inform building owners/managers of the need for an on-going energy management program, and to provide them with detailed information on the potential savings possible in their particular type operation. Concurrently, building maintenance personnel would receive information on ways to cut energy costs through improved operations and maintenance techniques. Additionally, participants will be provided with information on how to select energy consultants, self help measures (energy audit), and financing of retrofit projects.

The workshops would be co-hosted by a local organization and would be limited to fifty (50) participants. Each workshop would deal with a specific commercial facility (i.e., office buildings) and would be no more than one day in length. In addition to the discussion, each participant would be provided with detailed written materials, and would be given the opportunity to meet individually with representatives of manufacturers and energy management consultants.

Training

The training program would provide members of the design professions an opportunity to upgrade their skills in the area of performing energy audits and evaluating conservation opportunities in existing commercial structures. The training course would include approximately forty (40) hours of classroom instruction, and would be limited to fifteen (15) participants.

Courses would be conducted locally using materials provided by the Governor's Office. The Governor's Office would also conduct training sessions for course instructors and would provide standardized testing materials for student evaluation. The courses would be aimed at professional level building designers/engineers.

The training sessions for course instructors would be open to university faculty and to members of professional organizations. In return for the training and materials, the participating university and/or professional groups would agree to offer the class at least once annually in its local area, and to provide the Governor's Office with data as to course attendance and completion. Universities and professional groups would be allowed to collect fees to cover the instructor's time. Basic materials would be provided by the Governor's Office. The instructor training sessions would be limited to ten (10) participants and would last approximately three days.

As support agencies for the program, the State Boards of Registration would work with the Governor's

Office to develop and implement the training program, and would evaluate the existing requirements for certification to determine if the additional training should be required.

Milestones

3rd Quarter, 1977

Collect and evaluate existing materials for the workshops and training course.
Finalize the agenda and schedule for the workshops.

4th Quarter, 1977

Complete materials development for the workshops and training course.
Finalize the course outline and schedule.

1st Quarter, 1978

Co-host twenty (20) workshops.
Perform an initial evaluation of the training course.
Prepare course materials for the remainder of 1978.
Host one training course.

2nd Quarter, 1978

Co-host twenty (20) workshops.
Conduct five (5) training sessions for course instructors.

3rd Quarter, 1978

Co-host twenty (20) workshops.
Begin training courses in local areas.

4th Quarter, 1978

Co-host twenty (20) workshops.
Update workshop and training materials.
Complete fifty (50) training courses.
The State Boards of Registration would evaluate the necessity of making the training programs a part of their certification requirements and would draft any necessary changes to their rules or legislation.

1979

Co-host eighty (80) workshops.
Prepare an annual materials update.
Complete fifty (50) additional training courses.

1980

Co-host eighty (80) workshops.
Prepare a final program evaluation.
Complete fifty (50) additional training courses.

Budget

YEAR	SECP FUNDS	OTHER FUNDS	TOTAL
1977	52,950	-0-	52,950
1978	203,750	133,800	337,550
1979	182,450	133,800	316,250
1980	159,600	133,800	293,400
TOTAL	598,750	401,400	1,000,150

1977 TOTAL $52,950

Workshops

Collect and evaluate materials 2 man months	7,000
Develop additional materials 4 man months	14,000
Develop agendas and schedule workshops - 2 man months	7,000
	28,000

Training Program

Collect and evaluate materials 2 man months	7,000
Develop additional materials 2 man months	7,000
Develop course and schedule training courses - 3 man months	10,500
Materials production for 1st course - $30/person x 15 persons/course x 1 course	450
	24,950

1978 TOTAL $203,750

Workshops

Produce materials for workshops - $25/person x 50 persons/meeting x 80 workshops	100,000
Instructors - 24 man months	84,000
Special speakers - $300/workshop x 80 workshops	24,000
Travel - $350/workshop x 80 workshops	28,000

Meeting room & invitations (local donation)	(8,800)
Update materials and schedule training courses - 2 man months	7,000
	243,000
Less registration fee @ $25/person	100,000
	143,000

Training Program

Initial project evaluation and course revision - 1 man month	3,500
Materials for instructor training - $35/instructor x 10 instructors/session x 5 sessions	1,750
Staffing for instructor training - 2 man months	7,000
Instructor time (local donation)	(25,000)
Materials for courses to be given in 1978 - $30/student x 15 students/course x 50	22,500
Update course materials for 1979 - 1 man month	3,500
Materials for courses to be given in 1979 - $30/student x 15 students/course x 50 courses	22,500
	60,750

1979 TOTAL $182,450

Workshops

Materials for workshops $25/person x 50 persons/workshop x 80 workshops	100,000
Instructors - 24 man months	84,000
Special speakers - $300/workshop x 80 workshops	24,000

Travel - $350/workshop x 80 workshops	28,000
Meeting room & invitation (local donation)	(8,800)
Update materials and schedule workshops for 1980 - 2 man months	7,000
	243,000
	x 1.05 (inflation)
	255,150
Less registration fee @ $25/person	100,000
	155,150

Training Program

Materials for courses $30/student x 15 students/ course x 50	22,500
Instructor time (local donation)	(25,000)
Update materials for courses in 1980 - 1 man month	3,500
	26,000
	x 1.05 (inflation)
	27,300

1980 TOTAL $159,600

Workshops

Materials production $25/person x 50 persons/ workshop x 80 workshops	100,000
Instructors - 24 man months	84,000
Special speakers - $300/ workshop x 80 workshops	24,000
Travel - $350/workshop x 80 workshops	28,000
Meeting room & invitations (local donation)	(8,800)
	236,000
	x 1.1 (inflation)
	259,600

Less registration fee @ $25/person	100,000
	159,600
Training Program	
Instructor time (local donation)	(25,000)

Energy Savings

The methodology for estimating energy savings due to the program measure for existing commercial buildings is based on the following formula:

$$\text{Energy Savings} = \text{square feet of space} \times \text{BTU savings per sq. ft. per year} \times \text{fraction of sq. ft. affected}$$

This formula was applied to office buildings, retail stores, hospitals, and a miscellaneous buildings category. Estimates of space in these four building types were based on the Project Independence Task Force Report and the Impact Assessment of ASHRAE Standard 90-75 by A. D. Little, Inc. These are the same documents used by FEA in its methodologies for thermal and lighting standards.

Savings estimates were somewhat subjective and ranged from 15% for hospitals to 30% for offices. These estimates seem realistic in the light of several studies.

Since the program is rather ambitious and there will be a substantial economic incentive for building owners and managers to reduce consumption, estimates of the proportion of existing floor space affected by 1980 were set at fifty (50) percent for each building type. To avoid double-counting, savings due to thermal and lighting standards for existing buildings were deducted from estimates for this program. The net result was estimated savings of 48.33 trillion BTU's, which is 0.54 percent of projected 1980 consumption.

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NEW RESIDENCES

Objective

To conserve 7.93 trillion BTU's of energy in 1980 (0.09 % of Texas' projected consumption) by increasing the efficiency of new homes/apartments and associated equipment.

Narrative

Mandatory codes are being developed and adopted by local cities to increase the efficiency of new residences; however, codes only provide for a minimum level of efficiency. Greater savings can be accomplished through innovative and quality construction practices and the selection of higher efficiency appliances and HVAC equipment. Alternative energy systems may provide for a reduction in the consumption of traditional energy sources. Builders are of a necessity profit oriented and therefore will incorporate only items which will provide a return to the consumer. Therefore, education must occur in both the production and consumption sectors. Prospective buyers must become more aware of the value of energy saving features and appliances. Education of the consumer must occur such that he may realize that energy efficiency is most economically purchased with inexpensive mortgage money as opposed to retrofits financed out of pocket. Lenders need to be informed of the value of loaning more money for an energy efficient home rather than an inefficient home where utility bills make the monthly outlay for the owner higher. The lenders have an opportunity to lend more money and reduce the risk of forfeiture since the borrower is financially less sensitive to increasing utility costs.

The following program elements will be developed to accomplish the objective.

Home Builders and Financiers Workshop

This program element would be implemented through a series of thirty (30) workshops for apartment and/or home builders, financiers and utility representatives. The purpose of the workshop is to inform the participants of the benefits and techniques of increasing energy efficiency of dwellings and associated equipment and

of the need and methods to recognize total life cycle costs in the financing of new dwellings. The workshops would be conducted by the Governor's Office in conjunction with local home builders associations and savings and loan associations.

Each workshop would be no more than one and one-half day long and be limited to fifty (50) participants. Discussion would center on topics such as alternative energy possibilities, energy conscious home or apartment design, potential changes in building codes, and innovative financing methods and sales techniques.

Awareness Campaign

In addition to the workshops, the Governor's Office would conduct a statewide public awareness campaign to provide new home buyers with factual up-to-date printed material on what to look for in new homes such as thermal efficiency, appliance efficiency, orientation, etc.

Support would be provided by local real estate associations. Printed material would be distributed to local real estate associations. The associations would serve as a central focal point in which new home buyers could obtain pertinent information on homes.

Milestones

3rd Quarter, 1977

Collect and evaluate materials for home builders' workshops.

Collect and evaluate existing materials for statewide awareness campaign for new home buyers.

Develop publications and develop marketing program.

4th Quarter, 1977

Develop additional materials for the workshops.

Finalize agendas and schedule workshops.

Prepare the awareness campaign for initial distribution.

1st Quarter, 1978

Conduct eight (8) workshops.

Begin distribution of awareness campaign materials.

2nd Quarter, 1978

Conduct seven (7) workshops.

Continue distribution of awareness campaign materials.

3rd Quarter, 1978

Conduct eight (8) workshops.

Continue the awareness material distribution.

4th Quarter, 1978

Conduct seven (7) workshops.

Continue the awareness materials distribution and update the awareness materials.

1979

Continue the awareness materials distribution.

Produce the awareness materials for 1979.

1980

Produce the awareness materials for 1980.

Continue distribution of the awareness materials.

Budget

YEAR	SECP FUNDS	OTHER FUNDS	TOTAL
1977	56,000	-0-	56,000
1978	189,250	62,500	251,750
1979	137,825	25,000	162,825
1980	144,375	25,000	169,375
TOTAL	527,450	112,500	639,950

1977 TOTAL $56,000

Workshop for Home Builders

Collect and evaluate materials 2 man months	7,000
Develop additional materials 4 man months	14,000
Develop agendas and schedule 2 man months	7,000
	28,000

Information for New Home Buyers

Collect and evaluate existing materials - 2 man months	7,000
Develop publication - 4 man months	14,000
Develop marketing program - 2 man months	7,000
	28,000

1978 TOTAL $189,250

Workshops for Home Builders

Produce materials - $25/person x 50 persons/meeting x 30	37,500
Staff - 9 man months	31,500
Special speakers @ $300/workshop x 30 workshops	9,000
Travel @ $350/workshop x 30	10,500
Survey - 2 man months	7,000
	95,500
Less Registration fee @ $25/person	(37,500)
	58,000

Information for New Home Buyers

Produce materials -$1.50/cy x 75,000 cy	112,500
Distribution to localities	18,750
Local distribution (donation)	(25,000)
	131,250

1979 TOTAL $137,825

Information for New Home Buyers

Produce materials - $1.50/cy x 75,000	112,500

Distribution to localities	18,750
Local distribution (donation)	(25,000)
	131,250
x	1.05 (inflation)
	137,825

1980	TOTAL	$144,375
Information for New Home Buyers		
Produce materials - $1.50/cy x 75,000	112,500	
Distribution to localities	18,750	
Local distribution (donation)	(25,000)	
	131,250	
x	1.1 (inflation)	
	144,375	

Energy Savings

Energy savings calculations for new residences were based on the same methodology as that used for existing residences. The methodology is described under the program measure narrative for existing residences. Because of program measure overlaps, the savings due to thermal standards were deducted from the gross estimates and the net result was estimated savings of 7.93 trillion BTU's, which is 0.09 percent of projected 1980 consumption.

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EXISTING RESIDENCES

Objective

To conserve 104.25 trillion BTU's of energy in 1980 (1.17 % of Texas' 1980 projected consumption) by providing several levels of energy audit assistance and consumer information about conservation products and habits.

Narrative

Residential energy consumption is nearly as much a function of occupant action as it is of construction or heating and cooling systems. Therefore, an educated consumer is a very effective mechanism for saving energy.

Programs are needed to provide individuals with quantitative information concerning what energy savings might be expected from different decision alternatives. More and more individuals are being flooded with energy conservation suggestions and products. This inundation of generalized information results in confusion and uncertainty concerning possible energy conservation investments and apathy regarding a more energy conscious life style. The energy consumer can be expected to make a rational economic decision only when the individual believes his decision is based on case specific credible information. Therefore, the program has to deliver substantive information to individuals that allow the consumer to educate himself or receive assistance from a creditable source. It would be impossible to motivate all the consumers to educate themselves regardless of the availability of information. Therefore, the implementation must be accomplished through the use of dual strategies: (1) information and education, and (2) technical assistance.

Information and Education

Utilities Workshops

The Public Utilities Commission would serve as the lead agency in hosting a series of workshops for utilities, local city officials and lending institutions. The purposes of the workshops are to encourage utilities or a combination of utility/lending institutions to

finance home retrofit, and to provide utilities with "state approved" do it yourself home audit/evaluation materials. The materials would be simple enough for the average person to work out and would include representative examples. This information would be disseminated through the utility companies.

The workshops would be conducted in twenty-six (26) locations within the state. They would be limited to fifty (50) participants (operating executives and marketing managers of utilities, lending executives, and city officials) and last no longer than one day. Topics covered would include but not be limited to innovative financing of home retrofit, marketing techniques, and provision of energy audit services.

Local Energy Audit Assistance

As a second project, the Governor's Office would, in conjunction with local governments, conduct a home energy audit/evaluation service. Acting as the lead agency, the Governor's Office of Energy Resources would provide printed materials and related technical information on the home energy audit/evaluation service. It would also provide a publicity package, technical assistance, and partial financial assistance.

This program element would provide a mechanism similar to the Federal Energy Administration's Project Conserve through which home owners, exercising a minimal amount of effort, (supplying specific kinds of information on his residence to a coordinator in participating localities*), could obtain estimated energy and dollar savings and approximate costs for increasing the energy efficiency of his residence. This information would provide the homeowner with estimated potential dollar savings from such retrofit actions as adding storm windows, storm doors, ceiling insulation, caulking and weather stripping, and adjusting thermostat settings. A home owner would return completed materials to a coordinator and obtain estimates by mail or could use the phone hot line to obtain estimates. The estimates would include contractor installed and do it yourself cost ranges for each recommendation and an estimate of the savings potential and payback period for each suggested action. The first participating locality would serve as a pilot project for early evaluation and analysis and test of dissemination mechanism. This program would be supported by a media campaign in each participating locality.

Statewide Awareness

As a third project, the Governor's Office would

* Texas A&M University has applied for funding of a local coordinator for Dallas. This project and the project described above would be coordinated.

conduct a statewide awareness campaign on energy efficient consumer purchasing, efficient use of home appliances, furnaces and air conditioners. Materials produced at the state level would be disseminated to the state's radio, television and newspapers. The various media would disseminate the information as a public service.

Technical Assistance

Weatherization

Direct technical assistance would be provided through the weatherization program. The Department of Community Affairs would coordinate the program.

Training for Home Energy Auditors

Indirect technical assistance would be provided through a series of systematic training courses for home energy auditors. This project would insure that home owners who choose to use a private contractor would have the most up-to-date and best technical assistance available. This project would, therefore, allow home owners a third option - requesting audit assistance for the private sector - for conducting energy audits/evaluations of their residences. The Governor's Office of Energy Resources would act as lead agency for this project.

Each training course would be approximately forty (40) hours of instruction and would be limited to fifteen (15) participants. The primary focus would be on such topics as how to perform a home energy audit/evaluation*, cost effectiveness of conservation options, marketing techniques for home retrofit, financing home retrofit and economics and engineering of solar retrofit. Successful completion of the course (to include passage of a written exam) would entitle the individual to be listed on the Governor's List of Certified Home Energy Auditors.

Milestones

3rd Quarter, 1977

Collect and evaluate materials for utilities workshops.

Develop additional workshop materials.

Collect and evaluate materials for local energy audit assistance.

Develop additional audit assistance materials.

Develop concept for statewide awareness campaign.

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* Includes an analysis of energy savings opportunities for existing residential structures and complete cost/benefit of each conservation strategy recommended.

Collect and evaluate materials for home energy auditors training course.

Develop additional materials for training course.

4th Quarter, 1977

Finalize agendas and schedule utilities workshops (26).

Travel to prospective participating localities to be involved in local energy audit assistance program.

Produce and distribute statewide awareness campaign materials (for 1978 campaign).

Develop training course and schedule for 1978.

Produce materials for first three (3) courses.

1st Quarter, 1978

Produce utility workshop materials.

Conduct seven (7) utilities workshops.

Produce materials for local audit offices.

Develop publicity packets for local audit offices.

Conduct local coordinator training.

Conduct four (4) training courses for home energy auditors.

2nd Quarter, 1978

Conduct six (6) utility workshops.

Produce publicity packet materials for local audit offices.

Begin local energy audit assistance programs.

Provide financial assistance (grants) to first set of participating localities.

Conduct four (4) training courses for home energy auditors.

3rd Quarter, 1978

Conduct six (6) utility workshops.

Conduct four (4) training courses for home energy auditors.

4th Quarter, 1978

Conduct seven (7) utility workshops

Update and distribute statewide awareness campaign materials (for 1979 program).

Conduct four (4) training courses for home energy auditors.

Produce materials for home energy auditor training (for 1979 courses).

1979

Produce materials for local energy audit assistance program.

Continue local energy audit assistance.

Provide local grants for 1979.

Update and distribute publicity packet for local energy audit assistance program.

Conduct sixteen (16) training courses for home energy auditors.

Produce materials for home energy auditor training (for 1980 courses).

1980

Produce materials for 1980 local energy audit assistance program.

Provide grants to participating localities.

Update and distribute publicity packet for local energy audit assistance program.

Update and distribute materials on statewide awareness campaign.

Conduct seventeen (17) training courses for home energy auditors.

Budget

YEAR	SECP FUNDS	OTHER FUNDS	TOTAL
1977	138,550	-0-	138,550
1978	809,750	985,600	1,795,350
1979	829,140	1,353,000	2,182,140
1980	832,260	1,528,000	2,360,260
TOTAL	2,609,700	3,866,600	6,476,300

1977 TOTAL $138,550

Utilities workshops

Collect and evaluate materials
9 man months 31,500

Develop additional materials 3 man months	10,500
Finalize agendas and schedule workshops - 2 man months	7,000
	49,000

Local Energy Audit Assistance

Collect and evaluate materials 2 man months	7,000
Develop additional materials 6 man months	21,000
Travel to localities @ $200/ trip x 19 trips	3,800
	31,800

Statewide Awareness

Develop concept, schedule - 2 man months	7,000
Production of 1978 campaign 6 man months	21,000
Distribution	10,000
	38,000

Training for Home Energy Auditors

Collect and evaluate materials 2 man months	7,000
Develop additional materials 2 man months	7,000
Develop course and schedule 1978 - 1 man month	3,500
Produce materials for 1st 3 courses - $50/person x 15 persons/course x 3 courses	2,250
	19,750

1978 TOTAL $809,750

Utilities workshops

Staffing for 26 workshops 8 man months @ $3,500	28,000
Produce workshop materials $75/person x 50 persons/workshop x 26	97,500
Travel @ $400/workshop	10,400
Meeting rooms and invitations (local donation)	(2,600)
	135,900

Local Energy Audit Assistance

Produce materials @ $ .05/ home x 450,000	22,500
Staffing - 3 man months	10,500
Materials - $100/person x 19	1,900
Travel - $700/person x 19	13,300
Develop publicity concept 1 man month	3,500
Produce publicity materials 3 man months	10,500
Local grants for 6 months operation	235,000
Local match (donation)	(225,000)
Computer terminals	100,000
Computer time sharing (.20/ audit)	136,800
	534,000

Statewide Awareness

Update materials and distribute for 1979 - 6 man months + $5,000	26,000
Radio/TV/Newspaper space (donation)	(50,000)
	26,000

Training Program for Home Energy Auditors

Instructors for 16 courses 16 man months	56,000
Initial evaluation/revision 1 man month	3,500
Materials for remaining 1978 courses - $50/person x 15 persons/course x 13 courses	9,750
Travel @ $1,100/course x 16	17,600
Special speakers @ $500/ course x 16	8,000
Update materials and schedule 1979 courses - 2 man months	7,000
Produce materials for 1979 courses - $50/person x 15 persons/course x 16 courses	12,000
Meeting rooms and invitations (local donation)	(8,000)
	113,850
Weatherization Program	(700,000)

1979 TOTAL $829,140

Local Energy Audit Assistance

Produce materials .05/home x 900,000	45,000
Local grants for 1979	470,000
Local match (donation)	(470,000)
Computer time sharing (.20/form)	136,800
Update and distribute publicity packet - 3 man months	10,500
	662,300
x	1.05 (inflation)
	695,415

Statewide Awareness

Update and distribute materials for 1980 - 6 man months + $5,000	26,000
Radio/TV/Newspaper space (donation)	(50,000)
	26,000
	x 1.05 (inflation)
	27,300

Training Program for Home Energy Auditors

Instructors for 16 courses 16 man months	56,000
Travel @ $1,100/course	17,600
Special speakers @ $500/course	8,000
Update materials and schedule 1980 courses - 2 man months	7,000
Produce materials for 1980 $50/person x 15 persons/course x 17 courses	12,750
Meeting rooms and invitations (local donation)	(8,000)
	101,350
	x 1.05 (inflation)
	106,425
Weatherization	(825,000)

1980 TOTAL $832,260

Local Energy Audit Assistance

Produce materials for 1980 .05/home x 900,000	45,000
Local grants for 1980	470,000
Computer time sharing (.20/form)	136,800
Local match (donation)	(470,000)

Travel @ $300/trip x 38	7,600
Update publicity packet 3 man months	10,500
	669,900
x	1.1 (inflation)
	736,890

Statewide Awareness

Radio/TV/Newspaper space (donation)	(50,000)

Training Program for Home Energy Auditors

Instructors for 17 courses - 17 man months	59,500
Travel @ $1,100/course	18,700
Special speakers @ $500/ course	8,500
Meeting rooms and invitations (local donation)	(8,000)
	86,700
x	1.1 (inflation)
	95,370

Weatherization	(1,000,000)

Energy Savings

Since the residential sector is relatively large, care has been taken in calculations of estimated savings due to this program. The methodology used to calculate energy savings is based on several factors that were felt to be important, including differences in single-family dwellings, multi-family dwellings and mobile homes, differences in structural characteristics of homes built in different periods of time, and differences in the cost of implementing various energy saving measures. Each energy saving measure was

classified into one of two types: (1) weatherization measures (such as insulation, storm windows and doors) which are rather costly, or (2) life-style measures (such as efficient thermostat settings and efficient use of appliances) which can be done at low cost. Potential savings percentages and compliance ratios were subjectively estimated for each of the program measures and structure categories and an overall percentage savings was determined. This amount was reduced by savings due to the thermal standards program and the net result was 104.25 trillion BTU's or 1.17 percent of 1980 projected consumption.

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AGRICULTURE

Objective

To conserve 10.95 trillion BTU's of energy in 1980 (0.12 % of Texas' 1980 projected consumption) by promoting conservation in the agricultural sector.

Narrative

While energy consumption for Texas agriculture accounts for less than two (2)* percent of the total gross energy used in the state, it is important to consider this sector in the implementation of a State Energy Conservation Program. Agriculture has more economic impact in Texas than any other industry. Nationally, Texas ranks third in cash receipts from agricultural production. The agricultural products from the vast land resources and unique climate of Texas is essential to meet the food and fiber needs of the state and nation.

Energy is essential for adequate food and fiber production to meet the world's needs. The agricultural industry in Texas and the United States has mechanized and freed vast amounts of labor for work on other industries. The food and fiber output of the American farmer is higher than most farmers in the world, but this high output can be sustained only through continued availability of energy.

As a productive industry, agriculture is annually responsible for between five and twelve (5-12) percent of the nation's energy consumption. The importance of agricultural products has increased because of the nation's balance of trade situation, a condition which adds to the need for providing continued growth of a viable agricultural industry in Texas and the United

* While the end consumption is only two (2) percent, the total energy consumption that is related to agriculture is approximately sixteen (16) percent. This includes the energy used in the transportation, storage, processing, marketing, purchasing and preparing of agriculture products; however, energy consumption for these agriculture related activities are reflected in the transportation, industrial, residential and commercial program measures.

States. The energy consumed in Texas agricultural production benefits many and is essential for a viable industry; the energy conserved in Texas agricultural production will benefit many and strengthen the industry.

The agricultural energy conservation program would be implemented by actions to establish and utilize more effective channels of communication between the sources of accurate information and the full and part-time farmers and ranchers of the state.

The Agricultural Extension Service of Texas A&M University, as lead agency, would be responsible for providing a comprehensive clearinghouse for agriculturally related energy information. The primary objective of this activity is to collect, verify and disseminate accurate and practical information on energy conservation measures, techniques and technology relevant to rural pursuits and agricultural production. The clearinghouse will focus on basic topics which include, but are not, limited to, energy conserving crop drying processes, techniques and technology, energy conserving measures relating to fertilizers, pesticides and agricultural wastes, results from research on cropping patterns, alternate sources of power for irrigation pumps, and other agricultural energy conservation projects. The program will be designed to complement and supplement existing information networks by providing timely, tested material to newsletters, magazines, committee meetings, conferences, and other information transfer channels. A secondary objective of this activity is to provide information on specific agricultural energy conservation projects and the general agricultural situation to the people of Texas.

The Governor's Office of Energy Resources, the Texas Department of Agriculture, the Texas Department of Community Affairs, the University of Texas system, the Texas A&M system, the University of Houston, and Texas Tech would provide support to the activity by providing pertinent information to the clearinghouse and by providing their existing avenues to disseminate and assemble data. Further support of this activity would be sought from farming and ranching associations and organizations and local, state and federal governmental agencies dealing in rural and agricultural areas. This program will be monitored by tabulating both the aggregate number and specific type of information transfer, measuring the utility and effectiveness of the information by a sample survey of the recipients and by monitoring the energy consumption in the agricultural sector.

Special Note: Because energy efficiency is critical to the economic viability of many of our farms and ranches and to the Texas social/economic systems, the Agriculture Sub-committee of the State Energy Conservation Plan Advisory Committee recommended a

significant increase in funding be provided for such other programs as demonstration of efficient irrigation systems and a 4-H energy conservation contest; however, it is anticipated that the Energy Extension Service will provide additional funds for the agriculture sector which will supplement this program.

Milestones

3rd Quarter, 1977

Collect and evaluate information on current energy conservation measures in the agricultural sector.

Design information dissemination procedure.

4th Quarter, 1977

Continue to collect and evaluate and begin to disseminate information on energy conservation measures in the agricultural sector.

1st Quarter, 1978

Collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

2nd Quarter, 1978

Continue to collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

3rd Quarter, 1978

Continue to collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

4th Quarter, 1978

Continue to collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

Prepare annual program report for the Governor's Office.

1979

Continue to collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

Prepare annual program report for the Governor's Office.

1980

Continue to collect, evaluate and disseminate information on energy conservation measures in the agricultural sector.

Prepare annual program report for the Governor's Office.

Budget

YEAR	SECP FUNDS	OTHER FUNDS	TOTAL
1977	55,000	5,000	60,000
1978	90,000	10,000	100,000
1979	94,500	10,000	104,500
1980	99,000	10,000	109,000
TOTAL	338,500	35,000	373,500

1977 TOTAL $55,500

Collect, evaluate and disseminate information - 12 man months	42,000
Prepare and publish information 3 man months	10,500
Support, supplies and printing	3,000
Distribution (donation)	(5,000)
	55,500

1978 TOTAL $ 90,000

Collect, evaluate and disseminate information - 18 man months	63,000
Prepare and publish information 6 man months	21,000
Support, supplies and printing	6,000
Distribution (donation)	(10,000)
	90,000

1979 TOTAL $ 94,500

Collect, evaluate and disseminate information - 18 man months	63,000
Prepare and publish information - 6 man months	21,000

Support, supplies and printing	6,000
Distribution (donation)	(10,000)
	90,000
x	1.05 (inflation)
	94,500

1980	TOTAL	$ 99,000
Collect, evaluate and disseminate information - 18 man months	63,000	
Prepare and publish information - 6 man months	21,000	
Support, supplies and printing	6,000	
Distribution (donation)	(10,000)	
	90,000	
x	1.1 (inflation)	
	99,000	

Energy Savings

FEA methodology has been used to calculate energy savings due to the agricultural program measure. Data on potential fuel savings were taken from a study by Texas A&M University. In that study it was estimated that maximum savings of 42% could be achieved in motor fuels used in irrigation, 31% for electricity in irrigation, and 25% in machinery operations. Savings for other operations were negligible.

Since these estimates represented potential maxima, in the calculations a 30% average reduction was assumed for irrigation motor fuels, 25% for irrigation electricity and 15% for machinery operations. Machinery operations include preplanting, planting, cultivating, fertilizing, and application of pesticides. Compliance factors of 33 1/3% were used for irrigation and 30% for machinery operations.

The overall result was estimated savings of 10.95 trillion BTU's or 0.12% of total 1980 projected consumption.

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LOCAL ENERGY CONSERVATION

Objective

To conserve 12.12 trillion BTU's of energy in 1980 (0.14 % of Texas' 1980 projected consumption) by using local code and ordinance powers to increase the efficiency of the residential and commercial sectors, by establishing model energy management programs within the local government, and by providing innovative energy conservation services at the local level.

Narrative

Local governments are closest to and are direct extensions of the people. Consequently, the energy concerns of cities mirror and magnify those of the state and federal government. It is a fairly recent realization that no longer is there water to waste, oil to spill or money to burn. This recognition, that the apparently abundant riches of this nation, and the world, are dwindling to a definite end has caused a sense of frustration at the government's apparent inability to anticipate and address the problems of our time. The concern that the governmental institutions and processes have not responded to changes in the environment that they are supposed to understand and manage is felt both by those being governed as well as by those responsible for governing.

Prompted by expressed and perceived concern, local public officials and leaders are moving to improve the processes involved in addressing comprehensive and critical issues such as energy conservation. In their day-to-day operations of providing for the public good and protecting the public interest, local communities are a microcosm of energy issues which exist throughout the state and nation. As community services are expanded and standards of living are elevated, greater demands on energy and resources are required. As the demand for energy increases, conservation practices can substantially abate or postpone a crisis of shortage. Conservation of resources can provide an opportunity for technology to reach beyond conventional materials in meeting energy needs. Surviving the transitional years will require not only the political will and skill necessary to implement conservation measures,

but also the imagination, intelligence and leadership assets of the general public necessary to develop new energy conservation alternatives.

This program measure would be implemented by voluntary actions of local public officials, adminstrators, managers and planners.

The Governor's Office of Energy Resources would, as the lead agency, be responsible for developing and co-hosting a series of twenty-six (26) one-day regional workshops. A grant fund for innovative programs would be established for locally designed and desired demonstration projects.

Workshops

The regional workshops would be multipurposed. Attendees would be local elected officials, city managers, departmental directors, building code enforcement personnel, local purchasing directors, planning officials and public facility managers/ engineers. The workshops would be aimed at assisting local governments establish meaningful energy conservation programs. The attendees at each workshop would be limited to two hundred persons. The workshops would bring the individuals together at a single location and would provide a dynamic forum for the transfer and exchange of information on methods of influencing residential and commercial energy use patterns at the local level. Topics to be covered in the workshops would include, but not be limited to, such programs as public transportation and carpool promotion, energy conservation codes and ordinances, energy conservation management methods for city owned facilities, energy conservation management of city vehicle fleets, energy conscious procurement practices, establishment of local energy outreach programs, public awareness and public participation programs and overall management and administration of local energy conservation programs. Participants in the workshops would be provided with specific, detailed written material on each topic. They would also receive a listing of key program personnel at both the state and federal level. The workshops would be co-hosted with the Texas Municipal League and the Texas Association of Counties. Materials developed for the workshops would be provided to the co-hosts for use with their constituency. Additional materials would be developed for use in the magazines and newsletters of the co-hosts and assistance would be provided in assisting the co-hosts coordinate energy conservation presentations at their respective annual conferences. The support and involvement of other state agencies would be sought. These agencies would include the Texas Department of Community Affairs, the State Department of Highways and Public Transportation, the Public Utility Commission, the Board of Control, the State Building Commission and the Texas Advisory Commission on Intergovernmental Relations.

Grants

An annual grant fund would be established to provide local communities with adequate resources to undertake innovative energy conservation projects at the local level. Proposals from local communities would be accepted on an annual basis in conjunction with the federal funding cycle. The basic criteria for selection of project proposals would include that they be a primary energy conservation program, that they cannot duplicate other state/federal conservation projects in the area and that they have a high degree of application transferability to other communities. Proposals with a cost/benefit ratio of more than 10¢/million BTU saved would not be accepted.

Milestones

3rd Quarter, 1977

Assemble and evaluate materials.
Prepare and print information.
Arrange with co-hosts to develop workshop agenda and locations.
Develop and publish the Local Innovative Project Grant Fund guidelines and criteria.

4th Quarter, 1977

Co-host two (2) local workshops.
Evaluate the effectiveness of the individual workshops.
Collect and prepare materials for future workshops.
Review, select, and fund the Local Innovative Grant Proposals.

1st Quarter, 1978

Co-host two (2) local workshops.
Evaluate the effectiveness of the individual workshops.
Collect and prepare materials for future workshops.
Monitor and evaluate the selected Local Innovative projects, and publish results.

2nd Quarter, 1978

Co-host two (2) local workshops.
Evaluate the effectiveness of the individual workshops.
Collect and prepare materials for future workshops.
Monitor and evaluate the selected Local Innovative projects, and publish results.

3rd Quarter, 1978

Co-host two (2) local workshops.
Evaluate the effectiveness of the individual workshops.
Collect and prepare materials for future workshops.
Review, select and fund the Local Innovative Grant Proposals.

1979

Co-host eight (8) local energy conservation workshops.
Evaluate the effectiveness of the individual and aggregate workshop program.
Collect, update, and prepare materials for future workshops.
Select, monitor, and evaluate Local Innovative Projects and publish results.

1980

Co-host eight (8) local energy conservation workshops.
Evaluate the effectiveness of the individual and aggregate workshop program.
Collect, update, and prepare materials for future workshops.
Select, monitor, and evaluate Local Innovative Projects and publish results.

Budget

Year	SECP Funds	Other Funds	Total
1977	261,000	100,300	361,300
1978	320,000	101,200	421,200
1979	336,000	101,200	437,200
1980	352,000	101,200	453,200
TOTAL	1,269,000	403,900	1,672,900

1977 TOTAL $261,000

Local Workshops

Collect and evaluate materials - 3 man months	10,500
Prepare new materials - 2 man months	7,000
Develop agenda, schedule and make workshop arrangements - 1 man month	3,500
Materials production for 2 workshops - $30/person x 200 persons/workshop x 2 workshops	12,000
Speaker fees @ $1,000/workshop x 2 workshops	2,000
Meeting rooms & invitations (donation)	(300)
Travel @ $1,000/workshop x 2 workshops	2,000
	37,000

Local Innovative Projects

Develop Guidelines and criteria - 2 man months	7,000
Publish guidelines and criteria	10,000
Grant funds	200,000
Local match	(100,000)
Grant administration - 2 man months	7,000
	224,000

1978 TOTAL $320,000

Local Workshops

Collect and evaluate materials - 6 man months	21,000
Prepare new materials - 4 man months	14,000
Develop agenda, schedules and make workshop arrangements - 2 man months	7,000
Materials Production for 8 workshops - $30/person x 200 persons/workshop x 8 workshops	48,000
Speaker fees @ $1,000/workshop x 8 workshops	8,000
Meeting rooms & invitations (donation)	(1,200)
Travel @ 1,000/workshop x 8 workshops	8,000
	106,000

Local Innovative Projects

Grant funds	200,000
Local match	(100,000)
Grant administration - 4 man months	14,000
	214,000

1979	TOTAL	$336,000
Workshops	106,000	
Local contribution	(1,200)	
Local Innovative Projects	214,000	
Local match	(100,000)	
	320,000	
	x 1.05	(inflation)
	336,000	

1980	TOTAL	$352,000
Workshops	106,000	
Local contribution	(1,200)	
Local Innovative Projects	214,000	
Local match	(100,000)	
	320,000	
	x 1.1	(inflation)
	352,000	

Energy Savings

Approximately $1.2 million of the budget (including local matching funds) of this program are allocated to the Innovative Projects program for local governments. Since it is impossible to anticipate the content of local projects at this time, savings cannot be directly estimated. However, if it is assumed that projects will not be funded unless the cost per million BTU's saved is at least as low as the maximum of the optional program costs, then savings can be indirectly estimated. The maximum cost per million BTU in the optional programs is 8¢. Rounding this to 10¢ gives a minimum of 12 trillion BTU's which can be saved through this program element ($1.2 x 10^6/$0.10 per million BTU).

In addition, calculations for the local conservation program have been made for savings associated with purchase of energy-efficient automobiles. Data on the per capita purchase of autos were obtained for the City of Austin and extrapolated to other urban areas of the state. The methodology used was the same as that for the mandatory government procurement program. This resulted in estimated savings of 0.12 trillion BTU's, or less than 0.01 percent of projected 1980 consumption.

The total savings for this program are expected to be 5.12 trillion BTU's, which is 0.06 percent of projected 1980 consumption.

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PUBLIC SCHOOLS

Objective

To conserve 22.05 trillion BTU's of energy in 1980 (0.25 % of Texas' 1980 projected consumption) by promoting energy management in public school facilities and by the development and use of energy conservation education curricular materials.

Narrative

An informed and enlightened citizenry has often been held to be the nation's primary defense against threatening forces. Whether individuals squander energy resources through ignorance or inefficiency, the results are the same and universal in effect. It would appear obvious, and indeed quite appropriate, to apply this concept to the contemporary need for energy conservation education in the daily pursuit of all Americans. While this need is being met on a small and fragmented scale in Texas, a broader, more systematic and comprehensive effort in this area is desirable.

A survey conducted by the University of Houston found that there are fewer than a dozen energy related curricular projects at the local district level. Despite the educational efforts by industry and other organizations, the conservation message is either not heardor not accepted. Few students and teachers are aware of what constitutes energy and energy conservation and fewer know how energy sources are discovered and the time and cost associated with exploration.

A series of five regional hearings sponsored by the Federal Energy Administration in 1976, to determine current status and future needs of in-school energy education, reinforced the need for a large scale, systematic and comprehensive approach in energy conservation education. The hearings also brought into clear focus the need for teacher training and the use of energy education materials.

An ERDA publication, Energy and Environment: Citizen's Workshop Handbook, emphasizes the need for an informed citizenry who has the basic information needed to make wise choices on matters concerning energy.

To adequately prepare the citizens of Texas to deal with energy conservation, one should not overlook the role of the public schools. It is imperative that today's youth be prepared to meet and accept the responsibilities of the future.

A survey conducted by Region XIII Education Service Center indicated that teachers are desirous of becoming aware of the issues embodied in energy education, of the importance of the place this subject should hold in the total school program, and of ways in which this subject can be integrated into existing curricula. Evidence exists which suggests that the critical nature of energy issues has spawned not only timely information but much misinformation as well. Therefore, teachers and students would benefit greatly by having access to appropriate and functional instructional materials which present up-to-date and accurate information in a well organized manner.

According to a report (Three Energy Conservation Audits for Schools - Chicago Study Summary), schools represent the largest and most homogeneous group of public buildings in the United States. Regardless of their locations, public schools are the most conspicuous buildings in any community. Estimates suggest that at least one-third of the populace in the majority of communities is directly involved in the education process.

A study by the American School and University (1972) magazine revealed that the median United States school district spends about $270 for each 1,000 square feet. The National Science Foundation has found that today's school buildings waste as much as forty (40) percent of the energy they consume. A simple calculation shows that taxpayer's money in the amount of $108 per 1,000 square feet of educational plant went up the chimney or out of the door in a median school district.

Recently, energy conservation efforts by school districts have shown that dramatic and immediate savings of energy and tax dollars are possible. Data gathered by the Educational Facilities Laboratory (EFL) indicates that significant amounts of energy and dollars can be saved in a typical elementary school by reducing energy waste and even more in secondary schools. Schools clearly have the opportunity to set a community example for energy conservation.

For the purposes of this program, public schools are viewed as an educational facility composed of physical plant, students, teachers, administrators, materials, support staff and program. Viewed in this manner, three (3) levels at which energy conservation strategies can be developed and implemented are identifiable. These levels are:

1. The programmatic - the education program (curriculum) and schedule of activities taking place at the school.

2. The operational - how the facility and its supporting systems are run to house and support the educational activities.

3. The physical plant and its operating system - the buildings and their mechanical equipment.

Implementation of the elements in this program would be accomplished by the use of two approaches. The first approach would be directed at the school facilities (combination of levels 2 and 3) and the second would be aimed at the school curriculum (level 1).

Structuring the approach to public schools program in this fashion allows for ease of conducting one or several of the elements of the program independently of one another without undue interruption of the educational process. However, there is a prevailing school of thought that expresses the desirability and merit of conducting programs that impact schools concurrently, to the extent possible, in order to maximize the percent of market penetration and, subsequently, energy savings by this target group.

The following program elements would be developed to accomplish the objective.

On-Site Audit Pilot Program for Public Schools

The Governor's Office in conjunction with the Texas Education Agency would provide grants to a school district in one education region of the state to assist and encourage on-site energy audits. Since it would not be practical to provide audit assistance for all facilities in a particular district (due to the large number of buildings owned and operated by school districts and obvious financial limitations), the grants would be used to conduct audits in one of each generic type of building in the district selected, i.e. type ten - school buildings built prior to 1940, type twenty (type twenty-two if air conditioned) - school buildings built between 1945 and the present, and type thirty - school buildings built since about 1965. Copies of the audit reports would be made available to other school districts since the majority of the school buildings in use presently would fall under one of the above generic types and would also serve as excellent case reports for use in the facilities workshops of the public school's program. During the pilot program, a report would be prepared detailing statistical information on public schools throughout the state, in order to estimate the cost and complexity of extending the audit program statewide.

The Texas Education Agency would provide support by assisting in the monitoring and evaluation of the program which would be conducted by a follow-up inspection one year after the original audit and by tracking the progress by the district through the

energy reporting system set up. Since the major portion of the work involved in an on-site audit is the development of an appropriate procedure for a specific school plant, the follow-up would be conducted in a short time frame and at minimal expense.

The Texas Education Agency would act as the lead agency and would conduct a series of regional workshops for school district administrators (facility managers, purchasing officers and transportation officers) to encourage and assist school districts in instituting and/or upgrading energy management programs. Each workshop would be one day in length and focus on such topics as intra-district auditing and evaluation procedures, extra-district services available (government programs and consulting firms), solar retrofit, financial considerations, energy conservative design of new facilities, life cycle costing/procurement practices, vehicle fleet management/conservation techniques and student/teacher/parent involvement.

Support would be provided by the Governor's Office of Energy Resources and Regional Education Service Centers. The Governor's Office would provide printed materials and coordination for the program and the Regional Service Centers would provide space and administrative support in each region.

As the lead agency, the Texas Education Agency (TEA) would monitor and evaluate the program through the establishment of a systematic energy reporting system through which all public school districts would submit energy consumption data to TEA on a periodic basis. This would allow for easy tracking of school district program and tabulation of overall energy savings. TEA would monitor and evaluate further, through its annual mid-winter conference for school administrators, by allocating an ample amount of time during the conference for information sharing and exchange of ideas on problems, difficulties encountered, and successes realized in energy management at the local district level. Support would be provided by the Governor's Office by supplying additional materials/speakers.

Energy Conservation Education Curriculum Workshop

The Texas Education Agency would serve as lead agency by conducting a series of seminars - one in each education region of the state - for school district curriculum administrators, coordinators and teachers. The purpose of the seminars would be to encourage the programmatic development and widespread use of energy conservation curricular materials, to request local school district cooperation and assistance in ultimate implementation of energy education courses on a statewide basis and to promote a keen awareness of energy conservation in the state's student-citizens.

The seminars would be limited to one day in length in each region and would address such topics as availability of existing energy related curricular

materials, need for additional materials, teacher involvement in materials development, incorporating energy conservation into existing curricula, feasibility of energy education courses, financial considerations and text book availability.

The Governor's Office would provide support through coordination and some partial funding of material development. Regional Service Centers would provide support and space arrangements for seminars. Local school districts would provide leave time for teachers involved.

Specialized Teacher in-Service Training

The Texas Education Agency through its in-service programs in conjunction with the support agencies would conduct a series of 252 workshops to familiarize and train teachers (elementary, middle school and secondary) in the use of energy related supplementary materials and how to incorporate materials into existing curricula. Local school districts would provide space for in-service workshops at the local district level. The Governor's Office would provide some printed materials.

Energy Conservation Module Development

The Governor's Office of Energy Resources in conjunction with the Texas Education Agency would conduct two (2) (elementary and secondary) energy conservation materials development workshops, the purpose of which would be to develop appropriate supplementary energy conservation materials for elementary and secondary school teachers. The workshops would be approximately four weeks in length and limited to twenty (20) participants in each workshop. The Governor's Office would provide partial funding and coordination. TEA would provide administrative support. Local school districts would provide support in assisting in the field test of materials developed.

Energy Education Course(s)

The Texas Education Agency would initiate the development of energy education courses appropriate for levels 1-12 and conduct, oversee, monitor, and evaluate progress toward complete implementation. The Governor's Office would provide support through promotion and coordination. Local school districts and state universities would provide support by assisting in the design, development and testing of courses.

Student Energy Awareness and Training

In cooperation with the Governor's Office of Energy Resources, TEA would host twenty (20) workshops for secondary students. The purpose of the workshops would be to promote and encourage student involvement in

energy conservation activities at home, school and in the community, and to learn energy conservation options which could be initiated by students, which would produce immediate results, and which could be shared with elementary and middle school counterparts.
Each workshop would be one day in length in each education region in the state. The Governor's Office would provide printed materials, coordination and partial funding. TEA would provide administrative support. Local school districts would provide leave time for teacher chaperons and excused absences for students involved. The Association of Student Councils under the auspices of the Association of Secondary School Administrators would provide support through assistance in the promotion and organization of workshops designed for student participation.

Milestones

3rd Quarter, 1977

Develop selection criteria (school district and contractor)
Begin material collection and evaluation for school facility workshops and curriculum coordination workshops.
Identify and select school district and contractor.
Develop additional materials for facility and curriculum workshops.
Award grant for audit.
Design and develop energy reporting systems for school districts and train TEA personnel.
Begin analysis for potential expansion of audit statewide.
Begin organizing and planning module development workshops.
Collect and evaluate materials for module development and in-service workshops.

4th Quarter, 1977

Complete analysis of potential expansion.
Produce material for facility, curriculum and in-service workshops.
Finalize agendas and schedule facility workshops, curriculum workshops and in-service workshops.
Produce audit reports.

1st Quarter, 1978

Conduct series of five (5) facility workshops.
Collect and evaluate material for student-citizen workshops.
Conduct series of twenty-one (21) in-service training workshops.
Implement reporting system in districts completing the first series of facility workshops.
Conduct series of five (5) curriculum workshops.

Survey participants in first series of curriculum workshops.

2nd Quarter, 1978

Form advisory committee for energy education courses.
Conduct series of five (5) facility workshops.
Conduct series of five (5) curriculum workshops.
Conduct series of twenty-one (21) in-service workshops.
Finalize agendas and schedule module development workshops.
Implement reporting system in districts completing second series of facility workshops.
Survey participants in curriculum workshops.
Convene advisory committee (1 meeting).

3rd Quarter, 1978

Conduct follow-up inspection in school district in which on-site audit was performed.
Conduct two (2) module development workshops.
Conduct five (5) facility workshops.
Conduct five (5) curriculum workshops.
Conduct twenty-one (21) in-service workshops.
Finalize agendas and schedule ten (10) student-citizen workshops for 4th quarter.
Produce materials for student-citizen awareness workshops.
Advisory committee meeting.

4th Quarter, 1978

Begin field test of modules developed.
Conduct twenty-one (21) in-service workshops.
Conduct ten (10) student-citizen workshops.
Conduct five (5) facility workshops.
Conduct five (5) curriculum workshops.
Complete implementation of reporting system in all school districts.
Complete survey of curriculum coordinators.
Advisory Committee meeting (2).

1979

Conduct eighty-four (84) in-service workshops.
Conduct ten (10) student-citizen workshops.
Begin implementing modules in school districts.
Monitor and evaluate facility program.
Evaluate curriculum workshops.
Begin textbook review and analysis.
Convene advisory committee (4) meetings.
Design and develop energy education courses outline.
Evaluate student-citizen program.

1980

Continue implementation and dissemination of modules in school districts.
Evaluate student-citizen programs.
Conduct eighty-four (84) in-service workshops.
Develop field test mechanisms for energy education courses and implementation schedule.
Coordinate, monitor and evaluate.

Budget

YEAR	SECP FUNDS	OTHER FUNDS	TOTAL
1977	264,000	-0-	264,000
1978	261,700	153,100	414,800
1979	332,535	204,000	536,535
1980	419,320	180,000	599,320
TOTAL	1,277,555	537,100	1,814,655

1977 TOTAL $264,000

School Facility Audits

Review and evaluate existing audit programs for school buildings - 2 man months	7,000
Develop guidelines and select district for pilot audits - 2 man months	7,000
Pilot audits - 5 buildings @ $3,000 ea.	15,000
Prepare/modify audit program for Texas school buildings 4 man months	14,000
Train TEA personnel to use program and load - 3 man months	10,500
Develop workshop materials 4 man months	14,000
Schedule workshops - 2 man months	7,000
Develop reporting system 2 man months	7,000
Produce workshop materials $25/person x 150 person/ workshop x 20	75,000
Computer terminal	3,000
	159,500

Curriculum Coordinator Workshops

Collect and evaluate existing materials - 2 man months	7,000
Develop workshop materials 3 man months	10,500
Produce workshop materials $10/person x 50 persons/workshop x 20 workshops	10,000
Finalize agenda and schedule 2 man months	7,000
	34,500

Module Development

Organize and plan program 4 man months	14,000
Collect and evaluate base materials - 3 man months	10,500
	24,500

In-Service Training

Collect and evaluate existing materials - 2 man months	7,000
Finalize agenda and schedule 2 man months	7,000
Produce workshop materials $15/person x 25 persons/workshop x 84 workshops	31,500
	45,500

1978 TOTAL $261,700

School Facility Audits

Staff for workshops - 6 man months	21,000
Speaker fees - $100/workshop	2,000
Travel @ $350/workshop	7,000
Meeting rooms and invitations (local donation)	(2,200)
Computer time @ $5/audit	5,000

TEA staff - 6 man months	21,000
Local staff time (donation)	(60,000)
	56,000

Curriculum Coordinators Workshop

Staff for workshops - 3 man months	10,500
Travel @ $250/workshop	5,000
Speaker fees @ $100/workshop	2,000
Meeting rooms and invitations (local donation)	(2,200)
	17,500

Module Development

Finalize agenda and schedule institutes - 2 man months	7,000
Participant and site selection 3 man months	10,500
Staff for 2 development institutes - 4 man months	14,000
Module development- 40 @ $600 each	24,000
Speaker fees @ $400/institute	800
Institute facilities and support (local donation)	(4,000)
Teacher/developer time (donation)	(28,000)
Reproduce and distribute modules for field test	1,200
Local district time during field test (donation)	(20,000)
	57,500

In-Service Training

Staff for workshops - 16 man months	56,000
Travel @ $250/workshop	14,700
Meeting rooms and invitations (local donation)	(9,300)
Schedule workshops for 1979 2 man months	7,000
	77,700

Student-Citizen Awareness

Collect and evaluate materials 2 man months	7,000
Develop workshop materials - 3 man months	10,500
Schedule workshops - 2 man months	7,000
Produce workshop materials $10/person x 50 persons/ workshop x 10 workshops	5,000
	29,500

Energy Education Courses

Form Advisory Committee - 1 man month	3,500
Staff for Advisory Committee meetings - 4 man months	14,000
Advisory Committee travel @ $1,500/meeting	6,000
Advisory Committee time (donation)	(9,600)
	23,500

1979 TOTAL $332,535

School Facility Audits

TEA staff time - 12 man months	42,000
Computer time @ $5/audit	10,000
Local staff time (donation)	(160,000)
	52,000
	x 1.05 (inflation)
	54,600

Curriculum Coordinator Workshops

Schedule workshops - 1 man month	3,500
Produce workshop materials $10/person x 50 persons/ workshop x 20 workshops	10,000

Staff for workshop - 3 man months	10,500	
Travel @ $250/workshop	5,000	
Speaker fees @ $100/workshop	2,000	
Meeting rooms and invitations (local donation)	(2,200)	
	31,000	
	x 1.05	(inflation)
	32,550	

Module Development

Module revision - 4 man months	14,000	
Produce modules - $35/set x 1,000 sets	35,000	
Distribute modules (TEA donation)	(6,000)	
	49,000	
	x 1.05	(inflation)
	51,450	

In-Service Training

Staff for workshops - 16 man months	56,000	
Produce workshop materials $15/person x 25 persons/ workshop x 84 workshops	31,500	
Travel @ $250/workshop	14,700	
Meeting rooms and invitations (local donation)	(9,600)	
	102,200	
	x 1.05	(inflation)
	107,310	

Student-Citizen Awareness

Staff for workshops - 2 man months	7,000	
Travel @ $250/workshop	2,500	
Teacher leave time @ $30/ day	7,500	
Schedule workshops for 1980 1 man month	3,500	

Meeting rooms and invitations (local donation)	(2,200)
	20,500
	x 1.05 (inflation)
	21,525

Energy Education Courses

Text book review and analysis 12 man months	42,000
Staff for Advisory Committee meetings - 4 man months	14,000
Advisory Committee travel @ $1,500/meeting	6,000
Advisory Committee time (donation)	(24,000)
	62,000
	x 1.05 (inflation)
	65,100

1980 TOTAL $419,320

School Facility Audits

TEA staff time - 12 man months	42,000
Computer time @ $5/audit	10,000
Local staff time (donation)	(160,000)
	52,000
	x 1.1 (inflation)
	57,200

Curriculum Coordinators Workshops

Schedule workshops - 1 man month	3,500
Produce workshop materials $35/person x 50 persons/ workshop x 20 workshops	35,000
Staff for workshops - 3 man months	10,500

Travel @ $250/workshop	5,000
Speaker fees @ $100/workshop	2,000
Meeting rooms and invitations (local donation)	(2,200)
	56,000
	x 1.1 (inflation)
	61,600

Module Development

Reprint and distribute modules $35/set x 3,000	105,000
TEA staff time (donation)	(6,000)
	105,000
	x 1.1 (inflation)
	115,500

In-Service Training

Schedule workshops - 2 man months	7,000
Staff for workshops - 16 man months	56,000
Produce workshop materials $35/person x 25 persons/ workshop x 84 workshops	73,500
Travel @ $250/workshop	14,700
Meeting rooms and invitations (local donation)	(9,600)
	151,200
	x 1.1 (inflation
	166,320

Student-Citizen Awareness

Staff for workshops - 2 man months	7,000
Travel @ $250/workshop	2,500
Teacher leave time @ $30/day	7,500
Meeting rooms and invitations (local donation)	(2,200)
	17,000
	x 1.1 (inflation)
	18,700

Energy Education Courses

Text book selection - 6 man months	21,000	
Develop field test and implementation schedule	42,000	
	63,000	
	x 1.1	(inflation)
	69,300	

Energy Savings

Energy savings estimates for the public schools program measure were calculated for the facilities program element and the driver education program element. Data from the Texas Education Agency and Department of Public Safety indicate that about 5% of the drivers in the state will be affected by the driver education program by 1980. Using FEA methodology and assuming a 50% retention rate results in savings of 2.7 trillion BTU's.

Estimates for savings in facilities were based on a program run by the Texas Education Agency in 1974. Data from this program indicate that schools ordinarily consume approximately 810,000 BTU's per square foot per year, but by efficient operation can reduce this by approximately 30%. Using TEA data it has been possible to estimate that by the third quarter of 1979 (when mandatory standards go into effect), there will be approximately 88.5 million square feet of floor space in public schools. Since all public schools can be reached in the program and the high cost of energy will motivate compliance, a 90% compliance factor has been assumed. This results in savings of 19.35 trillion BTU's per year.

Together the driver education and facilities program elements are expected to save 22.05 trillion BTU's, representing 0.25% of 1980 total projected consumption.

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COORDINATION & MONITORING

Objective

To conserve energy through the effective management and evaluation of the state's Energy Conservation Program and through the development of a sound policy focus for future state energy conservation efforts.

Narrative

Since energy conservation is a complex and highly interrelated function which lacks a focal point for common and consistent management, the overall quality of the State's Energy Conservation Program will depend, in large measure, on the proven principles and practices of planning, coordination, monitoring and evaluation. New data collection and analysis will be needed, new opportunities and potentials will be recognized and adjustments must be made as unexpected problems develop or new possibilities arise in the implementation of this program. Overseeing the progress of a comprehensive state energy conservation program requires an accurate grasp not only of present conditions and activities but also of future direction and goals and the relative and absolute merits of alternative methods of accomplishment.

The Governor's Office of Energy Resources, as lead agency, would provide for the overall management, planning, coordination, monitoring and evaluation function of the State's Energy Conservation Program. In performing its duties and responsibilities, the Governor's Office would undertake a number of important tasks which would include, but would not be limited to, the following:

Develop an information system to capture and analyze data useful in decision making relative to energy conservation.

Establish data bases and reporting mechanisms for each State Energy Conservation Program Measure.

Evaluate the State's Energy Conservation Program to determine the performance effectiveness of the specific elements and the actual total savings accomplished.

Communicate energy conservation material and describe results and activities occurring within each of the specific program measures, through the publication and dissemination of a monthly newsletter.

Develop energy conservation strategies, priorities and policies.

Analyze new and evolving energy conservation issues, needs and problems.

Identify new energy conservation program opportunities.

Provide technical assistance to the agencies designated as responsible for specific elements of the State's Energy Conservation Plan.

Coordinate the specific activities of the agencies and organizations in fulfilling their designated responsibilities in the State's Energy Conservation Plan.

Provide continuing liaison with national and regional offices of the Federal Energy Administration.

Provide continuing liaison with the energy committees of the national public interest groups such as the National Governors' Conference and the Council of State Planning Agencies.

Maintain a continuing liaison with the energy conservation officials and offices in the other states.

Develop and prepare official proposals and applications for funding of supplemental State Energy Conservation Plans.

Prepare quarterly progress reports for the Federal Energy Administration.

Prepare annual plan updates for the Federal Energy Administration.

Prepare a final project completion report for the Federal Energy Administration.

To assist the Governor's Office in guiding plan implementation, an ongoing citizens committee would be established. The committee would be responsible for providing the Governor's Office with its advice and counsel in the implementation of the plan and in the preparation of the quarterly progress reports and annual plan updates.

The committee would consist of representatives from the following interest groups:

1) Major manufacturers
2) Small manufacturers
3) Commercial business

4) Home construction
5) Local government
6) Environmental groups
7) Electric utilities
8) Gas utilities
9) Labor
10) General public.

Milestones

4th Quarter, 1977

Develop program and schedule for monitoring performance of each program measure.
Prepare quarterly progress report for FEA.
Prepare annual plan update and grant request.

1st Quarter, 1978

Monitor program measure implementation.
Prepare quarterly progress report for FEA.
Conduct advisory committee meeting.

2nd Quarter, 1978

Monitor program measure implementation.
Prepare quarterly progress report for FEA.
Conduct advisory committee meeting.

3rd Quarter, 1978

Monitor program measure implementation.
Prepare quarterly progress report for FEA.
Conduct advisory committee meeting.

4th Quarter, 1978

Monitor program measure implementation.
Prepare quarterly progress report for FEA.
Prepare annual plan and grant request.
Conduct advisory committee meeting.

1979

Monitor program measure implementation.
Prepare quarterly progress reports.
Prepare annual plan update and grant request.
Conduct 4 advisory committee meetings.

1980

Monitor program measure implementation.
Prepare quarterly progress reports.
Prepare final project completion report.
Conduct 4 advisory committee meetings.

Budget

Year	SECP Funds	Other Funds	Total
1977	146,000	10,000	156,000
1978	267,000	68,000	335,000
1979	280,350	68,000	348,350
1980	315,700	68,000	383,700
TOTAL	1,009,050	214,000	1,223,050

1977 TOTAL $146,000

Project monitoring/coordination, 36 man months	126,000
State Coordinator (state funds)	(10,000)
Grant preparation for 1978	20,000
	146,000

1978 TOTAL $267,000

Project monitoring/coordination 60 man months	210,000
Advisory committee travel and per diem - 45 members x $150/ member x 4	27,000
Advisory committee time (donation)	(38,000)
State Coordinator (state funds)	(30,000)
Grant preparation for 1979	30,000
	267,000

1979 TOTAL $280,350

Project monitoring/coordination 60 man months	210,000
Advisory committee travel and per diem - 45 members x $150/ member x 4	27,000
Advisory committee time (donation)	(38,000)
State Coordinator (state funds)	(30,000)
Grant preparation for 1980	30,000
	267,000
x	1.05 (inflation)
	280,350

1980

TOTAL $315,700

Project monitoring/coordination 60 man months	210,000
Advisory committee travel and per diem - 45 members x $150/ member x 4	27,000
Advisory committee time (donation)	(38,000)
Newsletter - 12 issues @ $10,000/issue (state funds)	(120,000)
State Coordinator (state funds)	(30,000)
Final project evaluation and report	50,000
	287,000
x	1.1 (inflation)
	315,700

Socio-Economic Analysis

SOCIAL & ECONOMIC IMPACTS

The socio-economic impacts of the Texas Energy Conservation Plan are expected to be diverse and of significant magnitude when evaluated on a statewide basis. However, the individual program measures are aimed at disparate groups ranging from homeowners to industrialists, thus making it quite difficult to isolate the impacts of specific programs with any great degree of precision. It is relatively easy to isolate those groups who receive the first or second order effects of a program; however, pinpointing indirect effects as they spread throughout the complex socio-economic system of the state would be a very costly and time consuming process. Consequently, with the exception of the effects on utilities and gas and oil producers, this analysis has been limited to a general consideration of the direct effects of program measures on socio-economic entities of the state.

Effects on Utility and Petroleum Industries

The petroleum industry and utilities are very significant elements of the Texas economy. For example, in 1976 the petroleum industry employed some 263,000 people, provided Texans with some $1.6 billion royalty income (1975), and paid 21.2 percent of all state taxes. Petroleum refining alone added $1.2 billion to the value of manufacturing in the state. Similarly, electric and gas utilities employed some 53,000 people in 1974 and paid total wages in excess of $500 million.

At the present time, planning and decision making are complicated in both these industries because of uncertainties about many factors including global political events, future consumer demand, future prices, the exact amount of proven and possible reserves of various fuels and the development of new technologies. The large amounts of money and long lead times required to plan and implement projects in these industries further compound the problem.

Electric utilities in Texas face particularly severe problems because approximately ninety (90) percent of the electric power in the state is generated from natural gas which is rapidly being exhausted. Consequently, power companies are being forced to consider massive capital outlays for conversion to other fuels at a time when uncertainty is high and capital formation may be difficult and expensive.

Fortunately, energy conservation plans may lead to some alleviation of these problems. Declining growth in demand will mean reduced income for utilities, but will also mean a lower rate of expansion which should release some capital for conversion. Also, government policies will hopefully become more definitive through the development of coordinated plans such as this. Finally, plans can help to promote public awareness and understanding of the situation which will help the entire socio-economic system respond to energy problems.

Because of the many problems and complications such as the ones cited above, the impacts of individual program measures on utilities and petroleum companies in the state are very difficult to estimate and will not be considered in this discussion. Nevertheless, since these industries are vital to the economic well-being of the state, it is important to bear in mind that virtually all of the programs will have some impact on them.

Program Groups and Energy Savings Values

A rather rough indication of the benefit/cost ratio of these programs has been calculated as such effectiveness relates to federal monies invested. This measure is the ratio of the value of the energy savings in 1980 associated with a given program relative to the federal dollars requested for the program in 1980. The budget figures for 1980 were chosen because many of the programs require substantial start-up costs with little immediate benefit. Furthermore, savings calculations for 1980 had already been calculated. The value per BTU is based on the BTU value of an average barrel of crude oil on the world market today ($13.50/5.8 million BTUs = $2.33 x 10^{-6}). That is, the value of the energy saved is equal to the amount of energy saved in 1980 (in BTUs) times $2.33 per million BTUs. A summary of these figures is given in Table 7.

In the discussion that follows, it has been convenient to treat the program measures in three collective groups. These are (1) programs that relate primarily to buildings, (2) the industrial process program, and (3) other programs, including the carpool/vanpool program, the government procurement program, the local conservation program and the agricultural program.

TABLE 7

SAVINGS BENEFIT PER FEDERAL DOLLAR INVESTED

1980

Program Measure	Energy Savings (trillion BTU's)	Value of Energy Savings ($ millions)	1980 SECP Budget	Benefit/ Cost
Thermal and Lighting Standards	5.66	$ 13.19	$ 134,200	98
Vanpools/carpools	0.42	0.98	11,660	84
Government Purchasing	0.18	0.42	16,720	25
Industrial Processes	271.69	633.04	421,800	1,500
New Commercial buildings	9.11	21.23	65,380	325
Existing commercial buildings	48.33	112.61	159,600	706
New Residential buildings	7.93	18.48	144,375	128
Existing residential buildings	104.25	242.90	832,260	292
Agriculture	10.95	25.51	99,000	258
Local Initiatives	12.12	28.24	352,000	80
Public Schools	22.05	51.38	419,320	123
	492.69	$1,147.98	$2,972,015*	386

Buildings Programs

Seven programs have an impact on buildings in the state. These are the thermal and lighting standards programs, the new and existing residential and commercial structures programs and the public schools program. For the most part, these programs will impact similar socio-economic groups and for that reason will be discussed together.

The groups that will be directly affected by these programs are local code officials, architects and engineers who design buildings, owners and managers of new and existing buildings, and in some cases the occupants of residential buildings. One of the principal impacts on these groups will be the need for education and training in the new thermal and lighting standards. The cost of this education will be defrayed somewhat by the state training

* Includes $315,700 for Coordination and Monitoring

program for thermal and lighting standards. However, building designers will also have to familiarize themselves with systems and techniques for reducing lighting levels and increasing thermal efficiency. The state training programs and workshops sponsored under the programs for new and existing commercial and residential structures should provide considerable assistance in this familiarization process. In addition, new markets will be created for engineering and architectural firms in the areas of energy audits and retrofit measures for existing buildings. The income generated from new opportunities such as these is likely to more than offset any educational expenses incurred as a result of new standards.

Related to the general area of education will be the need for curriculum changes in the programs of some educational and training institutes. In addition, colleges and universities in the state may develop extension courses in standards, and in techniques and systems useful in meeting or exceeding standards.

Another general area of economic impact will be on manufacturers and distributors of energy-consuming and energy-saving systems and devices such as HVAC systems, insulation, and appliances. Undoubtedly, shifts in demand will occur for such items. However, innovative firms can take advantage of the need for greater efficiency by developing new products and capabilities that would allow for profitable expansion.

In addition to these efforts will be some impact on the life-style of residents of both owner-occupied and rental housing as they will be asked to reduce consumption through such measures as more efficient thermostat settings, and more efficient use of appliances and lights. In addition, home-owners will be encouraged to incur expenditures by weatherizing their homes in order to conserve.

The public schools program element for facilities has impacts virtually identical to those of the other programs affecting buildings. However, other public school program elements will impact primarily on administrators, teachers and students. These impacts are likely to take the form of increased awareness and modified behavior on the part of the affected students. The result of such programs can be significant, but are unlikely to be felt for some years.

Industrial Processes

The primary socio-economic entities to be affected by the industrial processes program measures are the eleven target groups listed in Table 8 of the program narrative. This group consists of food and kindred products, textiles, lumber and wood products, paper and allied products, chemicals and allied products, petroleum and coal products, rubber and miscellaneous plastics, stone, clay and glass products, primary metals, fabricated metal products, and machinery.

These eleven industries were selected primarily on the basis of energy consumed as a percent of product value. As indicated in Table 8, these industries contribute in excess of $11 billion to the value added in manufacturing and hence add significantly to Texas' Gross State Product. Consequently, the continued health of these industries can be of considerable importance to the Texas economy.

TABLE 8

SELECTED INDUSTRY TARGET GROUPS

SIC CODE		VALUE ADDED (millions)
20	Food and kindred Products	1,716.6
22	Textiles	49.2
24	Lumber and Wood Products	369.4
26	Paper and Allied Products	342.0
28	Chemicals and Allied Products	3,189.8
29	Petroleum and Coal Products	1,338.2
30	Rubber and Misc. Plastics	349.1
32	Stone, Clay & Glass Products	610.9
33	Primary Metals	784.9
34	Fabricated Metal Products	1,089.6
35	Machinery	1,449.9
	TOTAL	$11,299.6

The industrial processes program measure can contribute to the vitality of these industries by encouraging them to seek ways to hold energy-related costs down and by providing information about systems and techniques for energy conservation. The technical Information Exchange, including the computerized document retrieval system, annual conference, workshops, and training curricula of the outreach program can each make substantial contributions in the dissemination of vital information.

The industrial processes program is expected to save a considerable amount of energy in the state primarily because industry will be highly motivated by financial considerations to do so. The savings associated with this program are estimated to be 271.69 trillion BTU's valued at $633.04 million. This represents a return of $1500 per federal dollar invested in 1980.

Other Programs

The remaining programs are those related to agriculture, carpools/vanpools, government procurement, and conservation at the local level. Each of these is discussed briefly below.

The agricultural program would affect not only farmers and ranchers in the state, but to a lesser extent manufacturers and distributors of certain farm implements and supplies (including motor fuels), and educational institutions in the state, particularly the Agricultural Extension Service of Texas A&M University. Also the utility industry would be affected through conservation in irrigation systems in the manner discussed previously.

A major portion of the savings are expected to come from greater efficiency in irrigation. This is expected to be achieved through increased pumping efficiency by tuning existing pumps or perhaps converting to alternative systems. Such measures would, of course, have a financial impact on manufacturers and distributors of the necessary parts and supplies. This impact is not expected to be of great magnitude, however.

The other area for which savings have been calculated relates to machinery operations. Here energy can be saved through more efficient techniques in such operations as planting, fertilizing and harvesting. Thus, savings occur in the form of reduced motor fuel consumption. The economic impact of this program element would be felt primarily by motor fuel producers and distributors, but again this impact should not be of great consequence.

The economic impacts of the program for conservation at the local level are similar to those in government procurement in that they are diffuse and very difficult to measure. Potentially, a number of socio-economic groups may be affected by this program. These groups include appliance manufacturers, auto manufacturers, and repair shops and parts shops, those involved with public transportation systems and supplies, and virtually all citizens of the local community. While the overall effect on energy consumption at the local level is expected to be significant, it does not seem possible to make reasonable estimates as to the magnitude of individual effects at this time.

The economic impacts of the carpool/vanpool program are not expected to be major. The most obvious effects will be minor increases in van sales, minor decreases in gasoline consumption, and perhaps even lesser effects on automobile repair shops and similar support services.

The groups impacted by the government procurement program are indeed diverse. These range from local procurement officials who will be provided with information and education concerning life-cycle costing and energy-efficient products, to state procurement

officials, state agencies using the system, and manufacturers and distributors with which the state deals. Consequently, while the system-wide effects of this program may be significant, the individual effects are very diffuse and difficult to measure, and no attempt has been made to do so.

Legal & Institutional Analysis

LEGAL & INSTITUTIONAL IMPACTS

In order to successfully administer the State Energy Conservation Plan, the agencies designated as lead agencies will have to meet the specific requirements discussed under the individual program measures as well as certain common requirements. These include such common requirements as the ability to provide or purchase services and supplies of various kinds and the ability to enter into interagency agreements or contracts. While lack of authority in an agency is not expected to be a common problem, it is a possible problem because of the difficulty of foreseeing each activity necessary to the complete implementation of this complex program.

Most of the agencies which can conduct the program have the necessary statutory authority, either in individual statutes or under the Interagency Cooperation Act [TEX. REV. CIV. STAT. ANN. art. 4413(32) (1976)]. There are some restrictions on the subject matter of interagency contracts, however. For example, the services must be within the statutory functions of the affected agencies [TEX. REV. CIV. STAT. ANN. art. 4413(32), sec. 5(a) (1976)]. The Governor's Office of Energy Resources has broad authority to carry out its responsibilities in this area. To the extent that particular agencies may lack requisite authority in a particular program area, the administration of the program could be amended sufficiently to avoid any difficulties.

The most straightforward solution would be for the Governor's Office to directly administer those parts of the program which another agency may lack authority to carry out. The Governor's Office could work out an inter-agency contract to solicit the advice and assistance of such an agency where that would be desirable. This approach would allow for proper administration in the Governor's Office while still maintaining close coordination with agencies with special expertise.

Another requirement is that municipalities be capable of adopting energy conservation standards as part of their building codes. Whether they have this authority is dependent upon what type of cities they are.

Cities in Texas are of three types, depending on the authority under which they were created:

1. General law cities have only those powers expressly granted by the legislature under the general laws of the state or those powers deduced therefrom by necessary implication.

2. Cities of more than 5,000 may elect to become "home-rule" cities, whereupon they may exercise any power not prohibited by the laws or constitution of Texas.

3. Special law cities are those which received charters by special law from the legislature. Such cities have the powers granted by their individual charters, which may not constitutionally be amended by the legislature. Special law cities also have powers granted to them by general laws passed by the legislature.

Article 1175, sec. 35 of Texas Revised Civil Statutes allows home rule cities to include energy conservation measures in their building codes.

Special law cities could exercise authority over energy conservation only if such authority were granted by general law, or if such authority were expressed or implied in their particular charters. Since all such special law charters were granted prior to 1912, the latter is unlikely.

General law cities have not been granted express power over energy conservation by statute. It is very questionable whether the power can be implied because statutes speak to "health and safety" only. (See Port Arthur Independent School District v. City of Groves.)

Authority over energy conservation standards was not granted to Texas cities by the 65th Legislature. Such authority for non-home rule cities will have to await action by the 66th Legislature in 1979. A federal law authorizing such authority is possible, but would present numerous problems in developing a nationwide method of local enforcement (witness the difficulties experienced in implementing federal flood plain regulations).

An alternative authority to effect energy conservation in new residential construction would be for the Federal Housing Administration to include more energy conservation standards for new home construction before the 1981 deadline. This action would leave existing residential and new and existing commercial construction unaffected.

Since the Legislature did not enact a provision

similar to that cited above for all Texas cities during the 65th session, an interim plan for improving energy conservation could include

1. Working with home rule cities to include energy conservation standards in their building codes for new or remodeled residential and commercial structures,

2. Working with the FHA to improve energy conservation standards for new residential construction, and

3. Seeking legislative authority for all cities and towns during the next session in 1979.

Lighting and Thermal Efficiency Standards

The first program measure for the Texas Energy Conservation Plan deals with mandatory lighting standards for new public buildings, the second program measure with mandatory thermal efficiency standards for new and renovated buildings. Before considering what agencies or agency can implement these program measures, the requirements for implementation must be analyzed.

Implementation will require that the agencies or agency be capable of accomplishing the following:

1. Collection and evaluation of existing materials concerning lighting standards,

2. Development of model code language for lighting standards and testing and analysis of available code language for thermal efficiency standards,

3. Analysis of methods of applying lighting standards to existing buildings,

4. Monitoring of pilot tests conducted by local governments,

5. Provision of training for code officials in pilot cities and technical assistance in implementing standards,

6. Development of state lighting standards after testing,

7. Conducting regional meetings,

8. Development and implementation of a systematic training program for standards enforcement personnel, and

9. Drafting of necessary legislation.

Because of apparent expertise or statutory mandates, the Governor's Office of Energy Resources, Texas Department of Community Affairs, Texas Advisory Commission on Intergovernmental Relations, Texas Engineering Extension Service, State Board of Control, Public Utilities Commission and Railroad Commission of Texas all appear to be candidates for implementing the lighting standards and thermal efficiency standards

program measures. To determine the extent each can aid in implementation, legal and institutional factors must be considered.

Governor's Office of Energy Resources

The Governor's Office of Energy Resources has experience and expertise in the energy field. It was not formed by statute, but by the Governor; however, the Appropriations Bill included funding for the Governor's Office of Energy Resources as a division in the Governor's Office. The Governor's Office is in a unique policy-making position and possesses a considerable influence over energy policies statewide. It is also backed by the authority of the Governor. Although the staff is small, it possesses the authority to contract with other agencies and outside professionals to aid in its duties and does possess the capability of adequately overseeing outside work. The staff's preliminary work on the Texas Energy Conservation Plan puts it in a unique position of having the necessary system of coordination with other entities in the energy field.

There do not appear to be any legal constraints to the Governor's Office as the lead agency in implementing the lighting and thermal efficiency program measures. In fact, several of the tasks, such as the drafting of legislation and developing of model code language, are particularly appropriate to the Governor's Office. The other tasks can be accomplished under the direction of the staff as long as funds are available for either interagency or private firm contracts.

Texas Department of Community Affairs

The Texas Department of Community Affairs (TDCA) has no special expertise in the energy resources field, but it performs many functions for local governments. One program TDCA is currently pursuing is Community and Local Development. The objectives of this activity are: 1) to assist local governments in housing development, establishment of codes and ordinances, and research; 2) to provide technical assistance to rural areas and administer the rural development coordination program; and 3) to provide to local governments financial, technical, and advisory assistance in economic development, management, planning, and municipal finance [Legislative Budget Board, Performance Report to the Sixty-fifth Legislature, Austin (1977)]. TDCA's general statutory authority includes acting as an information and referral agency for information on federal or state programs or services affecting local governments; collecting, publishing, and disseminating information; and sponsoring or conducting educational and training programs for local governments [TEX. REV. CIV. STAT. ANN. art. 4413(201), sec. 4 (1976)].

TDCA also has policy control and direction of the Technical Testing and Evaluation Council, which administers the State of Texas Building Materials and Systems Testing Laboratory [TEX. REV. CIV. STAT. ANN. art. 4413(39) (1976)]. The laboratory engages in the testing and evaluation of building materials, products, and systems to establish performance capability based on standards adopted by the council and approved by TDCA [Id., sec. 6]. The purpose of the testing is to assist local governments, the residential construction industry, and consumers by "facilitating the use of innovative methods and materials capable of meeting minimum performance criteria for health and safety." The laboratory, however, is currently rather inactive, since money for its administration was never appropriated. There are a few projects being conducted.

TDCA provides staff to serve as instructors in Texas Engineering Extension Service courses for municipal inspectors. It is also in the process of organizing regional municipal inspectors organizations for information exchange among different inspectors.

TDCA does have extensive coordination capabilities with local governments. Also, many local governments look to TDCA for assistance in code reformation [Id.]. TDCA could provide substantial assistance in Tasks 2, 4, and 7.

Texas Advisory Commission on Intergovernmental Relations

One of the chief functions of the Texas Advisory Commission on Intergovernmental Relations (TACIR) is the ongoing evaluation of interrelationships among state, federal, and local government agencies [TEX. REV. CIV. STAT. ANN. art. 4413(32b), sec. 10 (1976)]. TACIR also prepares studies and recommendations to improve intergovernmental relationships, evaluates proposed and existing federal programs and their effect on Texas, serves as a forum for the discussion and resolution of serious intergovernmental problems, evaluates the state's role in assisting political subdivisions in carrying out public responsibilities, and encourages and coordinates studies relating to intergovernmental relations conducted by government agencies, universities, and other research-oriented institutions [Id.].

The major activity within TACIR is general research involving ten substantive policy areas. These areas are: 1) federal aid/revenue sharing, 2) state and local tax policy, 3) health, 4) education, 5) housing, 6) transportation, 7) environmental management, 8) state and local government structure, 9) public management, and 10) constitutional revision [Legislative Budget Board, Performance Report to the Sixty-fourth Legislature, Austin, p. 317 (1975)]. TACIR has not addressed energy conservation in its research, although it has addressed the problems of development outside incorporated areas.

The commission, which consists of 24 members, is larger than its staff. TACIR is also not funded at a very high level. It can accept grants, money, and gifts, and can contract with other state agencies and private firms. At this time, however, its coordination with local governments is not extensive enough to directly perform the coordination tasks of these program measures. TACIR does cooperate with the Texas Municipal League, however. TACIR can probably play an active support role in implementing the lighting and thermal efficiency standards program measures, but does not possess adequate resources or authority to become a lead agency.

State Board of Control

Legislation has been sent to the Governor which will increase the authority of the State Board of Control and drastically alter the State Building Commission. Currently, the Commission, composed of the Governor, Attorney General, and chairman of the State Board of Control, has numerous duties and powers pertaining to energy conservation and state construction. S.J.R. 48 proposes a constitutional amendment repealing the Commission's constitutional authority. After the resolution is signed by the Governor, it still must be approved by the electorate in November, 1978.

Even without the constitutional amendment, however, the Commission will lose the authority that is most important to any energy conservation plan. S.B. 759, which was sent to the Governor on May 24, 1977, will transfer the Commission's statutory duties and powers to the State Board of Control effective September 1, 1977. This effectively transfers the bulk of the Commission's authority, including that under the State Building Construction Administration Act and the Energy Conservation in Buildings Act. Commission staff and property related to the administration of statutory duties are also transferred.

The State Building Construction Administration Act requires that certain state projects be constructed to provide the requisite physical facilities for the operation of state government in a dignified and aesthetically pleasing environment [TEX. REV. CIV. STAT. ANN. art. 678f (Supp. 1976)]. The act also provides that building design must conform with established construction practices and use methods, materials, and equipment of "proven dependability" so that projects will be economical to construct, operate, and maintain [Id., sec. 1]. This provision alone would probably justify the use of energy efficiency standards in the design of a state building, but another act has made the power express. The Energy Conservation in Buildings Act provides for the development of improved design, lighting, insulation, and architectural standards to promote efficient energy use in state buildings, including state university and college buildings [TEX. REV. CIV. STAT. ANN. art. 678i (Supp. 1976)].

The act primarily requires that the administering agency do three things: (1) publish a manual of standards for potential use by designers, builders,

and contractors of residential and non-residential buildings, (2) set mandatory standards for state buildings, and (3) prepare model energy conservation building codes (after consultation with the Governor's Energy Advisory Council and TDCA) and make the codes available for use by local governments. The State Building Commission has accomplished the first two objectives. The building codes have not been drafted, but the Commission has the necessary mailing lists (city officials, school districts, etc.) to accomplish distribution. Presumably, the lists will be transferred to the State Board of Control.

According to the director of the State Building Commission, Knox Davis, the standards and manuals were prepared without an appropriation. Funds from other programs were stretched or shifted to meet the Commission's statutory mandate. The Commission could not take on a new responsibility without financial assistance. This may be the case with the State Board of Control, also.

If financial assistance were available, the State Board of Control could aid in the implementation of Tasks 1, 2, 3, and 6 listed previously. The State Building Commission's staff has made progress in Task 1, which is the collection and evaluation of existing materials concerning lighting standards. The collection and evaluation were done prior to the preparation of the energy conservation manuals. The manuals do not totally adopt ASHRAE standards, as those were modified to meet Texas' climatic conditions. Task 2, development and testing of model code language, is part of the administering agency's duties under the Energy Conservation in Buildings Act. Task 3, the analysis of methods of applying lighting standards to existing buildings, appears to be a logical extension of the work already done by the Commission's staff. Finally, Task 6, which is the development of state lighting standards (but not enforcement), is within the mandate of the Energy Conservation in Buildings Act. The other tasks, which generally require monitoring, training, promotion, and technical assistance, are not within the special expertise of either the Commission or the State Board of Control. This is also true of Task 9, the drafting of necessary legislation.

Texas Engineering Extension Service

The Texas Engineering Extension Service was established by action of the Texas A&M University Board of Directors in 1948 [TEX. EDUCATION CODE ANN. sec. 88.001 (1970)]. Its major function is to provide job-related training on an extension basis for employees of business and industry, state agencies, municipalities and other political subdivisions. The Municipal Inspector Training Program currently offers two types of courses for building inspectors: (1) an annual school, one week in duration, $50/student enrollment, is held for municipal officials, and (2) the other program involves six (6) courses and 160 hours of instruction. It is offered in five (5) Texas cities and is open to potential municipal inspectors. A

certificate of completion from this program opens doors for a person seeking employment with a municipality (conference with Extension Service staff).

The possibility of coordinating many of the training programs needed under the Texas Energy Conservation Plan with the Engineering Extension Service appears feasible. The service already possesses considerable expertise that will be an asset to implementation of the plan.

Public Utility Commission and Railroad Commission of Texas

Historically, the state has looked to municipalities as the utility regulatory bodies in Texas. The Public Utility Regulatory Act [TEX. REV. CIV. STAT. ANN. art. 1446c (Supp. 1976)] retains a large part of the municipal role, but also makes some significant changes. After August 1, 1977, municipalities may by ordinance or election give their original jurisdiction over electric, water, and sewer utilities to the Public Utility Commission (PUC). PUC has original jurisdiction over these utilities in unincorporated areas and has original jurisdiction over telecommunications everywhere [Id. secs. 16 (e), 18]. PUC also has exclusive appellate jurisdiction over all but gas utilities [Id. sec. 16 (d)]. The Railroad Commission of Texas (RRC) has exclusive appellate jurisdiction to review all orders or ordinances of municipalities concerning gas utilities and has original jurisdiction over gas utilities outside the limits of municipalities [Id., sec. 19 (b)].

Some states have made energy conservation mandatory by requiring that the utilities regulatory agency or agencies prohibit utility companies from providing service to buildings that do not meet certain energy efficiency standards (insulation thickness, glass thickness, etc.). [Current Developments, (4) Housing and Development Reporter, 973 (1977)]. While regulation of energy efficiency in thermal and lighting standards is not specifically provided for in Texas law, the comprehensive scheme of regulation clearly intended in the Public Utility Regulatory Act, together with the liberal construction provision of the act (sec. 86), may provide limited authority for the PUC and other utility regulators in Texas to prevent waste by prohibiting utilities from providing service to customers who do not meet minimal thermal efficiency and lighting standards. The difficulties involved in enforcement plus the potential for abuse and hardship probably preclude such a scheme from being instituted by any government entity except the Legislature.

Nevertheless, PUC can provide support for the state's energy program by supplying information as to utility rate design changes and other pertinent information to which PUC has access. The Railroad Commission can also be an information source concerning the status of the gas utility industry.

Vanpools/Carpools

The third program measure for the Texas Energy Conservation Plan is to promote the increased use of vanpools and carpools.

Implementation will require that the agencies be capable of:

1. Conducting workshops,

2. Coordinating implementation efforts, and

3. Monitoring program effectiveness.

Governor's Office of Energy Resources

The Governor's Office has the necessary authority and expertise to implement the vanpool/carpool program measure.

Metropolitan Planning Organizations

Metropolitan Planning Organizations (MPO) were first conceived as such by the 1973 Federal Aid Highway Act. In Texas, however, they have been molded to fit the individual needs of the local governments.

Most MPO's are the individual councils of government, although in some areas they are a distinct body including all levels of elected officials. Their function is to participate in multi-modal transportation planning. Since they are responsible for an overall master plan for transportation, their participation in the vanpool/carpool measures is in line with their mandate.

Government Purchasing

The fifth program measure is to promote energy conservation through the procurement of energy efficient goods and services at the state and local levels. Implementation will require that the agencies or agency be able to do the following:

1. Conduct product analyses and compile commodity lists,

2. Monitor similar product analyses being done by the Federal Supply Service or the National Bureau of Standards,

3. Provide information to the local governments and school districts, and

4. Introduce more energy efficient products into the state purchasing procedure.

Possible candidates for implementation of this program measure are the State Board of Control, Texas Advisory Commission on Intergovernmental Relations, Texas Department of Community Affairs, Texas Municipal

League, Texas Association of Counties, and Texas Education Agency.

State Board of Control

The State Board of Control consists of three members appointed by the Governor. The staff is directed by an executive director appointed by the board. One major activity is full-time research and development of commodity specifications used in the purchase of supplies and materials for state agencies [TEX. REV. CIV. STAT. ANN. art. 664-3, sec. 10 (1964)]. The board may contract for outside testing of materials, but much of the testing is done by the staff.

The board handles the purchase of commodities for state agencies, either on an annual contract or scheduled purchase basis or on the open market on a competitive bid basis [TEX. REV. CIV. STAT. ANN. art. 664-3, sec. 7 (1964)]. It also purchases all motor vehicles used for transporting school children in school districts participating in the Foundation School Program [Id., sec. 5 (supp. 1976)].

Under current statutory authority, the board appears to be perfectly capable of implementing tasks 1, 2 and 4 in the government purchasing program measure. Task 3, which is the dissemination of product analyses to political subdivisions, presents a problem. Task 3, for which the board lacks clear authority and the necessary distribution system, could probably be undertaken without difficulty by the Texas Department of Community Affairs or the Governor's Office utilizing regional councils of governments. Both appear to have sufficient authority to implement task 3 of this program measure. (The authorities and capabilities of these agencies have been discussed earlier.) Alternatively, the board could cooperate with the Texas Municipal League, the Texas Association of Counties, the regional councils of governments and the Texas Education Agency, and these entities could disseminate information by way of newsletters to their constituents.

Industrial Processes

The sixth program measure for the Texas Energy Conservation Plan is to conserve energy through increased efficiency of industrial processes in Texas.

Implementation of this program measure will require that the responsible agencies have authority to

1. Promote the exchange of technical information among industries in Texas,

2. Provide information retrieval services,

3. Sponsor technical conferences,

4. Establish a state Industrial Energy Information Center,

5. Publish a newsletter,

6. Work with the Federal Energy Administration and the Department of Commerce to assist in the promotion of workshops, and

7. Develop and implement voluntary training and certification programs for industrial energy auditors.

Candidate agencies to carry out the implementation of this program measure include the Texas Industrial Commission and the Texas Engineering Extension Service.

Texas Industrial Commission

The Texas Industrial Commission (TIC) maintains data files on economic characteristics of all Texas counties and 540 communities. It encourages the expansion of existing industry and the relocation of existing industries within the state by providing industrial start-up training, information on potential plant sites, and sponsorship of industrial development projects [Legislative Budget Board, Performance Report to the Sixty-fifth Legislature, Austin, p. 233 (1977)]. TIC must develop an effective business information service and conduct and encourage research designed to further new and more extensive use of Texas' natural and other resources [TEX. REV. CIV. STAT. ANN. art. 6144e, sec. 4 (1970)].

Within its broad charge to promote industrial development and expansion and to "conduct and encourage research designed to ... develop new products and industrial processes," the TIC appears to have adequate authority and expertise to assist industry in the development and implementation of more energy efficient processes [Id.]. TIC also has expertise in the use of computers for the location of new industry; expertise which could also be used to disseminate information about new processes as they are developed. Although the primary mission of the TIC is the location of new industry and the expansion of existing industry within the state, the promotion of energy efficiency does not appear to be outside that charge, since the more industry can make use of existing resources, the better TIC will be able to attract and keep industry within the state. TIC, therefore, is probably capable of tasks 1-6 of the industrial processes program measure.

Texas Engineering Extension Service

The seventh task listed above, development of voluntary training and certification programs for industrial energy auditors, might be best implemented as a cooperative project between the TIC and the Texas Engineering Extension Service, which might also provide additional personnel to assist TIC in implementing other aspects of the program. The Engineering Extension Service is currently engaged in spreading knowledge of new developments in a number of fields, and assisting TIC in implementing this

program measure would be in line with its expertise and experience.

New and Existing Commercial

The seventh program measure in the Texas Energy Conservation Plan is designed to conserve energy by increasing the efficiency of new commercial facilities and associated equipment. A related program measure is designed to improve the operation and efficiency of existing commercial facilities and associated equipment.

To implement these program measures, the responsible agencies will need authority to

1. Hold workshops,

2. Train professionals in the techniques of efficient design,

3. Sponsor training projects,

4. Monitor program effectiveness, and

5. Train professionals to audit and evaluate existing commercial facilities.

Among the agencies which are possible candidates to implement these measures are the Governor's Office of Energy Resources, Texas Department of Community Affairs, State Board of Control, and Texas Engineering Extension Service. The general authority of each of these agencies has been discussed above, under thermal and lighting standards. The points raised in that discussion will apply equally well to these program measures, because the authorities and expertise necessary to implement this measure are almost identical to those needed to implement the lighting and thermal standards measures.

New and Existing Residential

The ninth and tenth program measures in the Texas Energy Conservation Plan are to conserve energy by increasing the efficiency of new homes/apartments and associated equipment by providing several levels of energy audit assistance and consumer information about conservation products and habits. Because the capabilities needed to implement these program measures are very similar, they are discussed together.

Necessary capabilities for these two measures include

1. Holding workshops for homebuilders, financiers, utilities and city officials.

2. Conducting public awareness campaigns,

3. Conducting training programs for those auditing and evaluating existing residences,

4. Providing technical support for weatherization programs.

5. Training contractors in retrofitting techniques, and

6. Monitoring program effectiveness.

The candidate agencies for implementing these program measures include the Governor's Office of Energy Resources, the Texas Department of Community Affairs, State Board of Control, and Texas Engineering Extension Service. The capabilities of each of these agencies have been discussed above under thermal and lighting standards. In addition, the authority of the Public Utility Commission and the Railroad Commission may be useful in the future in implementing parts of this program measure, as discussed in the lighting and thermal efficiency section.

Agriculture

The eleventh program measure is offered as a method of conserving 1980 energy by promoting conservation in the agriculture sector. To achieve this goal, the implementing agencies or agency must be able to participate in

1. Information collection and packaging,

2. Information distribution, and

3. Program monitoring.

Possessing extensive expertise in the agriculture sector, the Department of Agriculture and the Texas Agricultural Extension Service are the top choices for implementation of this program measure.

Department of Agriculture

The Department of Agriculture has responsibility for enforcement of agricultural laws, administration of agricultural service programs, and consumer protection in the areas of weights and measures, packaging and labeling, and marketing [Texas Advisory Commission on Intergovernmental Relations, Handbook of Governments in Texas, Austin, p. I-159 (1975)]. The Commissioner of Agriculture is given broad responsibility and authority to collect and disseminate information to farmers and to sponsor "farmer's institutes" [TEX. REV. CIV. STAT. ANN. art. 51, secs. 3, 10, 11 (1969)]. Therefore, the Commissioner (who carries out his responsibilities through the Department of Agriculture) has clear authority to undertake tasks 1 and 2 of this program measure. The Commissioner also has broad authority in all areas of agriculture, which would easily include task 3 [Id., et seq.].

Texas Agricultural Extension Service

The Texas Agricultural Extension Service was established by the Texas A&M University Board of Directors. Training, information, and educational services are quite extensive. Three programs

particularly pertinent to energy conservation are home economics, community resource development, and agriculture. Home economics encompasses educational programs in housing (including energy conservation) and consumer goods (including energy efficiency). Community resource development provides for problem solving through organized and group action. Agricultural education programs cover such topics as new methods of irrigation. The service has the expertise to accomplish all three of the tasks for the agriculture program measure.

Local Energy Conservation

The twelfth program measure is designed to conserve energy by establishing model energy management programs within the local government, and by providing innovative energy conservation services at the local level.

Lead agencies for this measure must be capable of

1. Conducting workshops,

2. Administering grants for demonstration projects, and

3. Monitoring program effectiveness.

The Governor's Office and Texas Department of Community Affairs are potential lead agencies. As discussed previously, each of these agencies has experience in working with local governments. Each also has experience in grant administration, program monitoring, and workshops. The Texas Municipal League and the Texas Association of Counties can be asked to participate in the workshops.

Of course, all agencies discussed in this report would be asked to be involved in the workshops since the topics covered include elements of most of the other program measures.

Public Schools

The thirteenth program measure of the Texas Energy Conservation Plan is to promote energy management in public school facilities and the development and use of energy conservation education curricular materials.

The capabilities needed to implement this program measure include

1. Administration of grants and other financial assistance,

2. Provision of technical assistance for energy audits,

3. Analysis and distribution of audit results,

4. Conducting workshops,

5. Preparation and distribution of materials,

6. Development of curricula,

7. Assistance with teacher training,

8. Development of materials for curriculum training,

9. Assistance with student awareness programs, and

10. Monitoring of program effectiveness.

The Central Education Agency (also known as the Texas Education Agency - TEA), the Governor's Office of Energy Resources, and the State Board of Control each have some capabilities which would be useful in implementing the tasks outlined above.

Texas Education Agency

TEA has general statewide authority to perform many of the functions listed above and undoubtedly has the expertise to perform them all. Unfortunately, TEA is limited by statute to those functions specifically assigned to it by the Legislature [TEX. EDUCATION CODE ANN. sec. 11.01, et seq. (1972)]. While it is likely that all ten tasks are within TEA's authority, it would be possible for the Governor's Office of Energy Resources to undertake any tasks or parts of tasks which were determined to be outside of TEA's authority.

The State Board of Control has already done work in developing energy efficiency standards for state buildings. The results of that work have been discussed above under thermal and lighting standards. Much of this existing work could be made applicable to public school buildings by TEA or the Governor's Office of Energy Resources with the advice and technical assistance of the State Building Commission and voluntary cooperation of school districts.

Coordination and Monitoring

The final program measure is a necessary partner to all the others. This program measure is to conserve energy through the effective management and evaluation of the state's Energy Conservation Program and through the development of a sound policy focus for future state energy conservation efforts. An agency assigned to implement this program measure must be able to

Develop an information system to capture and analyze data useful in decision making relative to energy conservation.

Establish data bases and reporting mechanisms for each State Energy Conservation Program Measure.

Evaluate the State'e Energy Conservation Program to determine the performance effectiveness of the specific elements and the actual total savings accomplished.

Communicate energy conservation material and describe results and activities occurring within each of the specific program measures through the publication and dissemination of a monthly newsletter.

Develop energy conservation strategies, priorities and policies.

Analyze new and evolving energy conservation issues, needs and problems.

Identify new energy conservation program opportunities.

Provide technical assistance to the agencies designated as responsible for specific elements of the State's Energy Conservation Plan.

Coordinate the specific activities of the agencies and organizations in fulfilling their designated responsibilities in the State's Energy Conservation Plan.

Provide continuing liaison with national and regional offices of the Federal Energy Administration.

Provide continuing liaison with the energy committees of the national public interest groups such as the National Governor's Conference and the Council of State Planning Agencies.

Maintain a continuing liaison with the energy conservation officials and offices in the other states.

Develop and prepare official proposals and applications for funding of supplemental State Energy Conservation Plans.

Prepare quarterly progress reports for the Federal Energy Administration.

Prepare annual plan updates for the Federal Energy Administration.

Prepare a final project completion report for the Federal Energy Administration.

For efficient coordination and monitoring, one agency must be responsible for this program measure. Since high-level policy and direction are involved, the Governor's Office is the appropriate agency to implement the measure. By statute, the Governor is the chief planning officer of the state [TEX. CIV.

STAT. ANN. art. 4413 (32a), sec. 2 (1976)]. The Governor's Office is also statutorily directed to review state plans and applications for federal assistance [Id., secs. 3 and 4]. The Governor's Office is the only state entity with the authority and expertise to coordinate all of the federal, state and local agencies involved in this complex program.

Environmental Analysis

ENVIRONMENTAL IMPACTS

Introduction

Throughout its history, Texas has been blessed with an abundant supply of natural resources capable of sustaining a wide variety of uses. This heritage has enabled Texas to grow and prosper in a manner characterized by a diversity of human lifestyles, agricultural capabilities, and business interests which are unique to our nation.

As the state has grown and developed, so has the realization that our resources are indeed finite. There is a need to study various resource management and conservation techniques which may be useful in Texas. The seriousness of these problems has resulted in federal legislation which, among other provisions, would encourage the state and local governments to develop planning and management mechanisms conducive to prudent conservation practices.

Environmental Review and Preview

Texas, the second largest of the fifty states, occupies about seven (7) percent of the total land and water area of the United States. It is as large as all of New England, New York, Pennsylvania, Ohio and Illinois combined. The state's area consists of 262,840 square miles of land and 4,499 square miles of inland water, or 168,217,600 acres of land and 2,879,360 acres of inland water.

Geologically, Texas is the intersection of four major physiographic subdivisions of North America: the Rocky Mountain Region, the Great Western High Plains, the Great Western Lower Plains and the Gulf Coast Forested Plains. The state's surface variations are provided additional contrast with fifteen (15) river basins, 200 major lakes and reservoirs, and by 3,700 streams with a combined length of 80,000 miles. Beneath the surface, aquifers underlie more than half the surface area of Texas.

Great variations in weather result from the fact that Texas has ten climatic subdivisions, with vast differences in elevation, precipitation, humidity, temperature, wind velocities and cloud conditions. The climatic differences provide for an abundance and variation of vegetation. From the forests of East Texas to the deserts of West Texas, from the grassy plains of North Texas to the semi-arid brushlands of South Texas, plant variety and species change continuously. This vegetation variation allows for a wide range of agricultural activities and allows for a vast forest and timber resource.

Texas has been and continues as a cultural crossroad. Indications are that some of the earliest recorded evidence of man in North America occurred in what is now known as Texas. Estimates are that man inhabited this area 40,000 years ago. Since then native American Indian tribes, colonization, settlement and development have brought many cultural and ethnic experiences and expressions to Texas.

In economic development and population distribution, as in topography, climate and culture, Texas is a land of contrast. The character and perspective of Texas has changed dramatically during the past six decades. In the early 1900's, Texas was a rural state with eighty (80) percent of its more than three (3) million population living and working in small towns or rural areas. By the mid-1970's, Texas has become an urbanized industrial state with approximately eighty (80) percent of the more than twelve (12) million population living and working in the state's metropolitan areas.

The adaptability of the different areas of the state to some type of agricultural enterprise attracted ranchers and farmers to settle in all parts of Texas. Industries to serve agriculture plus the subsequent development of other natural resources throughout the state, easy access to marine transportation, and early development of a statewide transportation network all contributed to growth.

During recent decades, the Texas economy has evolved from a primarily rural base in which ranching, farming, oil and gas production, associated support services, and retail trade made up the bulk of economic activity, to a much more broadly based, highly specialized, and interdependent agricultural, mining, and industrial economy. Other major economic activities have been developed from basic resources, such as marine commerce, sulfur production, petrochemical processing, recreation, forest products, fish and game, electric power and many more.

The oil and gas resources have been the mainstays in the Texas economy for several decades. Presently available data on known and anticipated reserves indicate that Texas reached an apex in the level of production of these resources in the early 1970's. The significance of that event lies in the relative importance of oil and gas, and their by-products, to the economic well-being of both Texas and the nation.

Texas provides nearly forty (40) percent of the oil and gas produced in the United States. As reserves dwindle and productive capacity diminishes, a corresponding increase in imports, both nationally and in Texas, has become necessary.

Significant economic development impacts are expected as Texas seeks to explore and develop alternative energy resources. Extensive areas of near surface lignite deposits in east and south central Texas are economically recoverable at prevailing energy prices. Geothermal, nuclear, solar, and other naturally occurring energy resources in Texas will be fully evaluated.

Many other natural resources provide Texas with opportunities for well balanced growth and continuing economic progress. The forests, extensive mineral deposits, aggregates and other building materials, desirable climate, pleasing topography, healthful environment, and other resources contribute to the capability to support both an expanding population and a diversity of economic activities.

Because Texas is large in land area and diverse in climate, it has a wide range of environmental problems. However, since much of the state is thinly populated it is relatively free of severe pollution problems. Environmental considerations are not synonymous with pollution problems. In addition to actively seeking solutions to present environmental problems, the state is incorporating environmental factors into most planning activities.

The quality of the Texas environment today and tomorrow rests upon the intellectual vigor, professional competence, and mutual cooperation of the talented public officials and administrators who manage and guide the development of the state.

The development, adoption and implementation of the Texas Environmental Policy in 1972 is the product of the imagination, energy and association of the administrators who compose the Texas Interagency Council on Natural Resources and Environment (ICNRE). The policy reflects the intent and effort of the member agencies to improve the quality of our environment. Implementation of the policy - in both letter and spirit - has significantly benefited Texas' environmental efforts.

PROPOSED ACTIONS

Proposed Plan

Texas is proposing the establishment of an active energy conservation plan for the state composed of required and optional programs which will reduce energy demand. The individual programs are described in detail in the Plan Report (Volume II). For convenience of discussion, the program measures are grouped into three (3) discrete categories:

1. Building related conservation programs (includes thermal standards, lighting standards, new commercial, existing commercial, new residences, existing residences and public schools),

2. Industrial processes conservation program, and

3. Other conservation programs (includes vanpools-carpools, government purchasing, agriculture and local conservation programs).

With due consideration of the industrial programs, the Texas Energy Conservation Program, in general, will succeed only as the result of small savings by millions of consumers. This implies the need for a vigorous public education program which provides specific instructions that the public can understand and which promotes a positive response and widespread cooperation. Reliable and detailed technical information must be disseminated to engineers, architects, contractors, builders, planners, government officials, educators and consumers.

Qualitative Impacts

The environmental impact analysis is based on energy savings calculations for the selected program measures which in combinations of actions can be expected to achieve the mandated five (5) percent overall energy reduction while preserving and protecting the state's environment.

The conservation actions relating to buildings will have a beneficial environmental impact. These actions include: (1) thermal standards, (2) lighting standards, (3) reduced heating and cooling demand, (4) procurement of more efficient appliances, and (5) consumer actions resulting from public education programs.

Improved thermal efficiency in new and renovated buildings will directly result in reduction of space heating and air conditioning requirements. Such improvements can be realized through better designed fenestration (adding storm windows, awnings for summer, etc.), by reducing radiative and conduction heat transport (outward in winter, inward in summer), and by reducing infiltration. Another aspect of thermal efficiency improvement would be better heating plants, better architectural designing and broader heating/cooling/humidity tolerance ranges.

Adverse environmental effects will result from increased emissions and resource consumption resulting from the manufacture of the materials required to meet better thermal efficiency standards. These effects have not been evaluated quantitatively but are not expected to be significant.

Lighting standards will directly result in electrical savings. However, in modern public buildings, a significant fraction of the heating requirement comes from the heat dissipated by the

lights. The need for increased space heating to compensate for reduced lighting heat may result in increased air pollutant emissions. Since the winter season in Texas is relatively short and mild and because of the types of fuel in common use, the added space heat requirements should have minimal environmental impact. On the other hand, for most of the year and for most of Texas, the heat dissipated by lights must be removed from the building by the air conditioning system so lighting standards will reduce cooling demand.

The introduction of more energy efficient appliances and equipment through conservation oriented procurement programs will have direct savings on electrical generation and fossil fuel consumption.

The reduction in electrical demand and fossil fuel consumption resulting from these building related conservation actions will reduce air and water pollution, delay the need for new generating sites and transmission lines, conserve fuel supplies and reduce the need for importing foreign oil.

The industrial processes conservation program will have a beneficial environmental effect. The program is aimed at increasing the efficiency of industrial processes and equipment. To the extent that energy consumption is reduced in industrial processes and equipment, direct electrical and fossil fuel savings will occur. To the extent that energy efficiency is increased in industrial processes and equipment, important indirect savings accrue.

The industrial program will increase the energy conservation analytical capabilities of industry personnel, increase the awareness of the potential for conservation in industrial processes and machinery and provide a comprehensive source and channel of information for industrial conservation efforts.

The increased efficiency of industrial processes and equipment resulting from this program will reduce air and water pollution, conserve fuel resources, and reduce the need for imported crude oil.

The energy conservation actions of the other programs will have beneficial impacts on the state's environment. These actions include: (1) vanpools-carpools, (2) government purchasing, (3) agriculture, and (4) local conservation programs.

Programs designed to reduce automobile traffic will result in direct beneficial environmental effects. Air emissions will be reduced, and reduced traffic density will improve the flow of traffic and result in less energy usage. Fatalities, injuries, and loss of property from accidents are expected to decrease.

The use of more energy efficient equipment and appliances provided by conservation oriented procurement programs will have direct savings on electrical generation and fossil fuel consumption.

The agricultural program will directly save electricity and fossil fuels through increased efficiency and usage of processes and equipment.

The public awareness programs and innovative projects at the local level will result in energy and fuel savings through consumer actions and involvement.

The reductions in electrical demand and fossil fuel consumption resulting from these other conservation actions will have similar beneficial effects to the building related conservation actions.

Quantitative Impacts

The quantifiable environmental impacts resulting from the implementation of the Texas Energy Conservation Plan have been calculated with the use of the Federal Energy Administration methodologies. The impacts, described on the following tables, show a reduction in air and water pollutant emissions and other environmental factors.

A listing of the program measures of the State Plan, the estimated energy savings of each measure and its percent of energy savings are illustrated on Table 9. Tables 10 through 14 show how the calculated energy reductions of the combined program measures are multiplied by specific coefficients of reduction to produce overall environmental emission and factor decreases for gasoline, distillate oil, coal, natural gas and production/distribution of refinery products, respectively.

The Tally Sheets, Tables 15 through 17, show the aggregate and total environmental emission and factor reduction for air, water and other considerations, respectively. The total reduction values from these tables are listed again on Table 19.

Table 18 utilizes the Brookhaven National Laboratory's "1980 Base Case" calculations for environmental pollution elements from the generation and consumption of energy. The 1980 national measures are multiplied by the Federal Energy Administration adjusted projection percentage for Texas. The 1980 Texas figures illustrate a "no conservation" value.

Table 19 shows the beneficial aspects of the Texas Energy Conservation Plan. The individual pollution values from Table 18 are reduced by the corresponding reduction values from the Tally Sheets, Tables 15 through 17, to arrive at a percentage decrease in environmental pollution resulting from the implementation of the Texas Energy Conservation Plan. This table illustrates that the State Conservation Plan will result consistently in beneficial environmental impacts. No adverse environmental effects have been identified.

Alternatives

Alternatives to the proposed implementation of the Texas Energy Conservation Plan include the following:

* Delay implementation (Alternative 1)

* Implement selected program measures (Alternative 2)

* Revise program measures and implement (Alternative 3)

* Do not implement the Plan (Alternative 4)

The least desirable alternative, from an environmental quality standpoint, is Alternative 4 since reductions in various emissions/factors will not occur. Alternative 3 could potentially be better than the proposed action if new measures are added which will lead to further reductions in various emissions/factors. Implementation of selected program measures from the Plan, Alternative 2, will yield beneficial reductions similar to those of the proposed action, but of smaller magnitude. Delaying Plan implementation, Alternative 1, will delay the beneficial reductions in various emissions/factors.

Negative Environmental Declaration

The qualitative and quantitative evaluation and assessment process has resulted in the finding that the implementation of the Texas Energy Conservation Plan will have neither significant nor adverse project-induced environmental impact. The magnitude and importance of this conservation program required the environmental analysis, but it is evident that this program will protect and preserve the state's environmental quality while allowing for continued economic growth.

The monitoring and evaluation element of the State Plan will be utilized to maintain a continuing analysis of the environmental aspects of each program measure. Since the environment encompasses many interrelated components of the biological, physical and social systems, a comprehensive environmental analysis should consider each vital component of this system, examine the impact of a given action on all system components, and extend to the outermost limits of the project impact. The results of a comprehensive analysis should not be interpreted as describing a "steady state world" in which components and relationships are fixed. A healthy environment is a continuous ebb and flow of change; its equilibrium is always dynamic, never static.

TABLE 9

ESTIMATED SAVINGS OF PROGRAM MEASURES

Program Measure	Trillion BTU	Percent
Thermal and lighting standards	5.66	0.06
Vanpool-carpool	0.42	0.0
Government purchasing	0.18	0.0
Industrial processes	271.69	3.04
New commercial buildings	9.11	0.1
Existing commercial buildings	48.33	0.54
New residential buildings	7.93	0.09
Existing residential buildings	104.25	1.17
Agriculture	10.95	0.12
Local energy conservation	12.12	0.14
Public schools	22.05	0.25
Coordination and monitoring	-	-
	492.69	5.51

TABLE 10

ENVIRONMENTAL IMPACTS: GASOLINE

(Environmental Impact per 10^{12} BTU of Gasoline)

Impact	Coefficient for Reduction	Energy Reduction (trillion BTU)	Resultant Emission Reduction
Air (Tons)			
Particulates	62	3.58	221.96
Oxides of Nitrogen	298	3.58	1,066.84
Sulfur Dioxide	15	3.58	53.70
Hydrocarbons	201	3.58	719.58
Carbon Monoxide	2,120	3.58	7,589.60
Carbon Dioxide	74,500	3.58	266,710.00

TABLE 11

ENVIRONMENTAL IMPACTS: DISTILLATE OIL

(Environmental Impact per 10^{12} BTU)

Impact	Coefficient for Reduction	Energy Reduction (trillion BTU)	Resultant Emission Reduction
AIR (tons)			
Particulates	35	53.79	1,882.65
Oxides of Nitrogen	330	53.79	17,750.70
Sulfur Dioxide	126	53.79	6,777.54
Hydrocarbons	31	53.79	1,667.49
Carbon Monoxide	174	53.79	9,359.46
Carbon Dioxide	74,000	53.79	3,980,460.00
Aldehydes	4	53.79	215.16
OTHER			
Occupational Death (Men)	0.0007	53.79	0.04
Occupational Injuries (Men)	0.05	53.79	2.69
Occupational Man Day Lost (Man-day)	2.5	53.79	134.48
Solid waste tons	48	53.79	2,581.92

TABLE 12

ENVIRONMENTAL IMPACTS: COAL

(Environmental Impact per 10^{12} BTU)

Impact	Coefficient for Reduction	Energy Reduction (trillion BTU)	Resultant Emission Reduction
AIR (tons)			
Particulates	66.2	15.64	1,035.37
Oxides of Nitrogen	348	15.64	5,442.72
Sulfur Dioxide	409	15.64	6,396.76
Hydrocarbons	8.4	15.64	131.38
Carbon Monoxide	23.1	15.64	361.28
Carbon Dioxide	104,000	15.64	1,626,560.00
Aldehydes	0.68	15.64	10.64
WATER (tons)			
Acids	12.1	15.64	189.24
Bases	1.0	15.64	15.64
Dissolved Solids, Mis.	62.5	15.64	977.50
Suspended Solids	9.0	15.64	140.76
Non-degradable Org.	1.3	15.64	20.33
Biological Oxygen Dem.			
Chemical Oxygen Demand			
OTHER			
Thermal Rejection (BTU) x 10^9	249	15.64	3,894.36
Occupational Death (Men)	0.0759	15.64	1.19
Occupational Injuries (Men)	1.32	15.64	20.64
Occupational Man Day Lost (Man-day)	96.26	15.64	1,505.51
Solid Waste Tons	1,394	15.64	21,802.16

TABLE 13

ENVIRONMENTAL IMPACTS: NATURAL GAS

(Environmental Impact per 10^{12} BTU)

Impact	Coefficient for Reduction	Energy Reduction (trillion BTU)	Resultant Emission Reduction
AIR (tons)			
Particulates	39.16	359.01	14,058.83
Oxides of Nitrogen	69.18	359.01	24,836.31
Sulfur Dioxide	136.45	359.01	48,986.91
Hydrocarbons	37.17	359.01	13,344.40
Carbon Dioxide	85,000	359.01	30,515,850.00
Aldehydes	11.34	359.01	4,071.17
WATER (tons)			
Acids	-		
Bases	-		
Dissolved Solids, Mis.	.4	359.01	143.60
Suspended Solids	.76	359.01	272.85
Non-degradable Org.	2.41	359.01	865.21
Biological Oxygen Dem.	.76	359.01	272.85
Chemical Oxygen Demand	4.66	359.01	1,672.99
OTHER			
Thermal Rejection (BTU)	0.89	137.04*	121.96
Occupational Death (Men)	.0007	359.01	0.25
Occupational Injuries (Men)	.05	359.01	17.95
Occupational Man Day Lost (Man-day)	2.5	359.01	897.53
Solid Waste Tons	48	359.01	17,232.48

* Natural gas for electric power generation

TABLE 14

ENVIRONMENTAL IMPACTS: PRODUCTION/DISTRIBUTION OF REFINERY PRODUCTS

(Environmental Impact per 10^{12} BTU of Vehicle Fuels)

Impact	Coefficient for Reduction	Energy Reduction (trillion BTU)	Resultant Emission Reduction
AIR (tons)			
Particulates	3.2	116.16	371.71
Oxides of Nitrogen	26	116.16	3,020.16
Sulfur Dioxide	23.5	116.16	2,729.76
Hydrocarbons	26	116.16	3,020.16
Carbon Monoxide	3	116.16	348.48
Carbon Dioxide	-	116.16	-
Aldehydes	4.15	116.16	482.06
WATER (tons)			
Acids			
Bases			
Dissolved Solids, Mis.	0.4	116.16	46.46
Suspended Solids	0.76	116.16	88.28
Non-degradable Org.	2.41	116.16	279.95
Biological Oxygen Dem.	0.76	116.16	88.28
Chemical Oxygen Demand	4.66	116.16	541.31
OTHER			
Thermal Rejection (BTU)	-		
Occupational Death (Men)	0.0007	116.16	0.08
Occupational Injuries (Men)	.05	116.16	5.81
Occupational Man Day Lost (Man-day)	2.5	116.16	290.40
Solid Waste Tons	48	116.16	5,575.68

TABLE 15

TALLY SHEET

(AIR)

	Particulates (ton)	Ox. of Nitro. (ton)	Sulfur Dioxide (ton)	Hydro-Carbons (ton)	CO (ton)	CO_2 (ton)	Aldehydes (ton)
Gasoline	222	1,067	54	720	7,589	266,710	-
Refinery Products	372	3,020	2,730	3,020	348	-	482
Natural Gas	14,059	24,836	48,987	13,344	7,467	30,515,850	4,071
Distillate Oil	1,883	17,751	6,777	1,668	9,359	3,980,460	215
Coal	1,035	5,443	6,397	131	361	1,616,560	11
TOTAL	17,571	52,117	64,945	18,883	25,126	36,389,580	4,779

TABLE 16

TALLY SHEET

(WATER)

	Acids (ton)	Bases (ton)	Dis. Solids (ton)	Sus. Solids (ton)	Non-deg. Org. (ton)	Bio. O.D. (ton)	Chem. O.D. (ton)
Gasoline	-	-	-	-	-	-	-
Refinery Products	-	-	46	88	280	88	541
Natural Gas	-	-	144	273	865	273	1,673
Distillate Oil	-	-	-		-	-	-
Coal	189	16	978	141	20	-	-
TOTAL	189	16	1,168	502	1,165	361	2,214

TABLE 17

TALLY SHEET

(OTHER)

	Thermal Reject (billion BTU)	Occupational Death (Person)	Occupational Injury (Person)	Occupational Man-day Lost	Solid Waste (ton)
Gasoline	-	-	-	-	-
Refinery Products	-	0.08	5.81	290	5,576
Natural Gas	122	0.25	17.95	898	17,232
Distillate Oil	-	0.04	2.69	135	2,582
Coal	3,894	1.19	20.64	1,505	21,802
TOTAL	4,016	1.56	47.1	2,828	47,192

TABLE 18

POLLUTANTS FROM ENERGY GENERATION

AND CONSUMPTION IN TEXAS

	National* 1980	Texas* 1980
AIR POLLUTANT (tons/year)		
Particulates	6,320,000	627,576
Oxides of nitrogen	23,500,000	2,333,550
Sulfur dioxide	19,900,000	1,976,070
Hydrocarbons	6,640,000	659,352
Carbon monoxide	40,600,000	4,031,500
Carbon dioxide	5,374,000,000	533,638,200
Aldehydes	373,000	37,039
WATER POLLUTANT (tons/year)		
Acids	n.a.	n.a.
Bases	n.a.	n.a.
Dissolved Solids	960,000	95,329
Suspended Solids	165,000	16,385
Non-degradable Org.	105,000	10,427
Biochemical Oxygen Demand	59,000	5,859
Chemical Oxygen Demand	171,000	16,980
OTHER		
Thermal rejection into water (BTU)	$4,740 \times 10^{12}$	471×10^{12}
Solid wastes (tons)	198,000,000	19,661,400
Occupational deaths (persons)	1,295	129
Occupational injuries (persons)	24,600	2,443
Occupational man-days lost	1,770,000	175,761

*Based on 1980 Base Case using the Brookhaven National Laboratory (BNL) Energy System Network Stimulator in conjunction with the BNL Energy Model Data Base; national energy consumption is 90×10^{15} BTU in 1980.

**Energy consumption estimated to be 8.937×10^{15} BTU in 1980 (9.93% of national consumption).

TABLE 19

CHANGES IN ENVIRONMENTAL EMISSIONS AND IMPACTS RESULTING FROM THE IMPLEMENTATION OF THE TEXAS ENERGY CONSERVATION PLAN

Emissions/Impacts	1980 Value Without Energy Conservation Plan (tons)	Reduction (tons)	Percent Change
AIR			
Particulates	627,576	17,571	(-2.80)
Oxides of nitrogen	2,333,550	52,117	(-2.23)
Sulfur dioxide	1,976,070	64,945	(-3.29)
Hydrocarbons	659,352	18,883	(-2.86)
Carbon monoxide	4,031,580	25,126	(-0.62)
Carbon dioxide	533,638,200	23,389,580	(-6.82)
Aldehydes	37,039	4,779	(-12.90)
WATER			
Acids	-	189	-
Bases	-	16	-
Dissolved solids	95,329	1,168	(-1.23)
Suspended solids	16,385	502	(-3.06)
Non-degradable org.	10,427	1,165	(-11.17)
Biochemical oxygen demand	5,859	361	(-6.16)
Chemical oxygen demand	16,980	2,214	(-13.04)
OTHER			
Thermal rejection	471 x 10^{12} BTU	4.02 x 10^{12} BTU	(-0.90)
Solid wastes	19,661,400 tons	47,192 tons	(-0.24)
Occupational deaths	121 persons	1.56 persons	(-1.29)
Occupational injuries	2,443 persons	47.1 persons	(-1.93)
Occupational man-days lost	175,761 man-days	2,828 man-days	(-1.61)

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Public Participation

PUBLIC PARTICIPATION

Recognizing the value of public participation in the development of the State Energy Conservation Plan, the Governor's Office established an advisory committee for continuous counsel and assistance. The membership of the committee was composed of representatives of various private organizations, trade associations, public interest groups, universities and state agencies. The fifty-one (51) member advisory committee brought together a tremendous wealth of expertise and experience.

The responsibilities of the committee were

1. To provide guidance, direction and advice to the Governor's Office staff during the State Energy Conservation Plan (SECP) development,

2. To generate and recommend optional program measures to be included in the SECP,

3. To review and analyze optional program measures and recommend probable implementation strategies.

4. To offer viable implementation mechanisms for required program measures, and

5. To work closely with the Governor's Office staff to insure that selected program measures and implementation methods are practical.

The committee carried out its duties and responsibilities through subcommittees. The functioning subcommittees were: (1) Agriculture, (2) Commercial Users, (3) Industry, (4) Residential Users, and (5) Transportation. With the exception of the industrial subcommittee which met four times, the committee held three monthly meetings - March (Austin), April (Houston), and May (Dallas).

Each meeting provided a critique of the technical competence and political acceptability of the work submitted for committee review.

Significant public participation during the developmental phase prolongs the process, but engenders a greater willingness on the part of the citizens to become involved in the implementation phase of programs of this nature.

The high degree of cooperation and expressed interest in energy conservation exhibited by the members of the advisory committee during the State Energy Conservation Plan development was made manifest further through a recommendation, at the final advisory committee meeting, that an advisory committee be utilized during the implementation phase of the program.

The following is a listing of the membership of the advisory committee including the organization represented by each member.

Committee Member	Subcommittee Discussion Group	Organization
Mr. Morris Backer, P.E.	Commercial	Bovay Engineers, Inc.
Mr. Curt G. Beyer	Industry	Exxon Company, U.S.A.
Mr. Richard Brown	Residential	Texas Municipal League
Mr. R. H. Burck	Transportation	Braniff International
Mr. John Byram	Commercial	Byram Properties
Mr. Bruce Cloud	Transportation	H. P. Zachry Co.
Mr. Knox Davis	Commercial	State Building Commission
Mr. J. Ray Driver, Jr.	Commercial	Kinghorn, Driver & Co.
Mr. Alan R. Erwin	Residential	Public Utility Commission
Mr. Homer A. Foerster	Commercial	State Board of Control
Mr. Gene Fondren	Transportation	Texas Auto Dealers Assn.
Mr. David Fox	Residential	Fox & Jacobs, Inc.
Mr. John Garrett, Sr.	Transportation	Richmond Road & Engineering Co.
Mr. Ben M. Gillespie	Residential	Southern Union Co.
Dr. Charles G. Groat	Transportation	University of Texas at El Paso
Mr. Henry Groppe	Industry (Discussion Leader)	Groppe, Long & Littell
Mr. Steven Hacker, CAE	Residential	Insurance Counselors Assn. of Texas
Mr. H. Earl Hall, Jr.	Residential	Equitable Savings Assn. (Texas Savings & Loan League)
Dean George Hardy III	Industry	University of Houston Bates College of Law

Committee Member	Discussion Group	Organization
Mr. Jim Harrell	Transportation	Texas Motor Transportation Assn.
Mr. James H. Harwell	Industry	Industrial Commission
Dr. Jack Hehn	Residential	North Texas State University
Hon. John Hill	Transportation	Attorney General, State of Texas
Mr. Norman Hill	Transportation (Discussion Leader)	San Antonio Transit System
Mr. L. M. Holder	Commercial	Texas Society of Architects
Mr. Reagan Houston	Transportation	Department of Highways & Public Transportation
Dr. John R. Howell	Residential	Energy Institute, University of Houston
Mr. Harry Hubbard	Residential	Texas AFL-CIO
Mr. Roland Hussey	Industry	Houston Lighting & Power
Mr. J. Tom Jones	Residential	City of Dallas, Building Inspection Department
Ms. Laura Keever	Industry	League of Women Voters
Ms. Nancy F. Lockhoof	Residential	Travis County Extension Service
Mr. Ben F. McDonald, Jr.	Residential	Department of Community Affairs
Dr. George F. Meenaghan	Agriculture	Texas Tech University Office of Research Service
Mr. Walter E. Michalke	Industry	Alcoa
Mr. L. L. Monkres	Commercial	City of Houston, Building Inspection Department
Mr. Mickey Moore	Residential	Texas Retail Federation
Mr. Fred Repper	Commercial (Discussion Leader)	Central Power & Light Co.
Ms. Mary Rollins	Transportation	Consumer Representative
Mr. Kenneth Schnitzer	Commercial	Century Development Corp.
Mr. Pat Smith	Agriculture (Discussion Leader)	Texas Farm Bureau
Col. Wilson E. Spier	Transportation	Department of Public Safety
Mr. Roy Tolk	Residential (Discussion Leader)	Southwestern Public Service Co.

Committee Member	Subcommittee Discussion Group	Organization
Mr. Joe Ventura	Agriculture	Governor's Energy Advisory Council
Dr. Richard Wainerdi	Industry	Texas A&M University Center for Energy and Mineral Resources
Ms. Jane Wells	Commercial	State Board of Education
Mr. Don West	Residential	West-Leach Associates (Austin Association of Builders)
Ms. Char White	Residential	Texas Environmental Coalition
Mr. Reagan Brown	Agriculture	Department of Agriculture
Mr. M. A. (Milt) Williams	Industry	Union Carbide Corporation
Dr. Herbert Woodson	Residential	University of Texas at Austin, Center for Energy Studies

Summaries of each subcommittee meeting follow:

INDUSTRY

The members of the industrial discussion group included representatives from large manufacturers, consulting engineering firms, utilities, the general public, universities and state government. In addition, visitors from the federal government also participated in the discussions.

Initial Meeting

At this meeting, the group covered the listing of potential program measures and discussed the direction that the program element dealing with industry should take.

Major items discussed included

* The definition of conservation. The group felt that "conservation" must be related to improving efficiency per unit of production.

* The need for industries to have adequate energy for expansion. The group noted that certain industries such as the petrochemical industry which produce high value export products may need to increase production and therefore gross energy consumption to meet export needs, and thus help ameliorate our nation's balance of payments problem.

* The energy projections and data base. The group requested that staff check with FEA on its energy projection. Concern was expressed that projected consumption was not adequate to provide for economic expansion.

* Program monitoring and evaluation. The group noted that the national monitoring and evaluation programs established by FEA should be used to track program performance. It was especially noted that large integrated industries do not exhibit significant regional differences in the energy per unit product ratio. For industries which require closer monitoring, the group felt that the state should work with the individual trade associations to obtain state specific data.

* Program approach. The group felt that since the economic incentive to conserve was quite high in the industrial sector, the proper role for the state was not to require conservation but rather to facilitate information transfer within and among industrial groups.

* Alternate sources. The group requested that the staff check with FEA and obtain clarification as to whether conversion to alternate energy sources would qualify as "conservation" under the plan.

Second Meeting

At this meeting, the group discussed the first draft of the industrial program measure.

Major items discussed included

* The definitions of industrial groups. The group noted that the initial breakdown of industries by size and technical sophistication was adequate but that an additional measure of value of energy versus value of production would be included.

* Technical information exchange. The group discussed this program element and concurred with its approach. They requested that the presentation format be modified to highlight individual program elements.

* Outreach program. The group discussed this program element and noted that some of the workshops, particularly those dealing with common items of equipment or processes, were to be restricted in attendance (25).

* Operator training. The group noted that the provision of operator training materials would enhance the program. They agreed that adequate materials do exist but that someone should locate, catalog, and publicize them.

* Energy savings. The group discussed the energy saving methodology. They agreed on the method but requested that staff check individual saving potentials and relate them to the energy cost to value of final product ratio requested.

Third Meeting

At this meeting, the group discussed the Draft Plan Report.

Major items discussed included

* Utilities. The group felt that utilities should be included in the industrial program.

* Program budget. The group noted that while the overall budget figures appeared adequate, the Industrial Commission should have latitude to shift among individual items of expense. They also noted that the item of expense for pilot audits, while adequate in total, should reflect fewer audits at a higher individual cost.

* Overall budget. The group noted that the cost per BTU saved in local government program measure was significantly higher than all other program measures. They requested that staff re-check the energy saving estimates and re-evaluate the program measure.

* Continued participation. The group felt that continued citizen input during the plan implementation was vital. They recommended that the industrial discussion group be continued and that small manufacturing representatives be added.

TRANSPORTATION

Members of the transportation discussion group included representatives from airlines, metropolitan transit organizations, automobile dealers, universities, state government, metropolitan planning organizations, trucking industries, and consumer groups.

Initial Meeting

The first transportation subcommittee meeting reviewed the first draft of the plan and several other possible programs which could save energy.

* Various traffic control systems such as traffic light controls to minimize delay in trip time, preempt control systems for transit vehicles, and contraflow lanes for bus traffic were suggested.

* In the area of driver education, re-education, and improvement, possible programs involving re-testing of drivers for license renewal, "sentencing" DWI's and persons with frequent traffic violations to take driver improvement courses, and greater emphasis on energy conservative driving habits in the public school driver education program were discussed.

* Energy savings through improved mass transit systems, subscription bus services, rural transit programs, and staggered school hours to allow for the same buses to transport children and the general public were reviewed.

* Programs involving mandatory inspection and tune-up were considered too costly to administrate. It was suggested that the State monitor a federally funded experimental program to monitor auto emissions (and indirectly, engine efficiency) being conducted in Arizona.

* The most promising programs were suggested to be those promoting the increased use of carpools and vanpools. Programs involving increased auto efficiency are being addressed at the federal level, and so must any program that would involve vehicles engaged in interstate commerce.

Second Meeting

The revised draft of the transportation program measures was discussed.

* A suggestion was made to expand the vanpool effort beyond industries and manufacturers to include schools, churches, civic groups, hospitals, etc. It was pointed out that direct contact with company management would be the most effective method of getting workshop participants. Short of direct contact, a letter from the Governor would probably be good incentive.

* It was suggested that a preliminary series of workshops be held to involve service clubs, local organization, MPO's, etc. as community organizers of the program.

* Several possible constraints to vanpools were enumerated - insurance considerations, IRS policy, state regulatory status, EPA emissions standards, and the possibility of a "gas guzzler" tax. All of these questions must be addressed before the first workshop series.

* The committee agreed that the carpool program, as a separate effort, would not likely be cost effective. Effectiveness of carpool programs is difficult to monitor and a major carpool effort would be minimally effective only in the largest metropolitan areas, where carpool programs are already in progress. It was recommended that the carpool program be combined with the vanpool program, because it was felt that both efforts are compatible and should be jointly conducted.

* Several other topics concerning transportation conservation were introduced, but most were considered of too politically sensitive a nature to be successful.

Third Meeting

The committee decided that the carpool/vanpool program measure was acceptable in its current form, but introduced several points of emphasis.

* It was recommended that service groups (Goodwill Industries, etc.) especially be invited to attend the implementation workshops.

* Committee members generously offered to be of assistance in identifying people and/or groups who might be useful in the initial workshop series.

* The committee agreed than an ongoing advisory committee should be formed to monitor the progress of the plan through the target year 1980. Such an advisory group would work with the Governor's Office of Energy Resources and the program measure identified as "coordination and monitoring."

* It was further recommended that public hearings were not necessary before the Plan Report is submitted for A-95, to the Governor, and finally to FEA.

* Much of the committee discussion centered on the need for a coordinated state energy policy with long range planning. The commiteee felt that the state should not act reflexively, responding only when federal mandates or guidelines were imposed. To respond to the requirements of the Energy Policy and Conservation Act of 1975 will prove beneficial to the state, but the current program is too limited in scope and short term in impact to be of lasting significance. The committee urged that state leadership continue conservation efforts initiated by the SECP, and more importantly, initiate and sustain through an ongoing mechanism a unified, aggressive state energy policy.

* Everyone expressed an interest in receiving progress reports during the implementation phase of the SECP.

COMMERCIAL

Members of the commercial discussion group included building owners, designers, utilities, financiers, local and state officials.

Initial Meeting

At the initial meeting, the group discussed the listing of potential program measures and the approach that measures dealing with commercial buildings should take.

Major items covered included

* Thermal standards. The group suggested that it may not be necessary to test codes at the local level, but instead to revise them during implementation as cost effectiveness is determined. They noted that codes should be closely monitored during implementation. The group suggested that the potential program measure that would require lenders to recognize life cycle costing should be re-evaluated.

* Increasing thermal efficiency of existing buildings. The group noted that the potential for saving by increased thermal efficiency is low -- instead emphasis should be placed on operating systems. They requested that the potential for tax incentives for renovation be investigated. They noted that audit assistance would be helpful but should not be required.

* Increasing the efficiency of HVAC systems. The group noted that audits would be helpful but should not be mandatory. They recommended against any measure requiring minimum efficiency, and pointed out that tax incentives would bring a greater response.

* Energy use patterns. Peak load pricing was discussed and not recommended. Operator training/ certification was recommended for further investigation.

* Lighting standards. The group found this program to be acceptable and agreed that lighting levels in new buildings should be reduced. In existing buildings, sub-metering was recommended as the proper approach to encourage compliance.

* Information transfer. The group agreed that this was a necessary program element. They recommended that professional organizations be heavily involved.

* Public school facilities. The group recommended that thermal comfort standards for schools be re-evaluated. They suggested that in many schools ceiling fans could be used to replace air conditioning for most of the year.

Second Meeting

At the second meeting, the group discussed the draft program measures dealing with commerical buildings.

Major items covered included

* Thermal and lighting standards. The group generally concurred in the approach taken in these program measures. They did request that the staff investigate the possibility of funding more pilot cities and insuring that the plan not preclude other cities from adopting standards if they desire.

* New and existing commercial facilities. The group generally concurred with the approach taken in these program measures. They did request that the staff re-evaluate the number of workshops and training courses.

Third Meeting

At this meeting, the group discussed the Draft Plan Report.

Major items of discussion included

* Thermal and lighting standards. The group requested that a footnote be added specifically encouraging cities other than those selected as pilot test sites to participate by adopting local standards. They also requested that the objective statements be clarified to show that the projected savings related to total state consumption, and not only to the commercial sector. They also requested that a technical advisory committee would prove beneficial during program implementation.

* New and existing commercial facilities. The group concurred with the program measures. They recommended that the ASHRAE 100 Series Standards be added to the bibliography.

* New and existing residential. The group noted that the certification program for energy auditors should be aimed at individuals, and that firms should not be "certified." They also recommended that the term energy audit should be defined to include financial analysis.

* Public participation. The group felt that continued public input was necessary during the plan implementation. They recommended that their discussion group be continued and expanded to include other segments of the building industry.

RESIDENTIAL

Representatives to the residential subcommittee included individuals from the homebuilding industry, utility companies, insurance companies, lending institutions, universities, state and local governments, and environmental groups.

Initial Meeting

At the initial meeting, the group displayed, through very active and enthusiastic participation in the discussion, a keen interest in energy conservation opportunities in the residential sector.

The group also demonstrated a sincere willingness to cooperate in this planning effort by offering their expertise and experience to maximize energy savings in this sector via the most viable existing mechanisms.

Each of the program measures covered in the group discussion were generally considered to be adequate, however, there were expressed concerns related to certain elements of the approach (such as what organization, agency, etc. should be co-host for the seminar series).

Major points covered included

* Extension Service should be utilized in the awareness programs (seminars, workshops, etc.).

* A consumer information/education program is needed (topics to be included are outlined in new residence and existing residence program measures).

* Avoid duplicating effort in programs.

* Development of good, usable and factual materials for retrofit.

* Need for a systematic training program for building inspectors (residential) and construction site superintendents.

* Need for exploring methods by which financiers of residential buildlings can offer incentives for building energy conserving homes.

* Development of a program that utilizes television to inform residential consumers on how to improve the efficiency of their homes.

* Provide a means by which consumers can select reputable and qualified business establishments engaged in retrofit and related activities.

* Residential consumers need information related to cost/benefit of purchasing energy efficient homes.

Second Meeting

The members of the residential subcommittee were asked to review and discuss three program measures in addition to those listed under the residential sector. The three program measures were (1) thermal standards, (2) lighting standards and (3) public schools.

Only two of the program measures were discussed by the group.

Thermal Standards - Major points covered included

* Adequacy of budget during pilot tests.

* Clarification of support agency's role.

* Insurance that efforts already underwav and nearing completion not be duplicated.

The general concensus of the group was that the elements of this program measure were appropriate to meet the needs of state citizens and to achieve the objectives of the program.

Public Schools - The members of the group were briefed on the various elements of the public school program. All comments and remarks were positive.

New Residences - The discussion related to this program measure focused on the following:

* Need for monitoring mechanisms for new homes to establish a data base of actual energy consumption.

* Content of materials used in the awareness campaign (such as potential to be realized by purchasing an energy efficient home).

* Other organizations and agencies' involvement in distribution of materials.

Existing Residences - The discussion related to this program measure centered on the local energy audit assistance element. The members of the group recommended that the audits be conducted in a participating locality on a "sectional basis" as opposed to a "blanket or shot gun" approach.

It was the concensus of the group that the elements of this program measure are adequate to meet the needs of the citizens of Texas.

Third Meeting

The members of the group reviewed the Draft Plan Report during the first quarter hour of the work session, after which a very active discussion of each program measure ensued. Much of the discussion centered on issues and concerns of members related to the implementation phase of the programs.

Some of the elements viewed with concern due to the possibility of potential problems during the implementation phase were:

* Utility workshops - dissemination mechanism for materials.

* Local Energy Audit Assistance - local coordinators in participating localities.

* Home Builders & Financiers Workshop - limitations on the number of participants and the need to include utility representation in workshops.

The group recommended that an advisory committee be utilized during the implementation phase of the program. The group further recommended that the advisory committee, during implementation, be charged with specific responsibilities similar in nature to responsibilities of committee members involved in the developmental phase.

AGRICULTURE

Representatives to the agriculture subcommittee came from state and local governments, universities, and public interest groups.

Initial Meeting

Participants generally agreed with the program measure and approach subject to consideration of the additional major points listed below.

* Disseminate information on efficient and effective water irrigation methods and techniques.

* Investigate feasibility of natural gas pipeline leak detection and correction in rural areas.

* Investigate energy consumption in agricultural drying processes and determine feasibility of energy conservation techniques.

* Investigate fertilizer, pesticide and agriculture wastes for potential energy conservation measures.

* Disseminate information resulting from research on cropping patterns and alternate sources of power for irrigation pumps.

* Influence federal regulation to insure energy conservation instead of the current energy consuming tendencies.

* Investigate feasibility of a central information source to provide reliable and timely information concerning agricultural energy conservation techniques to the existing information dissemination network.

There was a general feeling that

* Information concerning agricultural energy conservation should be made available in both rural and urban areas.

* Agricultural and energy material and data are readily available from existing sources such as the Agricultural Extension Service, Agricultural Stabilization Committees, the Water Conservation Districts, the Texas Water Institute, the Department of Agriculture, the State University System and farm organizations.

* Existing organizations and agencies should be utilized to the fullest in providing information and research in agricultural energy conservation.

* Energy conservation is an important goal in agriculture, but energy conservation is not always cost effective from a total agriculture systems concept.

Second Meeting

The second meeting introduced the following ideas:

* A proposal should be made regarding possible legislation to give authority to the Railroad Commission to inspect gas distribution lines throughout Texas. There have been reports to the Railroad Commission of inefficiency, waste, and unregulated areas of the lines. This inspection would insure that the farmers receive what they are paying for. Inspection by the Railroad Commission has been done on a small scale. To date, the RRC has no objection to doing a complete project of inspection. A study of the major lines would be the first step in getting a general idea of waste and cost. This inspection would not cost the farmer additional charges. Meters placed close to the pumps would be an additional charge to the farmer and would not insure efficiency of the lines. It was generally agreed by the group that it would be a good idea for the RRC to regulate line distribution. Due to legislative process, this plan could not be feasible until 1979.

* The Department of Agriculture representative endorsed Texas A&M University's Agriculture Information Service.

* The group noted that farmers in West Texas have been inquiring at Texas Tech regarding possible conversion to dry land farming methods. The

problems the farmers are facing are decreasing water tables and increasing gas irrigation costs.

The subcommittee asked that they be informed of the name of the staff member of State/Federal Relations in Washington, D.C. who would be handling agriculture information and coordination.

Third Meeting

The final agriculture subcommittee meeting made the following recommendations:

* The advisory committee should continue to function during plan implementation. The agriculture representative to that advisory committee should be knowledgable and have a grasp of the "overall picture."

* It was recommended that hearings be held by the Agricultural Extension Service in various locations around the state to solicit comments on program measures as well as other areas which the state should address. These hearings could be held during implementation when energy conservation information is passed out.

* Criticism was directed at two specific points in the draft: (1) the ten (10) percent agriculture energy consumption figure was thought to be too low and should be verified; and (2) the budget for the agriculture program was extremely low, given the importance of agriculture to the state and its role in balancing U.S. trade. Also, it was felt that funding (approximately $120,000) was needed to develop demonstration systems (efficient irrigation systems, etc.) where producers can actually see a system in operation. This was generally agreed to be one of the more effective means of insuring that farmers take action.

* Consideration should also be given to funding a 4-H energy conservation contest. A suggestion was made that the Energy Extension Service could supplement agricultural funds.

* Expansion and clarification was requested of the portion of the plan referring to rural pipeline leaks. Voluntary help could be enlisted to help locate leaks (e.g., 4-H). The suggestion was made to include the term "implementation" whenever the term "knowledge transfer" is used.