STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OFFICE OF THE SECRETARY

950 9488

JERRY APODACA
GOVERNOR

NICK FRANKLIN
SECRETARY

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June 2, 1978

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Dear New Mexico Resident:

The following conservation plan for the State of New Mexico is partially funded through two grants from the Department of Energy. Implementation of the plan began in July, 1977, and is expected to continue through 1980. During that time, we hope to save at least 32.6 trillion BTU's of energy in New Mexico.

New Mexico is blessed with an abundance of energy resources - coal, natural gas, oil, geothermal, solar and wind. We are fully aware of the finiteness of oil and natural gas and, therefore, priority uses which should be placed upon them. We are also aware of the technological uncertainty of solar and wind power and the environmental problems which may arise from widespread use of coal.

Energy conservation and the use of alternate forms of energy are therefore an important part of the state's overall energy plan. The New Mexico Energy and Minerals Department is committed to a strong effort to conserve our resources and we hope the following conservation plan will provide effective inroads toward that objective. With the cooperation of New Mexico residents, we feel we will reach our 1980 goals.

Sincerely,

NICK FRANKLIN
Secretary

ROGER EASLEY
Director
Conservation and Management
Division

NF/re

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FEA-U516-S-1

**PART I
GENERAL INFORMATION**

Approved by GAO
B-181254 (R0356)
Expires 12-31-78

FEDERAL ASSISTANCE		2. APPLICANT'S APPLICATION	3. NUMBER N/A	3. STATE APPLICATION IDENTIFIER	4. NUMBER NM 8 01 11 002
1. TYPE OF ACTION ☐ PREAPPLICATION ☒ APPLICATION <small>(Mark appropriate box)</small> ☐ NOTIFICATION OF INTENT (Opl) ☐ REPORT OF FEDERAL ACTION		5. DATE 19 <u>78</u> Year month day	6. DATE 19 <u>78</u> Year month day	7. ASSIGNED	8. DATE 19 <u>78</u> Year month day
4. LEGAL APPLICANT/RECIPIENT			5. FEDERAL EMPLOYER IDENTIFICATION NO. 33-505826-00		
a. Applicant Name : State of New Mexico b. Organization Unit : Energy Resources Board c. Street/P.O. Box : Post Office Box 2770 d. City : Santa Fe e. County : Santa Fe f. State : New Mexico g. ZIP Code : 87501 h. Contact Person (Name & telephone No.) : Fred O'Cheskey (505) 827-2472			6. PRO-GRAM (From Federal Catalog) a. NUMBER : 1801061011 b. TITLE : Title III, Part C, State Energy Conservation Programs, P.L. 94-163		
7. TITLE AND DESCRIPTION OF APPLICANT'S PROJECT			8. TYPE OF APPLICANT/RECIPIENT		
State Energy Conservation Plan Report (Implementation Phase)			A-State B-Intrastate C-Substate D-District E-County F-City G-School District H-Special Purpose District I-Community Action Agency J-Higher Educational Institution K-Indian Tribe L-Other (Specify):		
9. TYPE OF ASSISTANCE			10. TYPE OF APPLICATION		
A-Basic Grant B-Supplemental Grant C-Loan D-Insurance E-Other (Specify letter(s))			A-New B-Renewal C-Revision D-Continuation E-Augmentation Enter appropriate letter(s)		
11. AREA OF PROJECT IMPACT (Names of states, counties, cities, etc.)			12. ESTIMATED NUMBER OF PERSONS BENEFITING		
State of New Mexico			1.2 million		
13. PROPOSED FUNDING			14. CONGRESSIONAL DISTRICTS OF:		
a. FEDERAL \$ 415,400.00 b. STATE 630,000.00 c. LOCAL .00 d. OTHER 3,933,000.00 e. TOTAL 4,978,400.00			a. APPLICANT : Statewide b. PROJECT : Statewide 15. PROJECT START DATE 19 <u>78</u> Year month day 16. PROJECT DURATION 12 Months 17. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY 19 <u>77</u> Year month day 12 31		
18. FEDERAL AGENCY TO RECEIVE REQUEST (Name, City, State, ZIP code)			19. EXISTING FEDERAL IDENTIFICATION NUMBER		
Department of Energy, VI, Dallas, Tx.			GR260-111 Ltr. Cr. 92-00-0035		
20. REMARKS ADDED			21. REMARKS ADDED		
☒ Yes ☐ No			☒ Yes ☐ No		
22. THE APPLICANT CERTIFIES THAT:			23. CERTIFYING REPRESENTATIVE		
a. To the best of my knowledge and belief, the data on this pre-application/application are true and correct, this document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurance if the assurance is required. b. If required by OMB Circular A-95 this application was submitted, pursuant to instructions thereon, to appropriate clearinghouses and all responses are attached: opened			c. New Mexico State Clearinghouse ☐ ☒ ☐ ☐		
24. AGENCY NAME			25. APPLICANT'S SIGNATURE		
Jerry Apodaca			Signature: Governor of New Mexico		
26. AGENCY ADDRESS			27. ADMINISTRATIVE OFFICE		
28. ACTION TAKEN ☐ a. AWARDED ☐ b. REJECTED ☐ c. RETURNED FOR AMENDMENT ☐ d. DEFERRED ☐ e. WITHDRAWN			29. FUNDING a. FEDERAL \$.00 b. APPLICANT .00 c. STATE .00 d. LOCAL .00 e. OTHER .00 f. TOTAL \$.00		
30. ACTION DATE			31. CONTACT FOR ADDITIONAL INFORMATION (Name and telephone number)		
19 <u>78</u> Year month day			32. STARTING DATE 19 <u>78</u> Year month day 33. ENDING DATE 19 <u>78</u> Year month day 34. REMARKS ADDED ☐ Yes ☐ No		
35. FEDERAL AGENCY A-95 ACTION			36. FEDERAL AGENCY A-95 OFFICIAL (Name and telephone no.)		
a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part 1, 34B Circular A-95, it has been or is being made.			b. FEDERAL AGENCY A-95 OFFICIAL (Name and telephone no.)		

State New MexicoDate 12/30/77

Section 1/13:

- a. Federal - EPCA program only
- c. State - From all sources within state government, not exclusively Energy Resources Board.
- e. Other:

\$2,381,000	CSA & CETA - Weatherization
\$ 11,000	Fees - Hospitals for ESP
\$ 584,100	DOE - Weatherization
\$ 100,000	DOT - Vanpooling Funds
\$ 825,000	EES
\$ 5,000	Fees - ESP/Industrial
<u>\$ 26,945</u>	Carryover funds
 \$3,933,045	

PART I

GENERAL INFORMATION

Approved by GAO
B-181254 (R0356)
Expires 12-31-78

FEDERAL ASSISTANCE		2. APPLICANT'S APPLICATION		3. STATE APPLICATION IDENTIFIER	
1. TYPE OF ACTION ☐ PREAPPLICATION ☐ APPLICATION (Mark appropriate box) ☐ NOTIFICATION OF INTENT (D&L) ☐ REPORT OF FEDERAL ACTION		a. NUMBER N/A		a. NUMBER NM 8 01 11 001	
		b. DATE Year month day 19		b. DATE Year month day 1978 01 03	
4. LEGAL APPLICANT/RECIPIENT		5. FEDERAL EMPLOYER IDENTIFICATION NO.		6. PRO-GRAM (From Federal Catalog)	
a. Applicant Name : State of New Mexico		33-505826-00		a. NUMBER : 180161011	
b. Organization Unit : Energy Resources Board				b. TITLE : Title IV, Part B	
c. Street/P.O. Box : P. O. Box 2770				State Energy Conservation Plans	
d. City : Santa Fe				Public Law 94-385	
e. State : New Mexico		a. County : Santa Fe			
f. Contact Person (Name & telephone No.) : Fred O'Cheskey (505) 827-2472		g. ZIP Code : 87501			
7. TITLE AND DESCRIPTION OF APPLICANT'S PROJECT		8. TYPE OF APPLICANT/RECIPIENT		9. TYPE OF ASSISTANCE	
State Supplemental Energy Conservation Plan Report (Implementation Phase)		A-Title B-Institution C-Substate D-District E-County F-City G-School District H-Special Purpose District I-Community Action Agency J-Higher Educational Institution K-Indian Tribe L-Other (Specify):		A-Basis Grant B-Supplemental Grant C-Loan D-Insurance E-Other Enter appropriate letter(s) [A]	
10. AREA OF PROJECT IMPACT (Name of county, counties, State, etc.)		11. ESTIMATED NUMBER OF PERSONS BENEFITING		12. TYPE OF APPLICATION	
State of New Mexico		1.2 million		A-New B-Revision C-Continuation D-Augmentation Enter appropriate letter [D]	
13. PROPOSED FUNDING		14. CONGRESSIONAL DISTRICTS OF:		15. TYPE OF CHANGE (For 15a or 15b)	
a. FEDERAL \$ 201,300.00		a. APPLICANT		A-Increase Dollars B-Decrease Dollars C-Increase Duration D-Decrease Duration E-Cancellation F-Other (Specify):	
b. APPLICANT .00		b. PROJECT		N/A	
c. STATE .00		16. PROJECT START DATE Year month day		17. PROJECT DURATION Months	
d. LOCAL .00		19 78 1 1		12	
e. OTHER .00		18. ESTIMATED DATE TO BE SUBMITTED TO FEDERAL AGENCY		19. EXISTING FEDERAL IDENTIFICATION NUMBER	
f. TOTAL \$ 201,300.00		Year month day		GR260-111 Lts. Cr. 92-00-0035	
19 77 12 31					
20. FEDERAL AGENCY TO RECEIVE REQUEST (Name, City, State, ZIP code)		21. REMARKS ADDED			
Department of Energy, VI, Dallas, Texas		Yes No			
22. THE APPLICANT CERTIFIES THAT		a. To the best of my knowledge and belief, data in this preapplication/application are true and correct. The document has been duly authorized by the governing body of the applicant and the applicant will comply with the attached assurance of the assistance is approved.		b. If required by CMB Circular A-95 this application was submitted, pursuant to instructions therein, to appropriate clearinghouses and all responses are attached: Response attached	
(1) New Mexico State Clearinghouse		(2)		(3)	
23. CERTIFYING REPRESENTATIVE		a. TYPED NAME AND TITLE		b. DATE SIGNED	
Jerry Apodaca		Governor of New Mexico		Year month day	
				19 78 01 03	
24. AGENCY NAME		25. ORGANIZATIONAL UNIT		26. FEDERAL APPLICATION IDENTIFICATION	
				27. ADMINISTRATIVE OFFICE	
28. ADDRESS		29. FEDERAL GRANT IDENTIFICATION		30. FEDERAL GRANT IDENTIFICATION	
31. ACTION TAKEN		32. FUNDING		33. ACTION DATE </td	
☐ a. AWARDED		a. FEDERAL \$.00		Year month day	
☐ b. REJECTED		b. APPLICANT .00		19	
☐ c. RETURNED FOR AMENDMENT		c. STATE .00		34. STARTING DATE	
☐ d. DEFERRED		d. LOCAL .00		Year month day	
☐ e. WITHDRAWN		e. OTHER .00		19	
		f. TOTAL \$.00		35. CONTACT FOR ADDITIONAL INFORMATION (Name and telephone number)	
				36. ENDING DATE	
				19	
				37. REMARKS ADDED	
				Yes No	
38. FEDERAL AGENCY A-95 ACTION		a. In taking above action, any comments received from clearinghouses were considered. If agency response is due under provisions of Part 1, OMB Circular A-95, it has been or is being made.		b. FEDERAL AGENCY A-95 OFFICIAL (Name and telephone no.)	

PART II

C-11 Approval No. 80-R0186

PROJECT APPROVAL INFORMATION - Base Plan

Item 1.

Does this assistance request require State, local, regional, or other priority rating? - Yes X No

Name of Governing Body _____
Priority Rating _____

Item 2.

Does this assistance request require State, or local advisory, educational or health clearances?

Yes X No (Attach Documentation)

Name of Agency or Board _____

Item 3.

Does this assistance request require clearinghouse review in accordance with OMB Circular A-95?

X Yes No

(Attach Comments)

Item 4.

Does this assistance request require State, local, regional or other planning approval?

Yes X No

Name of Approving Agency _____
Date _____

Item 5.

Is the proposed project covered by an approved comprehensive plan?

Yes X No

Check one: State ☐
Local ☐
Regional ☐
Location of Plan _____

Item 6.

Will the assistance requested serve a Federal installation? Yes X No

Name of Federal Installation _____
Federal Population benefiting from Project _____

Item 7.

Will the assistance requested be on Federal land or installation?

Yes X No

Name of Federal Installation _____
Location of Federal Land _____
Percent of Project _____

Item 8.

Will the assistance requested have an impact or effect on the environment?

X Yes No

See instructions for additional information to be provided. Appropriate environmental impact statement attached

Item 9.

Will the assistance requested cause the displacement of individuals, families, businesses, or farms?

Yes X No

Number of:
Individuals _____
Families _____
Businesses _____
Farms _____

Item 10.

Is there other related assistance on this project previous, pending, or anticipated?

Yes X No

See instructions for additional information to be provided.

Item 11.

Is the project in a designated flood hazard area?

Yes X No

See instructions for additional information to be provided.

PART II

OAS Approval No. 80-R0186

PROJECT APPROVAL INFORMATION - Supplemental Plan

Item 1.

Does this assistance request require State, local, regional, or other priority rating? -

____ Yes X No

Name of Governing Body _____

Priority Rating _____

Item 2.

Does this assistance request require State, or local advisory, educational or health clearances?

____ Yes X No (Attach Documentation)

Name of Agency or Board _____

Item 3.

Does this assistance request require clearinghouse review in accordance with OMB Circular A-95?

X Yes ____ No

(Attach Comments)

Item 4.

Does this assistance request require State, local, regional or other planning approval? -

____ Yes X No

Name of Approving Agency _____

Date _____

Item 5.

Is the proposed project covered by an approved comprehensive plan?

____ Yes X NoCheck one: State ☐Local ☐Regional ☐

Location of Plan _____

Item 6.

Will the assistance requested serve a Federal installation?

____ Yes X No

Name of Federal Installation _____

Federal Population benefiting from Project _____

Item 7.

Will the assistance requested be on Federal land or installation?

____ Yes X No

Name of Federal Installation _____

Location of Federal Land _____

Percent of Project _____

Item 8.

Will the assistance requested have an impact or effect on the environment?

X Yes ____ No

See instructions for additional information to be provided. Appropriate environmental impact statement attached

Item 9.

Will the assistance requested cause the displacement of individuals, families, businesses, or farms?

____ Yes X No

Number of:

Individuals _____

Families _____

Businesses _____

Farms _____

Item 10.

Is there other related assistance on this project previous, pending, or anticipated?

____ Yes X No

See instructions for additional information to be provided.

Item 11.

Is the project in a designated flood hazard area?

____ Yes X No

See instructions for additional information to be provided.

PART III - BUDGET INFORMATION

SECTION A - BUDGET SUMMARY

Grant Program, Function or Activity (a)	Federal Catalog No.* (b)	Estimated Unobligated Funds		New or Revised Budget		
		DOE ** (c)	non-DOE** (d)	DOE ** (e)	non-DOE ** (f)	Total (g)
1. EPCA	80.001	\$ 9,720	\$ 0	\$ 415,400	\$ 4,536,100	\$ 4,961,220
2.						
3.						
4.						
5. TOTALS		\$	\$	\$	\$	\$

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	- Grant Program, Function or Activity				Total (5)
	(1) DOE	(2) Carryover	(3)	(4)	
a. Personnel	\$ 121,800	\$	\$	\$	\$ 121,800
b. Fringe Benefits	11,700				11,700
c. Travel	12,000	1,860			13,860
d. Equipment	---				---
e. Supplies	3,000				3,000
f. Contractual	246,900	7,860			254,760
g. Construction	---				---
h. Other	20,000				20,000
i. Total Direct Charges	415,400	9,720			425,120
j. Indirect Charges	---				---
k. TOTALS	\$ 415,400	\$ 9,720	\$	\$	\$ 425,120
7. Program Income	\$ N/A	\$ N/A	\$	\$	\$ N/A

*--Original State Energy Conservation Plan - 80.001

--Supplemental State Energy Conservation Plan - 80.003

**DOE funds refer to the funds authorized under the Energy Policy and Conservation Act, Title III, Part C, P.L. 94-163, and the Energy Conservation and Production Act, Title IV, Part B, P.L. 94-385, Non-DOE funds refer to all other funds including other authorized DOE funds.

1254
Expires 12-31-78

PART III
BUDGET INFORMATION

STATE New Mexico

DATE 4/28/78

PART III - BUDGET INFORMATION

ECPA

SECTION A - BUDGET SUMMARY

Grant Program, Function or Activity (a)	Federal Catalog No.* (b)	Estimated Unobligated Funds		New or Revised Budget		
		DOE ** (c)	non-DOE ** (d)	DOE ** (e)	non-DOE ** (f)	Total (g)
1. ECPA	80.003	\$ 17,225	\$ 0	\$ 201,300	\$ ---	\$ 218,525
2.						
3.						
4.						
5. TOTALS		\$	\$	\$	\$	\$

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	- Grant Program, Function or Activity				Total (5)
	(1) DOE	(2) Carryover	(3)	(4)	
a. Personnel	\$ 74,000	\$	\$	\$	\$ 74,000
b. Fringe Benefits	7,100				7,100
c. Travel	-				
d. Equipment	---				---
e. Supplies	400				400
f. Contractual	119,800	17,225			137,025
g. Construction	---				---
h. Other					
i. Total Direct Charges	201,300				
j. Indirect Charges	---				---
k. TOTALS	\$ 201,300	\$ 17,225	\$	\$	\$ 218,525
7. Program Income	\$ N/A	\$ N/A	\$	\$	\$ N/A

*DOE funds refer to the funds authorized under the Energy Policy and Conservation Act, Title III, Part C, P.L. 94-163, and the Energy Conservation and Production Act, Title IV, Part B, P.L. 94-365, Non-DOE funds refer to all other funds including other authorized DOE funds.

*--Original State Energy Conservation Plan - 80.001
--Supplemental State Energy Conservation Plan - 80.003

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PART IV: PROGRAM NARRATIVE

Part IV-A: Plan Intent

1. Program Overview:

Conservation is the most pragmatic strategy that Americans can apply immediately to the energy problems facing them as a result of dwindling energy supplies worldwide. In the future, new technologies will undoubtedly offer alternative energy sources and expanded conservation options, but the anticipation of this knowledge must not inhibit the pursuit of programs whose benefits can be defined now. These programs can be continually refined to respond to future technological advances as they develop.

Although New Mexicans consume less than one per cent of all the energy used in the United States, it is important that all citizens contribute toward national energy conservation efforts. A comprehensive energy conservation program for New Mexico should be designed to reduce the wasteful use of energy and thereby save money--public and private. Effective conservation programs will allow time for the State to develop its energy resources wisely for the ecological and economic good of present and future citizens.

The energy conservation plan for New Mexico should emerge as one singular, integrated program, rather than the "patchwork quilt" design presently projected by various national energy programs. It should be designed to reflect the unique needs and resources of the State, and should remain dynamic and flexible to respond to new technology and legislation which would aid in its further development. It is essential that federal and state financial resources be melded and integrated into the state's singular program, with each financial resource enhancing the other toward the ultimate goal.

It is obvious, however, that not all conservation measures directed toward the saving of BTU's of energy can be undertaken at once, since funding sources are finite. Thus, priorities must be applied in order to implement conservation programs:

- (1) Estimate of the potential success of the program measure;
- (2) Measurable BTU's saved by the program measure;
- (3) Assessment of the benefit to be derived from the program measure by the citizens and institutions of New Mexico.

Program measures meeting the "chance of success" criteria might be directed toward reducing consumption where public funds are spent, since expenditures are controlled by executive, legislative or public review. Significant savings of public funds will help to establish the credibility of similar program measures in the private sector. Program measures meeting the "BTU's saved" criteria would be designed to reduce energy use in the sectors with the highest percentage of state consumption, i.e., transportation

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PART IV: PROGRAM NARRATIVE

Part IV-A: Plan Intent

(24.4 per cent) and residential and commercial (14.8 per cent).¹ Other conservation measures may help New Mexicans even if they make little impact in terms of the total BTU savings.

The ultimate criteria of the conservation program is, of course, the total amount of funding available in any one year's operation, necessitating a flexible format at all times. New program measures will be added to the program as financing permits and as additional information and technology become available. Existing program measures that have achieved their maximum potential will be deleted.

2. Proposed Energy Conservation Goal

The Federal Energy Administration (now Department of Energy) projects that 560.4 trillion BTU's of energy will be consumed in New Mexico in 1980, based on current consumption rates.

Implementation of New Mexico's State Energy Conservation Program will reduce this consumption by 5.8 per cent, or 32.562 trillion BTU's.

In the course of implementing this program, however, measurable actual savings might not reflect this goal, since the energy consumed in energy production may offset the energy saved through conservation programs. This is true of any energy-producing state, and must be considered when an evaluation is made of the total energy consumption in 1980.

1. New Mexico Energy Resources Board, "A State Energy Plan for New Mexico," January, 1977.

Approved by GAO
B-181251 (R0356)
Expires 12-31-78

PART IV-B - PLAN SUMMARY

STATE NEW MEXICO
DATE 4/28/78

1...

PROGRAM MEASURES	1980 ESTIMATED ENERGY Savings (in BTU's)	ESTIMATED COST OF IMPLEMENTATION (in \$000's)			
		1977	1978	1979	1980
Thermal Efficiency Standards	(2.348)	Included in the seven Energy Savings Programs (ESP's)			
Lighting Efficiency Standards	(1.765)	Included in the Energy Savings Programs (ESP's, except ESP/Residential)			
Energy Efficiency Procurement Standards for State & Local Government	(0.410)	Included in the three Energy Management Programs (EMP's)			
1. Carpool, Vanpool, Public Transportation Measures	(0.094) 0.026	Some savings in the three EMP's: Remainder here.			
			143	125	400
Right-Turn-On-Red	NONE	State law passed March 26, 1973.			
2. Energy Savings Program/ State Agencies	1.033	8	150	195	185
3. Energy Management Program/ State Agencies	0.325	17	30	27	23
4. Energy Savings Program/ Public Schools & Libraries	5.617	316	67	75	75
5. Energy Management Program/ Schools, Universities, Libraries	0.047	73	40	18	16

* List all other program measures included in the proposed State Energy Conservation Plan.

0-516-S-1

Approved by GAO
B-191251 (R0356)
Expires 12-31-78

PART IV-B - PLAN SUMMARY

STATE _____
DATE _____

PROGRAM MEASURES	1980 ESTIMATED ENERGY Savings (in BTU's)	ESTIMATED COST OF IMPLEMENTATION (In \$000's)			
		1977	1978	1979	1980
6. Solar Water Heating/ Secondary Schools	0.072	1	100	2,200	2,300
7. Solar Portable Classroom Demonstration	0.037	65	15	1,250	1,400
8. Energy Savings Program/ County & Municipal Government	1.553	7	145	341	342
9. Energy Management Program/ County & Municipal Govt.	0.248	15	22	21	21
10 Energy Savings Program/ Commercial Businesses	5.693	28	50	98	98
11 Energy Savings Program/ Residential Structures	5.303	50	220	355	355
12 Weatherization/Low and Fixed Income Structures	0.689	709	3,215	3,493	3,784
13. Solar Sustenance Project	0.039	1	0	0	0
14 Energy Savings Program/ Hospitals	0.778	6	111	36	20

* List all other program measures included in the proposed State Energy Conservation Plan.

U-516-S-1

Approved by GAO
D-181251 (R0356)
Expires 12-31-78

PART IV-B - PLAN SUMMARY

STATE _____
DATE _____

PROGRAM MEASURES	1980 ESTIMATED ENERGY Savings (in BTU's)	ESTIMATED COST OF IMPLEMENTATION (in \$000's)			
		1977	1978	1979	1980
15. Energy Savings Program/ Industrial Office Bldgs.	0.268	6	5	5	5
16. Project 55	4.192	35	0	0	0
17. Waste Oil Recycling	0.002	6	0	0	0
18. State/Utilities-Initiated Conservation Programs	1.495	5	30	11	0
19. Conserving Energy in Agriculture	5.145	237	60	130	130
20. Procurement Practices of State Government	0	4	30	0	12
21. Modification of State Energy Conservation Plan	0	34	0	0	0
22. Public Information Programs	0	16	285	414	414
23. Administrative Packet	0	Included in Pgm Measures 1-22	462	554	576

List all other program measures included in the proposed State Energy Conservation Plan.

Approved by GAO
B-181251 (R0356)
Expires 12-31-78

PART IV-B - PLAN SUMMARY

STATE _____
DATE _____[illegible]

* List all other program measures included in the proposed State Energy Conservation Plan.

0-5-16-1

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

MANDATORY EPCA MEASURES

Thermal Efficiency Standards

Energy Savings Program (ESP)/Office Buildings - State Agencies
Energy Management Program (EMP) for State Agencies
Energy Savings Program (ESP) for Public Schools and Libraries
Energy Management Program (EMP) for Public Schools, Colleges and Universities, and Libraries
Energy Savings Program (ESP)/Office Buildings-County and Municipal Governments
Energy Management Program (EMP) for County and Municipal Governments
Energy Savings Program (ESP) for Commercial Businesses
Energy Savings Program (ESP) for Residential Structures
Energy Savings Program (ESP) for Hospitals
Energy Savings Program (ESP) for Industrial Office Buildings

Lighting Efficiency Standards

Energy Savings Program (ESP)/Office Buildings-State Agencies
Energy Management Program (EMP) for State Agencies
Energy Savings Program (ESP) for Public Schools and Libraries
Energy Management Program (EMP) for Public Schools, Colleges and Universities, and Libraries
Energy Savings Program (ESP)/Office Buildings-County and Municipal Governments
Energy Management Program (EMP) for County and Municipal Governments
Energy Savings Program (ESP) for Commercial Businesses
Energy Savings Program (ESP) for Hospitals
Energy Savings Program (ESP) for Industrial Office Buildings

Energy Efficiency Procurement Standards for State & Local Government:

Improvement of Energy Efficiency in Procurement Practices of State Government and its Political Subdivisions
Energy Management Program (EMP) for State Agencies
Energy Management Program (EMP) for Public Schools, Colleges and Universities, and Libraries
Energy Management Program (EMP) for County and Municipal Governments

Carpool, Vanpool, Public Transportation Measures:

Promotion of Car and Vanpooling and Public Transportation
Energy Management Program (EMP) for State Agencies
Energy Management Program (EMP) for Public Schools, Colleges and Universities, and Libraries
Energy Management Program (EMP) for County and Municipal Governments

OPTIONAL EPCA MEASURES

*Energy Management Program (EMP) for State Agencies

* Mandatory Energy Conservation and Production Act of 1976

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

OPTIONAL EPCA MEASURES

- *Energy Management Program (EMP) for Public Schools, Colleges and Universities, and Libraries
 - Solar Water Heating Demonstration for Existing Secondary School Buildings
 - Solar Portable Classroom Demonstrations
- *Energy Management Program (EMP) for County and Municipal Governments
- *Energy Savings Program (ESP) for Commercial Businesses
- *Energy Savings Program for Residential Structures
 - Weatherization of Low and Fixed-Income Single-Family Structures
 - Solar Sustenance Project
- *Energy Savings Program (ESP) for Hospitals
- *Energy Savings Program (ESP) for Industrial Office Buildings
 - Project 55
 - State/Utilities-Initiated Conservation Programs
 - Conserving Energy in Agriculture
- *Modification of State Energy Conservation Plan
- *Public Information Programs
 - Waste Oil Recycling

* Mandatory Energy Conservation and Production Act of 1976

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: Right Turn-on-Red

A State traffic regulation which permits the operator of a motor vehicle to make a right turn at a red traffic light after stopping, was passed by the New Mexico State Legislature prior to December 22, 1976.

Left turns on red, at certain one-way street intersections in Albuquerque, also are permitted.

Because the right turn-on-red regulation was implemented prior to the December 22, 1976 deadline, no BTU savings have been calculated.

A copy of the legislation (Section 64-16-5 NMSA 1953; Laws 1953, Chapter 139, Section 34, as amended by Chapter 158, Laws 1973) which permits a right turn-on-red, is attached.

(1) vehicular traffic facing the signal is warned that the red signal will be exhibited immediately thereafter and the vehicular traffic shall not enter the intersection when the red signal is exhibited except to turn as hereinafter provided; and

(2) no pedestrian facing the signal shall enter the roadway until the green is shown alone unless authorized to do so by a pedestrian "walk" signal;

C. red alone:

(1) vehicular traffic facing the signal shall stop before entering the crosswalk on the near side of the intersection or, if there is no crosswalk, then before entering the intersection, and may turn right after standing until the intersection may be entered safely, provided that such vehicular traffic shall yield the right of way to all pedestrians and vehicles lawfully in or approaching the intersection. Whenever the local authorities in their respective jurisdictions determine on the basis of an engineering and traffic investigation that a turn as hereinabove provided should be prohibited at a particular intersection, such turn may be prohibited by the posting of signs at the intersection indicating that such a turn is prohibited;

(2) Whenever the local authorities in their respective jurisdictions determine on the basis of an engineering and traffic investigation that a left turn should be allowed at a particular intersection, such turn may be allowed by the posting of signs at the intersection indicating that such a turn is allowed; and

CHAPTER 158

AN ACT

RELATING TO MOTOR VEHICLES; AMENDING SECTION 64-16-5 NMSA 1953 (BEING LAWS 1953, CHAPTER 139, SECTION 34, AS AMENDED) PERTAINING TO TURNS ON RED TRAFFIC LIGHTS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF NEW MEXICO:

Section 1. Section 64-16-5 NMSA 1953 (being Laws 1953, Chapter 139, Section 34, as amended) is amended to read:

"64-16-5. TRAFFIC CONTROL SIGNAL LEGEND.—Whenever traffic is controlled by traffic control signals exhibiting different colored lights, or colored lighted arrows, successively one at a time or in combination, only the colors green, yellow and red shall be used, except for special pedestrian control signals carrying a word legend, and the lights indicate and apply to drivers of vehicles and pedestrians:

A. green alone:

(1) vehicular traffic facing the signal may proceed straight through or turn right or left unless a sign at the place prohibits either turn. But vehicular traffic, including vehicles turning right or left, shall yield the right of way to other vehicles and to pedestrians lawfully within the intersection or an adjacent crosswalk at the time the signal is exhibited; and

(2) pedestrians facing the signal may proceed across the roadway within any marked or unmarked crosswalk;

B. yellow alone when shown following the green signal:

House Bill 529

Approved March 26, 1973

using the intersection."

(3) no pedestrian facing the signal shall enter the roadway until the green is shown alone unless authorized to do so by a pedestrian "walk" signal.

D. red with green arrow

(1) vehicular traffic facing the signal may cautiously enter the intersection only to make the movement indicated by the arrow, but shall yield the right of way to pedestrians lawfully within a crosswalk and to other traffic lawfully using the intersection; and

(2) no pedestrian facing the signal shall enter the roadway unless he can do so safely and without interfering with any vehicular traffic;

E. if an official traffic control signal is erected and maintained at a place other than an intersection, the provisions of this section apply except as to those provisions which by their nature can have no application. Any stop required shall be made at a sign or marking on the pavement indicating where the stop shall be made, but in the absence of any such sign or marking, the stop shall be made at the signal; and

F. when a sign is in place permitting a turn, vehicular traffic facing a steady red signal may cautiously enter the intersection to make the turn indicated by the sign after stopping as required by Paragraphs (1) and (2) of Subsection C of this section. Vehicular traffic shall yield the right of way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully

State NEW MEXICODate 4/20/77

Approved by GAO
B-181254 (R0356)
Expires 12-31-78

PART V

ASSURANCES

The applicant hereby assures and certifies that they will comply with the regulations, policies, guidelines, and requirements including OMB Circular No. A-95 and Federal Management Circulars Nos. 74-4, (Cost Principles Applicable to Grants and Contracts with State and local governments) and 74-7, (Uniform Administrative Requirements for Grants-in-Aid to State and local governments), as they relate to the application, acceptance and use of Federal funds for this Federally assisted project. Also the applicant assures and certifies with respect to the project that:

1. It possesses legal authority to apply for the grant; that a resolution, motion or similar action has been duly adopted or passed as an official act of the applicant's governing body, if necessary, authorizing the filing of the application, including all understandings and assurances contained therein, and directing and authorizing the person identified as the official representative of the applicant to act in connection with the application and to provide such additional information as may be required.
2. It will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and in accordance with Title VI of that Act, no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the applicant received Federal financial assistance and will immediately take any measures necessary to effectuate this agreement.
3. It will comply with Title VI of the Civil Rights Act of 1964 (42 USC 2000d) prohibiting employment discrimination where (1) the primary purpose of a grant is to provide employment or (2) discriminatory employment practices will result in unequal treatment of persons who are or should be benefiting from the grant-aided activity.

4. It will comply with requirements of the provisions of the Uniform Relocation Assistance and Real Property Acquisitions Act of 1970 (P.L. 91-646) which provides for fair and equitable treatment of persons displaced as a result of Federal and federally assisted programs.
5. It will comply with the provisions of the Hatch Act which limit the political activity of employees.
6. It will comply with minimum wage and maximum hours provisions of the Federal Fair Labor Standards Act, as they apply to hospital and educational institution employees of State and local governments.
7. It will establish safeguards to prohibit employees from using their positions for a purpose that is or gives the appearance of being motivated by a desire for private gain for themselves or others, particularly those with whom they have family, business, or other ties.
8. It will give the grantor agency or the Comptroller General through any authorized representative the access to and the right to examine all records, books, papers, or documents related to the grant.
9. It will comply with all requirements imposed by the Federal grantor agency concerning special requirements of law, program requirements, and other administrative requirements approved in accordance with Federal Management Circular 74-7.
10. It will comply with the provisions of the State energy conservation plan guidelines (41 FR 48325-48333, November 3, 1976) and the Energy Policy and Conservation Act (Pub. L. 94-163) to include all the required program measures, unless waived in whole or in part by FEA.
11. The funds will be spent solely for the implementation of State energy conservation plans.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-STATE AGENCIES

OVERVIEW OF PROGRAM

In New Mexico, approximately 1,400 office buildings are owned, leased or rented by State Government. The total number of square feet of usable space attributed to this sector is: 4,219,445 square feet.¹

These buildings are located throughout the State of New Mexico (121,666 square miles), and while they share similar building characteristics, they vary in terms of lighting and thermal efficiencies. The variance is accounted for by type and year of building construction, regional location, degree day data, energy cost differentials, opportunities for retrofit, and other factors.

During 1975-76, the New Mexico Energy Resources Board, Conservation Division, developed initial mechanisms for working with state agencies to assess and increase energy efficiency. Each state agency was asked to appoint an Energy Management Officer (EMO) who would be responsible for providing consumption data and information on energy conservation actions initiated within his/her agency. Approximately 65 per cent of the state agencies responded. A prototype Energy Management Manual also was distributed to all state agencies during 1975, and selective manual building audits were conducted during 1976. In addition, the state agencies were asked to continue reporting, on a quarterly basis, any conservation measures which have been implemented.

In the course of developing this energy program for state agencies it readily became apparent that a much more precise and specific method was needed to assess energy efficiency and make recommendations for improvements in physical building structures and mechanical systems. Thus, the New Mexico Energy Resources Board, Conservation Division, conceived the idea for a computerized approach to information gathering and assessment. This approach, known as an ENERGY SAVINGS PROGRAM (ESP) will be applied to all state agency office buildings in New Mexico.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting, as total energy efficiency is dependent upon both functions and their interrelationship.

To accomplish this task, a computer energy model currently is being developed.

¹State Department of Finance and Administration, Financial Control Division, 1975 figures.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS--STATE AGENCIES

OVERVIEW OF PROGRAM

Upon receiving data input from maintenance personnel and/or the state architect, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING buildings (including those being considered for rent or lease by the State of New Mexico); and
- 2) The energy efficiency and building code compliance in construction plans for NEW and RENOVATED buildings.²

In-Put

The data (mechanical, structural and energy consumption building information) going into the computer model for analysis of EXISTING state agency office buildings will be supplied by the Energy Management Officer in each building. A data input form will be developed to allow the EMO (an appointed administrative officer or maintenance person) to supply the energy audit information to the computer in non-technical language.

For analysis of buildings under consideration for rent or lease by the State of New Mexico, the Energy Resources Board, Conservation Division, in cooperation with the building owner or leasing agency, will supply the energy audit information to the computer.

Simultaneously, degree day data will be acquired from weather bureau services to enable input of accurate temperature information for each building, according to its location.

For analysis of construction plans for NEW and RENOVATED buildings, the state architect will supply the necessary data to the computer model.

Output

Upon receiving the data-feed on EXISTING state agency office buildings, the computer model will respond with a "print-out" or assessment, of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

For example, if the computer model's assessment indicates that a thermal inefficiency exists in a particular state office building, the corresponding computer recommendation may call for weatherstripping, insulating, putting

² New Mexico Construction Industries Commission has already adopted Chapter 53, Uniform Building Codes. This affects all new construction and all renovations over \$500.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-STATE AGENCIES

OVERVIEW OF PROGRAM

in storm windows or other retrofit alternatives designed to increase the thermal efficiency of the building. These recommendations will consider the cost-effectiveness of each action on an individual building basis, and the computer model will have the capability of updating the recommendations as new conservation techniques become known. During 1978 the ERB Conservation Division will conduct validations, field verifications of the computer audits in existing buildings.

Similarly, the computer energy model will be utilized to assess energy efficiency in buildings under consideration for rental or lease by the State of New Mexico, before rental or lease agreements are signed. The computer output will provide an information base for negotiating the implementation of energy-conserving retrofits in the building envelope and/or mechanical system before actual occupancy by the State.

The computer energy model also will be utilized to assess the energy efficiency of NEW and RENOVATED building plans, and offer construction options before new state structures are built. Thus, the construction of sound, energy-efficient state office buildings will be virtually assured from 1978 forward.

Assessments and recommendations for increasing the energy efficiency of existing buildings and construction plans for new and renovated buildings, will be disseminated as the ESP is implemented in the Energy Management Program for State Agencies. The information will be delivered to the New Mexico Energy Resources Board, Conservation Division; the State Department of Finance and Administration, Division of Property Control; State Agency Director; and chief administrative officer in each building occupied. The analysis of construction plans for new and renovated buildings will go to the state architect.

Information gathered through the ESP will enable the State Department of Finance and Administration, Division of Property Control, to more accurately determine the utility-cost budgeting needs for every state-occupied building. That is, the Division of Property Control will be able to recognize legitimate energy-budgeting needs, and will have the option of refusing increased funding to inefficiently run agencies. The ESP information also will provide firm evidence to support state agencies' funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective.

Training Program

When a state agency office building receives its computerized assessments and recommendations for retrofit, a prepared set of self-instructional training materials will be included to: (1) assist the EMO with initiating certain retrofit actions; and (2) assist administrative officials, professional staff and other building users with understanding and implementing energy conservation practices in the building.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-STATE AGENCIES

OVERVIEW OF PROGRAM

The self-instructional program will include work-books and training session materials, and possibly audiovisual materials, specifically designed for each audience.

When the ESP is fully developed, it will be implemented as a management tool in the Energy Management Program for State Agencies.

Calendar Milestones:

5

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing State Agency buildings.

Primary Fuel Energy Savings From:

Lighting in New, Renovated and existing Buildings	= 0.106 TBTU
Thermal and Mechanical in New and Renovated Buildings	= 0.077 TBTU
Thermal and Mechanical in Existing Buildings	= <u>0.850 TBTU</u>
TOTAL ENERGY SAVINGS OF ESP/OFFICE BUILDINGS/ STATE AGENCIES	= 1.033 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent the State's "share" of the overall savings.
3. The State's share can be established by determining the proportion of floor space owned or leased by the State of the total amount of floor space in the New Mexico estimate of Commercial and Public Buildings, Public and Other Buildings category.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by State Agencies.
5. Since energy conservation programs in State Agencies are 100% enforceable through budget review processes, it is assumed that participation will also be 100%.

¹Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/Office Buildings - State Agencies

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
1106 (thousand)		9150 (thousand)	=	12.09%

% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ^{2 & 3}
12.09%	=	12.09%

Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	X	% of Floor Area for Public & Other Buildings	=	Savings from Public Buildings
1.765×10^{12}	X	0.213	=	0.376×10^{12} BTU

Actual Floor Space of State Agencies ⁴	÷	Estimated Floor Space for State and County and Municipal Buildings ⁵	=	% of Space for State Agencies
4,219,445 square feet	÷	14,985,861 square feet	=	28.2%
Savings from Public Buildings	X	% of Space for State Agencies	=	PRIMARY FUEL SAVINGS FROM OFFICE BUILDINGS/STATE AGENCIES FOR LIGHTING EFFICIENCY
0.376×10^{12} BTU	X	0.282	=	<u>0.106×10^{12} BTU</u>

¹ U. S. Department of Commerce, Statistical Abstract of the United States.

² See Assumption 1.

³ Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

⁴ From 1975 Inventory of State Agency Space, Department of Finance Administration, State of New Mexico.

⁵ See ESP/Office Buildings - County & Municipal Government - 10,766,416 Ft.

Table 1

ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970

(Millions of square feet).

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	187	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source. Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

Table 2
ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
West								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

³Includes State, County and Municipal, and Federal Government floor area.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/Office Buildings - State Agencies

New and Renovated Structures

1974 Commercial Consumption ¹	÷	1974 Total Consumption for Commercial and Residential ¹	=	% of Consumption in Commercial Buildings
50.0 TBTU	÷	92.2TBTU	=	54.2%
		% of Consumption in Commercial Buildings	=	% of Savings in Commercial Buildings ²
		54.2%	=	54.2%
Total Savings from Thermal Efficiency Standards (See Appendix B; FEA methodology)	X	% of Total Savings for Commercial Buildings	=	Savings from Commercial Buildings
2.35×10^{12} BTU	x	0.542	=	1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Public & Other Buildings	=	Savings from Public Buildings
1.27×10^{12} BTU	X	0.213	=	0.271×10^{12} BTU
Savings from Public Buildings	X	% of Space for State Agencies	=	PRIMARY FUEL SAVINGS FROM OFFICE BUILDINGS/STATE AGENCIES FOR THERMAL EFFICIENCY IN NEW AND RENOVATED STRUCTURES
0.271×10^{12} BTU	X	0.282	=	<u>0.077×10^{12} BTU</u>

¹FEA Strawman Data, May. 1976.

²Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

Existing Structures

The annual energy consumption for conventional office buildings in the West is projected at 248,600 BTU/square foot..

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

$$\begin{array}{lcl} \text{Annual Energy Consumption/} & \times & \text{Actual Area of} \\ \text{Conventional Office Building} & & \text{State Agencies} \\ & & \text{Office Space} \end{array} = \begin{array}{l} \text{Annual Consumption} \\ \text{of State Agencies} \\ \text{Office Space} \end{array}$$

$$248,600 \text{ BTU/square ft.} \times 4,219,445 \text{ sq. ft.} = 1.049 \times 10^{12} \text{ BTU}$$

Assume that this total consumption should be distributed proportionally by energy source as shown by historical consumption data from the State Energy Management Program.

<u>Type of Energy</u>	<u>% Distribution by Type</u>	<u>Annual BTU Consumption</u>
Electricity	3.5%	$0.037 \times 10^{12} \text{ BTU}$
Natural Gas	96.2%	$1.009 \times 10^{12} \text{ BTU}$
Propane	0.3%	$0.003 \times 10^{12} \text{ BTU}$

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, subtract $12.6\%^3$ from $40.5\% = 27.9\%$ electrical savings excluding lighting.

Annual Energy Consumption X for State Agencies	% of Savings Possible/Energy Type	=	SAVINGS PER ENERGY TYPE FOR EXISTING OFFICE BUILDINGS/ STATE AGENCIES
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Electricity

$$0.037 \times 10^{12} \text{ BTU} \times 0.279 = 0.010 \times 10^{12} \text{ BTU}$$

Natural Gas

$$1.009 \times 10^{12} \text{ BTU} \times 0.486 = 0.490 \times 10^{12} \text{ BTU}$$

Propane

$$0.003 \times 10^{12} \text{ BTU} \times 0.486 = 0.001 \times 10^{12} \text{ BTU}$$

$$\text{END USE SAVINGS FROM EXISTING OFFICE BUILDINGS/STATE AGENCIES FOR THERMAL EFFICIENCY} = 0.501 \times 10^{12} \text{ BTU}$$

¹Table III-5 "Annual Energy Consumption for Conventional Office Building", An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper # 43B.

²Historical consumption data from State of New Mexico Energy Management Program, 1976.

³Figure V-1, "1970 Energy Demand by End use", An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/Office Buildings - State Agencies

Reduced Non-Electrical Demand

Total BTU rossil
Fuel Saved by
1980 through ESP/
Office Buildings-
State Agencies¹

÷

Heating Plant
Efficiency

BTU SAVED PER
PRIMARY ENERGY
SOURCE FOR
NATURAL GAS
AND PROPANE

(See chart below.)

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	0.490×10^{12}	0.6	0.817×10^{12}
Propane	0.001×10^{12}	0.5	0.002×10^{12}

TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 0.819×10^{12}

Reduced Electrical Demand

0.010×10^{12} BTU ÷ 3413 BTU/KWH = 2,929,974 KWH Saved of End Use Energy

Total KWH Electricity
Saved by 1980 through
ESP/Office Buildings-
State Agencies

X % of Power
Generated by
Type of Generation¹ = KWH Saved by Type of Generation

2,929,974	KWH X 0.1% Gas-fired Gas Turbine	=	2,930	KWH
2,929,974	KWH X 0.3% Oil-fired Gas Turbine	=	8,790	KWH
2,929,974	KWH X 23.2% Gas-fired Steam Turbine	=	679,754	KWH
2,929,974	KWH X 72.6% Oil-fired Steam Turbine	=	2,127,161	KWH
2,929,974	KWH X 3.8% Coal-fired Steam Turbine	=	111,339	KWH

KWH Saved by Type of Generation X Conversion Factro per Type of Fuel = Amount of Primary Fuel Saved

¹ Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

OGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - STATE AGENCIES

<u>682,684</u>	KWH in Natural Gas X 10.4 Cu.Ft./KWH =	<u>7,099,914</u>	Cu.Ft.
<u>2,135,951</u>	KWH in Oil X 0.076 Gallons/KWH =	<u>162,332</u>	Gallons
<u>111,339</u>	KWH in Coal X 0.88 Pounds/KWH =	<u>97,978</u>	Pounds

Unit of Primary- Energy Source	X	Conversion Factor to BTU's	=	BTU Saved/Source of Fuel for Generation
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<u>7,099.9</u>	MCF of Natural Gas X 1,000,000 BTU/MCF =	<u>0.007</u>	x	10^{12}	BTU
<u>162,332</u>	Gallons of Oil X 140,000 BTU/Gallon =	<u>0.023</u>	x	10^{12}	BTU
<u>49.0</u>	Tons of Coal x (26.2 x 10^6) BTU/Ton =	<u>0.001</u>	x	10^{12}	BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 0.031 x 10^{12} BTU

Primary Fuel Savings for Natural Gas and Propane = 0.819 x 10^{12} BTU
Primary Fuel Savings for Electricity = 0.031 x 10^{12} BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND
MECHANICAL IN EXISTING BUILDINGS = 0.850 x 10^{12} BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-STATE AGENCIES

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

OVERVIEW:

The Energy Management Program (EMP) for State Agencies is designed to reduce overall energy consumption and reduce or stabilize energy costs by:

1. Implementation information and training programs to obtain the support and cooperation of all building users in practicing energy conservation actions.
2. Implementing the ESP (Energy Savings Program) computer recommendations to increase the thermal and lighting efficiencies of state office buildings.
3. Implementing transportation strategies such as carpooling and vanpooling by state government employees who drive to work, and increasing the efficiency of state government transportation for employees on official business.
4. Purchasing energy-efficient equipment and products by utilizing life-cycle costing information.
5. Monitoring energy consumption for evaluation of the most effective energy conservation actions.

The New Mexico Energy Resources Board, Conservation Division, will act as a "facilitator" for the State Agency Energy Management Programs by providing information and consultation to state officials as they implement these management strategies. The Energy Resources Board, Conservation Division, also will coordinate the drafting of State legislation or regulations which are necessary for the successful implementation of such programs.

EMP actions implemented by state agencies will be reported to the Energy Resources Board, Conservation Division, so that they can be assessed and evaluated for application to other state agencies or other institutions in New Mexico.

During 1975-76, the Energy Resources Board, Conservation Division, developed initial mechanisms for working with state agencies in New Mexico to assess and increase energy efficiency. Each state agency was asked to appoint an Energy Management Officer (EMO) who would be responsible for providing consumption data and information on energy conservation actions initiated within the agency. A prototype Energy Management Manual was distributed to all state agencies during 1975, and selective manual building audits were conducted during 1976. In addition, the state agencies were asked to continue reporting on a quarterly basis, any conservation measures which have been implemented.

In February, 1977, New Mexico Governor Jerry Apodaca ordered all state agencies to implement a short-term energy conservation plan (Winter Emergency Program) to help alleviate the energy crisis facing the nation. The program

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

OVERVIEW:

called for the lowering of all thermostats to 65 degrees F. during working hours, and to 55 degrees F. during non-working hours. Additionally, state agencies were asked to discontinue use of portable heaters, heater blowers or threshold heaters wherever possible; close drapes or blinds at night; and avoid heating areas not in use. The Energy Resources Board, Conservation Division, performed spot checks on 16 agencies, comprising 31 buildings, to determine compliance with the Governor's mandate. It was learned that in spite of a willingness to comply with the short term conservation program, many state agencies' efforts to reduce consumption were hampered by inefficient heating systems and poorly insulated buildings. The ERB Conservation Division will analyze the effects of this emergency program further by studying all state agencies' consumption data.

Implementation of the Energy Savings Program (ESP) for State Agencies during 1978 will provide a more sophisticated method of assessing the thermal and lighting efficiencies of state agency building structures, and will offer a sound data base for implementing certain facets of the Energy Management Program during 1978-1980.

1. Information and Training

During 1978-1980, the Energy Resources Board, Conservation Division, will continue to supply information to all state agencies on energy conservation techniques which can be implemented by State government. In New Mexico, all state agencies will continue to submit quarterly consumption reports to the Energy Resources Board, Conservation Division, until 1978, when the computer consumption model is operational (SEE MONITORING), as well as conservation actions undertaken by each agency through 1980. The ERB, Conservation Division, will utilize this information to evaluate the effectiveness of various management techniques. Thus, strategies that are proven effective in one agency can be applied to another agency's operations.

During 1977, the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico developed a comprehensive self-instructional Energy Management Training Program for all users and staffs of state agencies.

A key element in the training program is the preparation and dissemination of Energy Management Manuals and other instructional materials to (1) assist Energy Management Officers and state agency maintenance staffs with implementing specific retrofit actions governing the energy efficient operation of their heating, lighting and mechanical systems; (2) assist all other state agency staff and building users with implementing energy conservation practices in all appropriate areas; (3) assist state transportation officials and all state agency employees with implementing conservation strategies in the transportation sector; and (4) assist state purchasing officers with the application of energy efficiency standards in purchasing practices.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

OVERVIEW:

2. Implementation of ESP Computer Recommendations

During 1978-1980, all state agencies will implement the computer recommendations made by the Energy Savings Program (ESP) for state agency office buildings to increase the thermal and lighting efficiencies. Self-instructional training program materials prepared by the Energy Resources Board, Conservation Division, will assist the Energy Management Officer and other staff with implementing all facets of their EMP, including the ESP recommendations. In 1978, the ERB, Conservation Division will conduct training workshops directed toward the implementation of no cost or low cost energy conservation improvements in state agencies. Additionally, during 1978 the ERB Conservation Division will conduct energy conservation workshops for boiler inspectors.

The ERB Conservation Division will continue to make information available on new technologies and new alternatives for reducing the energy consumption in building envelopes and mechanical systems, as it is developed.

Following implementation of energy conservation retrofit actions in existing state agency office buildings, and following inclusion of energy conservative design in plans for new and renovate buildings, all energy consumption in state agency office buildings will be monitored by the computer consumption model to determine actual energy and cost-savings. (SEE MONITORING).

3. Transportation

The energy-efficient transportation of state employees travelling on official business as well as travelling to and from place of employment poses great potential for energy savings by State government in New Mexico.

During 1976, the Energy Resources Board, Conservation Division, assisted in the establishment of the State Employees Commuter Association (SECA), a non-profit group of state employees who commute relatively long distances to and from work at State government offices in Santa Fe each day. During 1976 & 77, SECA obtained no interest loans from the Department of Transportation to lease six 15-passenger vans. Four of the vans are used between Albuquerque and Santa Fe, one van travels between Embudo and Santa Fe (130 miles round trip) and one van travels between Pojoaque and Los Alamos (70 miles round trip). As of November 1977, 90 state employee passengers were commuting by SECA vans daily. It is anticipated that by 1980, SECA will expand its service to 12 commuter vans carrying additional state employee passengers from Albuquerque, the Espanola Valley and Las Vegas to Santa Fe.

During 1977-1980, the ERB Conservation Division will actively promote car and vanpooling by all state employees working in Santa Fe, including local residents who drive to work daily. The Conservation Division will assist

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

OVERVIEW:

with development of a "matching" system, such as a locator board displayed in the State Capitol complex to help link state employees together for car and vanpooling. An aggressive information and publicity program will assist this effort, and additional incentives such as preferential parking for car and vanpoolers are under consideration.

During 1977, the State Motor Transportation Pool initiated a shuttle-van service for state employees travelling between Santa Fe and Albuquerque on official business. Four 15-passenger vans travel between the two cities on a regular schedule, Monday through Friday. When a state employee arrives in Albuquerque via the shuttle van (or vice-versa, arrives in Santa Fe), he or she checks out a state car to drive to an ultimate destination within the city. As the program gains acceptance, more shuttle vans will be added or more round-trips will be scheduled along this heavily travelled route.

4. Purchasing

During 1978-1980, guidelines for the purchasing of energy-efficient equipment and products by state agencies will be developed and implemented as the relevant information becomes available. Results of the Department of Energy's appliance efficiency tests will be incorporated into the purchase guidelines for State governments.

The Energy Resources Board, Conservation Division, will assist purchasing agents with incorporating life-cycle costing information into bid specifications for all state government purchases as life-cycle costing information becomes available. Life-cycle costing is defined as the cost of a product or appliance, including motor vehicles, over its entire useful period, with consideration of the initial purchase price, projected maintenance expense and energy-consumption costs.

The principle of life-cycle costing is also applied to purchases of motor vehicles by the state transportation pool. During 1975-1977, the State Transportation Pool has realized considerable energy and cost savings by replacing full-size and intermediate cars with compacts. Other state agencies owning motor vehicles will be mandated to phase out high-consumption vehicles wherever feasible, through 1980.

5. Monitoring

A computer consumption model is being developed by the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico to monitor energy consumption in publicly-funded operations. Thermal and lighting consumption data on public buildings, from primary and/or secondary sources; fuel consumption data on public vehicles; and purchasing information on public purchases will all be analyzed by the computer consumption model.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

OVERVIEW:

The computer analysis of consumption will be delivered to state agency directors and chief administrative officers in each state building, the State Department of Finance and Administration (DFA), Division of Property Control and the ERB Conservation Division.

Such energy consumption information will be used as a management tool by the DFA, Division of Property Control, and State Agency officials by evaluating capital improvement requests, construction plans for new and renovated buildings, and other budgetary requests. The ERB Conservation Division will utilize the consumption information to determine the most effective methods of reducing energy consumption in state government.

Program Measure: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

Calendar Milestones:

TASK	1976 Quarter	1977 Quarter	1978 Quarter	1979 Quarter	1980 Quarter
Implementation of Energy Management Program:					
- Quarterly Reporting of Consumption by State Agencies					
- Manual Building Audits (Selective) Continue					
- Transportation Strategies Studied					
- Promotion of Car and Vanpooling Programs					
- State Motor Pool Phases Out Full-Size Cars					
DOE Appliance Efficiency Testing					
Gathering of Life-Cycle Costing Information					
SECA Vans Operational					
Computer Energy Model in Development for ESP					
Computer Consumption Model in Development					
EMP Self-Instructional Training Materials in Development					
State Employee Shuttle Service Operational					
Additional Implementation of EMP in All State Agencies					
-Employee Training & Public Information					
-ESP Recommendations Implemented					
-Transportation Strategies Implemented					
-Life-Cycle Costing Incorporated into Purchasing					
-Training Workshops					
-Computer Consumption Monitoring					

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR STATE AGENCIES

ENERGY SAVINGS ESTIMATE

Assumptions:

1. The Energy Management Program for State Agencies is the program which implements the Energy Savings Program for State Agencies, and the Promotion of Car and Vanpooling and Public Transportation, and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions programs within State agency operations.
2. Savings from the ESP for State Agencies is indicated in the calculation summaries in brackets to show its value to an overall management program, but the savings are excluded from the total savings of this program to avoid duplication in the total savings and environmental impact of the State Energy Conservation Program.
3. Savings from the Promotion of Car and Vanpooling and Public Transportation program and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions program that will occur through the implementation of this program are included in this program, and excluded in the total savings of the other two programs.
4. The methodologies used to determine the amount of savings from the Transportation and Procurement programs are included in the detailed descriptions of those programs.

Calculations:

Savings from the Energy Savings Program for State
Agencies = $(1.033 \times 10^{12} \text{ BTU})$

Savings from Transportation Programs for State
Agencies = $0.185 \times 10^{12} \text{ BTU}$

SECA = $0.024 \times 10^{12} \text{ BTU}$

Promotion of Car &

Vanpooling for State

Employees

Shuttle Van

= $0.021 \times 10^{12} \text{ BTU}$

= $0.014 \times 10^{12} \text{ BTU}$

Savings From Procurement Programs = $0.140 \times 10^{12} \text{ BTU}$

TOTAL SAVINGS FROM ENERGY MANAGEMENT PROGRAM FOR
STATE AGENCIES = $0.325 \times 10^{12} \text{ BTU}$

SAVINGS INCLUDING ESP PROGRAM = $(1.358 \times 10^{12} \text{ BTU})$

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR STATE AGENCIES

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spend by end-users of most program measurers are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as FEA-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: EMP - State Agencies

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	\$20,000	\$10,000	\$30,000		\$10,000 ¹			
OTHER	*	**							
Total Direct	-	\$20,000	\$10,000	\$30,000		\$10,000			
Indirect									
TOTAL BUDGET		\$20,000	\$10,000	\$30,000		\$10,000			

* Refer to Administrative Package, 4.5% of EPCA Budget

**Refer to Administrative Package, 4.8% of ECPA Budget

¹DFA-State

PROGRAM MEASURE: ESP - State Agencies

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT	*	**							
SUPPLIES	*	**							
CONTRACTUAL	\$75,000	\$25,000	\$50,000	\$150,000	\$50,000				
OTHER	*	**							
Total Direct	\$75,000	\$25,000	\$50,000	\$150,000	\$50,000				
Indirect									
TOTAL BUDGET	\$75,000	\$25,000	\$50,000	\$150,000	\$50,000				

* Refer to Administrative Package, 12.0% of EPCA Budget
 **Refer to Administrative Package, 18.4% of ECPA Budget

¹ State Agencies

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

In New Mexico, approximately 4,000 buildings comprise the space occupied by public schools, public colleges and universities, and libraries attached to state, county or municipal governments. The total square feet of usable space attributed to each sector is:

Public Schools	29,077,771 square feet ¹
Colleges and Universities.....	10,653,485 square feet ²
Libraries	376,657 square feet ^{3,4}

These buildings are located throughout the State of New Mexico (121,666 square miles), and while they share similar building characteristics, they vary in terms of lighting and thermal efficiencies. The variance is accounted for by type and year of building construction, regional location, degree day data, energy cost differentials, local funding base, opportunities for retrofit, and other factors.

During 1976, the New Mexico Energy Resources Board, Conservation Division, developed initial mechanisms for working with the public schools in New Mexico, and to a limited extent with colleges and universities, to assess and increase energy efficiency. Public schools were asked to provide information on their monthly consumption of electricity, natural gas, LPG, and gasoline since 1973, and about 60 of the state's 88 school districts responded. A prototype Energy Management Manual was distributed to the public schools, and selective manual building audits also were held during 1976. In addition, the public schools were asked to report on any conservation measures which they have implemented.

In the course of developing this energy program for the public schools, it readily became apparent that a much more precise and specific method was needed to assess energy efficiency and make recommendations for improvements in physical building structures. Thus the New Mexico Energy Resources Board, Conservation Division, conceived the idea for a computerized approach to information gathering and assessment. This approach, known as an ENERGY SAVINGS PROGRAM (ESP), will eventually be

¹"Public School Capital Outlay Program Report, 1975", prepared by the State Department of Finance and Administration, Public School Finance Division,

²State Department of Finance and Administration 1975.

³New Mexico State Library, 1975 Annual Report.

⁴Because libraries share similar building characteristics with school buildings and college and university buildings, they are being addressed in this program rather than the public buildings program for state agencies and/or county and municipal governments.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, COLLEGES UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

applied to all public schools, colleges and universities, and libraries in New Mexico.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting as total energy efficiency is dependent upon both functions and their interrelationship.

To accomplish this task, a computer energy model currently is being developed. Upon receiving data input from building maintenance personnel and/or architects, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING buildings; and
- 2) The energy efficiency and building code compliance in construction plans for NEW and RENOVATED buildings. 5

In-Put

The data (mechanical, structural and energy consumption building information) going into the computer model for analysis of existing schools, universities and libraries will be supplied by the Energy Management Officer in each building. A data input form will be developed to allow the EMO (an appointed administrative officer or maintenance person) to supply the energy audit information to the computer in non-technical language.

Simultaneously, degree day data will be acquired from weather bureau services to enable input of accurate temperature information for each building according to its location.

For analysis of construction plans for NEW and RENOVATED buildings, the architect will supply the necessary data to the computer model.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, COLLEGES UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

OUTPUT

Colleges and Universities:

Upon receiving the data-feed on EXISTING college and university buildings, the computer model will respond with a "print-out" or assessment of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's energy efficiency, including an estimate of the cost-effectiveness of each action.

The computer energy model also will be utilized to assess the energy efficiency of NEW and RENOVATED building plans, and offer construction options before new college and university structures are built. Thus, the construction of sound, energy-efficient college and university buildings will be virtually assured from 1978 forward.

Assessments and recommendations for increasing the efficiency of existing buildings and construction plans for new and renovated buildings, will be disseminated as the ESP is implemented in the Energy Management Program. The information will be delivered to the New Mexico Energy Resources Board, Conservation Division; the State Board of Educational Finance; regents and members of the board of directors of all public colleges and universities; and/or other appropriate officials. The analysis of construction plans for new and renovated buildings also will go to the college or university architect.

Information gathered in the ESP will enable the Department of Educational Finance and Cultural Affairs, which controls funding for all public institutions of higher learning in New Mexico, to more accurately determine the utility-cost budgeting needs for all public colleges and universities. That is, the Department of Educational Finance & Cultural Affairs, will be able to recognize legitimate energy-budgeting needs, and will have the option of refusing increased funding to inefficiently run colleges and universities. The ESP information also will provide firm evidence to support the colleges and universities' funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective.

Libraries Attached to State, County or Municipal Governments:

Upon receiving the data-feed on EXISTING library buildings, the computer model will respond with a "print-out" or assessments of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's energy efficiency, including an estimate of the cost-effectiveness of each action.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, COLLEGES
UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

The computer energy model also will be utilized to assess the energy efficiency of NEW and RENOVATED building plans, and offer construction options before new library structures are built. Thus, the construction of sound, energy-efficient library buildings will be virtually assured from 1978 forward.

Assessments and recommendations for increasing the efficiency of existing buildings and construction plans for new and renovated buildings, will be disseminated as the ESP is implemented in the Energy Management Programs. The information will be delivered to the New Mexico Energy Resources Board, Conservation Division; the State Department of Finance and Administration (for state libraries); the county or municipal government administrator (for county and municipal libraries); and the local library administrator. The analysis of construction plans for new and renovated library buildings also will go to the library architect.

Information gathered in the ESP will enable the Department of Finance and Administration (for state libraries) and county and municipal governments (for county and municipal libraries) to more accurately determine the utility-cost budgeting needs for libraries under their jurisdiction. That is, these funding authorities will be able to recognize legitimate energy-budgeting needs, and will have the option of refusing increased funding to inefficiently run libraries. The ESP information also will provide firm evidence to support the libraries' funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective.

Public Schools

During 1977, New Mexico public schools' personnel gathered data for use in the Public School Energy Consumption System (PSECS) computer model. The data included specific information on heating and lighting systems, fuel consumption, type and year of construction, usage patterns, square feet of space, type and degree of insulation, number of windows and doors, capital outlay budget and other relevant facts. Class A audits were then performed by architects and engineers who verified information for the PSECS computer model. Specifically, these individuals validated data provided by the public schools pertaining to structural composition, mechanical systems, thermal efficiency and accuracy of square footage and land parcels. During 1978, we intend to run the data for all New Mexico's 688 schools through the PSECS system.

The data base gathered for use in the PSECS program may also be applied to the computer energy model currently being developed to provide assessments of;

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, COLLEGES UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

- 1) the energy efficiency of lighting and heating in EXISTING buildings; and
- 2) The energy efficiency and building code compliance.

While the PSECS model will yield an analysis of what general conservation measures to take as well as cost/benefit analyses, the computer energy model will give more sophisticated information about a building's energy use. For example, simulation of various situations, taking into account such factors as number of students in a building, number of times doors open and close, amount of sunshine at any given time, etc., will be run through the computer so that a building's energy consumption at any given time will be known. Information gathered will enable the Department of Educational Finance and Cultural Affairs, which controls funding for all public institutions of higher learning in New Mexico, to more accurately determine the utility-cost budgeting needs for all public colleges. That is, the Department of Educational Finance and Cultural Affairs, will be able to recognize legitimate energy-budgeting needs, and will have the option of refusing increased funding to inefficiently run schools. The ESP information also will provide firm evidence to support the public school's funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective.

The computer energy model will also supply an assessment of the energy efficiency of each building and recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

Private Sector

Eventually, the ESP will be made available, at cost, to schools, colleges and universities, and libraries in the private sector.

Training Program

When a local public school, college or university, or library receives its computerized assessments and recommendations for retrofit, a prepared set of self-instructional training materials will be included to: (1) assist building maintenance personnel with initiating certain retrofit actions; and (2) assist administrative officials, professional staff, students and other building users in utilizing energy conservation techniques in the building.

The self-instructional program will include workbooks and training-session materials, and possibly audiovisual materials, specifically designed for each audience.

When the ESP is fully developed, it will be implemented as a management

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOLS, COLLEGES
UNIVERSITIES AND LIBRARIES

OVERVIEW OF PROGRAM

tool in the Energy Management Programs for state agencies, public schools, colleges and universities, and county and municipal governments.

Program Measure: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Calendar Milestones:

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing Public Schools and Libraries.

PRIMARY FUEL ENERGY SAVINGS FROM:

LIGHTING IN NEW, RENOVATED AND EXISTING BUILDINGS	=	0.296 TBTU
THERMAL AND MECHANICAL IN NEW AND RENOVATED BUILDINGS	=	0.271 TBTU
THERMAL AND MECHANICAL IN EXISTING BUILDINGS	=	5.050 TBTU
TOTAL ENERGY SAVINGS OF ESP/PUBLIC SCHOOLS	=	<u>5.617 TBTU</u>

ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent the Schools and Libraries "share" of the overall savings.
3. Schools and Libraries share can be established by determining the proportion of floor space used of the total amount of floor space estimated in New Mexico estimate of Commercial and Public Buildings, School category.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by Schools and Libraries.
5. Since energy conservation programs in most schools and libraries are 100% enforceable through budget review processes, it is assumed that participation will also be 100%.

¹ Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/ Public Schools and Libraries

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
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1106(thousand)	÷	9150 (thousand)	=	12.09%
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% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ² & ³
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12.09%	=	12.09%
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Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	X	% of Floor Area, for Schools and Libraries ⁴	=	SAVINGS FROM SCHOOLS AND LIBRARIES FOR LIGHTING EFFICIENCY
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1.39×10^{12} BTU	X	0.213	=	0.296×10^{12} BTU
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¹U. S. Department of Commerce, Statistical Abstract of the United States.

²See Assumption 1.

³Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

⁴See Table 2.

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/ Public Schools and Libraries

New and Renovated Structures

1974 Commercial Consumption	÷	1974 Total Consumption for Commercial and Residential	=	% of Consumption in Commercial Buildings
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50.0 TBTU	÷	92.2 TBTU	=	54.2%
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% of Consumption in Commercial Buildings	=	% of Savings in Commercial Buildings ²
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54.2%	=	54.2%
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Table 1

**ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970**

(Millions of square feet)

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	187	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source: Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Table 2

ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices & Banks	Hotels	Garages	Schools ³	Hospitals	Public & Other	TOTAL
West								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

³Includes Libraries.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Total Savings from Thermal Efficiency Standards (See Appendix R, FEA methodology)	X	% of Total Savings for Commercial Buildings	=	Savings from Commercial Buildings
2.35×10^{12} BTU	X	0.542	=	1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Public Schools and Libraries	=	PRIMARY FUEL SAVINGS FROM OFFICE BUILDINGS/STATE AGENCIES FOR THERMAL EFFICIENCY IN NEW AND RENOVATED STRUCTURES
1.27×10^{12} BTU	X	0.213	=	<u>0.271×10^{12} BTU</u>

¹ FEA Strawman Data, May, 1976.

² Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

Existing Structures

The annual energy consumption for conventional school buildings in the west is projected at 153,000 BTU/Sq.Ft.¹ Assume that this total consumption should² be distributed proportionally by energy source as shown by school statistics.

Projected 1975/1976 Consumption by Public Schools is estimated² as follows:
 $153,300 \text{ BTU/Sq.Ft.} \times 29,077,771 \text{ Sq.Ft.} = 4.458 \times 10^{12} \text{ BTU}$

TYPE OF ENERGY	% DISTRIBUTION	ANNUAL BTU CONSUMPTION
Electricity	5.5%	0.245×10^{12}
Natural Gas	89.4%	3.985×10^{12}
Propane	5.1%	0.227×10^{12}

Projected consumption for Public Libraries is estimated³ as follows:
 $153,300 \text{ BTU/Sq.Ft.} \times 10,653,485 \text{ Sq.Ft.} = 1.633 \times 10^{12} \text{ BTU}$

TYPE OF ENERGY	% DISTRIBUTION	ANNUAL BTU CONSUMPTION
Electricity	5.5%	0.090×10^{12}
Natural Gas	89.4%	1.460×10^{12}
Propane	5.1%	0.083×10^{12}

Projected consumption for Universities and Colleges is estimated³ as follows:
 $153,300 \text{ BTU/Sq.Ft.} \times 376,657 \text{ Sq.Ft.} = 0.058 \times 10^{12} \text{ BTU}$

TYPE OF ENERGY	% DISTRIBUTION	ANNUAL BTU CONSUMPTION
Electricity	5.5%	0.003×10^{12}
Natural Gas	89.4%	0.052×10^{12}
Propane	5.1%	0.003×10^{12}

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Combining the three projections for consumption, the total consumption for Schools and Libraries is:

Electricity	0.338×10^{12}	BTU
Natural Gas	5.497×10^{12}	BTU
Propane	0.313×10^{12}	BTU

Although the Public Schools Energy Conservation Service (PSECS) program has not yet generated any summary reports on the kinds and amounts of savings that could be acquired through a school audit system, it is the present position of the Federal Energy Administration, Washington, that the non-residential buildings savings projected by Rand Corporation² could be achieved in school buildings, given that money was made available to institute retrofit actions recommended by an audit system. It is assumed that public libraries and universities are similar enough in design to public schools to realize the same degree of savings.

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, subtract 12.6% from 40.5% = 27.9% electrical savings, excluding lighting.

Projected Energy Consumption for Schools & Libraries/year	X	% of Savings Possible/Energy Type	=	SAVINGS PER ENERGY TYPE FOR EXISTING SCHOOLS AND LIBRARIES FOR THERMAL EFFICIENCY
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Electricity

$$0.338 \times 10^{12} \text{ BTU} \times 0.279 = 0.094 \times 10^{12} \text{ BTU}$$

Natural Gas

$$5.497 \times 10^{12} \text{ BTU} \times 0.486 = 2.672 \times 10^{12} \text{ BTU}$$

Propane

$$0.313 \times 10^{12} \text{ BTU} \times 0.486 = 0.152 \times 10^{12} \text{ BTU}$$

END USE SAVINGS FROM EXISTING SCHOOLS AND LIBRARIES FOR THERMAL EFFICIENCY = 2.918×10^{12} BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

TOTAL SAVINGS FROM EXISTING SCHOOLS AND LIBRARIES FOR
THERMAL EFFICIENCY = 2.340×10^{12} BTU

Overall Savings from ESP/PUBLIC SCHOOLS AND LIBRARIES

Savings from Public Schools and Libraries/Lighting	0.400×10^{12} BTU
Savings from Public Schools and Libraries/N&R Thermal	0.271×10^{12} BTU
Savings from Public Schools and Libraries/E Thermal	2.340×10^{12} BTU

TOTAL ENERGY SAVINGS DIRECTLY FROM ESP/PUBLIC SCHOOLS AND
LIBRARIES BY 1980 = 3.011×10^{12} BTU

¹Table III-9, "Annual Energy Consumption for Conventional School" An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

²Public School Finance, Statistics 1975/1976, Department of Finance and Administration, State of New Mexico.

³Since no data for consumption of libraries is available, projections from school data of consumption per square foot were extended to the total square feet of public libraries (from the 1975/1976 Annual Report, State Library, State of New Mexico.) and to universities and colleges.

⁴Figure V-1, "1970 Energy Demand by End Use," An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/PUBLIC SCHOOLS AND LIBRARIES

Reduced Thermal Demand

Total BTU Fossil Fuel Saved by 1980 through ESP/Schools and Libraries	÷	Heating Plant Efficiency	=	BTU SAVED PER PRIMARY ENERGY SOURCE FOR HEATING/COOLING
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(See chart below.)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM
PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	2.672×10^{12}	0.6	$4,453 \times 10^{12}$
Propane	0.152×10^{12}	0.5	0.304×10^{12}

**TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 4.757×10^{12}**

Reduced Electrical Demand

0.094×10^{12} BTU $\div$ 3413 BTU/KWH = 27,541,752 KWH Saved of End Use Energy

Total KWH Electricity Saved by 1980 through ESP/Public Schools X % of Power Generated by Type of Generation = KWH Saved by Type of Generation

<u>27,541,752</u>	KWH X 0.1% Gas-fired Gas Turbine =	<u>27,542</u>	KWH
<u>27,541,752</u>	KWH X 0.3% Oil-fired Gas Turbine =	<u>82,625</u>	KWH
<u>27,541,752</u>	KWH X 23.2% Gas-fired Steam Turbine =	<u>6,389,686</u>	KWH
<u>27,541,752</u>	KWH X 72.6% Oil-fired Steam Turbine =	<u>19,995,312</u>	KWH
<u>27,541,752</u>	KWH X 3.8% Coal-fired Steam Turbine =	<u>1,046,587</u>	KWH

KWH Saved by Type of Generation	X	Conversion Factor per Type of Fuel	=	Amount of Primary Fuel Saved
<u>6,417,228</u>	KWH in Natural Gas X	10.4 Cu.Ft./KWH =	<u>66,739,171</u>	Cu.Ft.
<u>20,077,937</u>	KWH in Oil X	0.076 Gallons/KWH =	<u>1,525,923</u>	Gallons
<u>1,046,587</u>	KWH in Coal X	0.88 Pounds/KWH =	<u>920,997</u>	Pounds

Unit of Primary Energy Source	X	Conversion Factor to BTU's	=	BTU Saved/Source of Fuel for Generation
<u>66,739.2</u>	MCF of Natural Gas X	1,000,000 BTU/MCF =	<u>0.067</u>	$\times 10^{12}$ BTU
<u>1,525,923</u>	Gallons of Oil X	140,000 BTU/Gallon =	<u>0.214</u>	$\times 10^{12}$ BTU
<u>460.5</u>	Tons of Coal x	(26.2×10^6) BTU/Ton =	<u>0.012</u>	$\times 10^{12}$ BTU

**TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 0.293×10^{12} BTU**

Primary Fuel Savings for Natural Gas and Propane = 4.757×10^{12} BTU
Primary Fuel Savings for Electricity = 0.293×10^{12} BTU

**PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND
MECHANICAL IN EXISTING BUILDINGS = 5.050×10^{12} BTU**

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/PUBLIC SCHOOLS AND LIBRARIES

¹Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR PUBLIC SCHOOL AND LIBRARIES

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: ESP - Public Schools

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	\$50,000	\$17,225 1977 carryover	-	\$67,225					
OTHER	*	**							
Total Direct	\$50,000		-	\$67,225					
Indirect									
TOTAL BUDGET	\$50,000	\$17,225	-	\$67,225					

* Refer to Administrative Package, 7.5% of EPCA Budget

**Refer to Administrative Package, 7.4% of ECPA Budget

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

The Energy Management Program (EMP) for public schools, colleges and universities, and libraries attached to state, county or municipal governments, is designed to reduce overall energy consumption and reduce or stabilize energy costs in those sectors by:

1. Implementing communications and training programs to obtain the support and cooperation of all building users in utilizing energy conservation practices.
2. Implementing the ESP computer recommendations (ENERGY SAVINGS PROGRAM) to increase the thermal and lighting efficiency of building structures.
3. Implementing transportation strategies such as carpooling and vanpooling.
4. Purchasing energy-efficient equipment and products, utilizing life-cycle costing information.
5. Monitoring of energy consumption for evaluation of most-effective energy conservation actions.

The Energy Resources Board, Conservation Division, will act as a "facilitator" for the EMP's by providing information and consultation to all public schools, colleges and universities and libraries as they implement these management strategies. The Conservation Division also will coordinate the drafting of necessary legislation or regulations to represent the "collective" needs of these institutions.

EMP actions implemented in these institutions will be reported to the Energy Resources Board, Conservation Division, so that (1) an assessment can be made of the EMP actions statewide; and (2) new and effective information from one sector can be evaluated for application to other sectors.

Public Schools

In 1976, the Energy Resources Board, Conservation Division, developed initial mechanisms for working with the public schools in New Mexico, including the publication of a preliminary energy management manual which recommended various conservation management techniques. Schools also were asked to provide information on their monthly consumption of electricity, natural gas, LPG and gasoline since 1973, as well as conservation measures undertaken following public hearings and selective building audits in the spring of 1976. It was learned that during the period from 1971-72 to 1975-76, heating costs rose 158.9 per cent and electricity costs rose 57.5 per cent in the public schools.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

In addition, the Energy Resources Board, Conservation Division, during 1977 funded 5 pilot projects and is monitoring two other projects in schools located around the state to demonstrate the energy savings resulting from various retrofit actions. These projects include: (1) the installation of solar panels on portable classrooms to provide passive solar heat; (2) replacement of north-facing windows with double pane glass; (3) addition of insulation on exterior cinder block walls; (4) maintenance overhaul/ replacement of broken windows, caulking and weatherstripping all windows and doors, repair and re-insulation of roof with spray-on foam insulation; (5) replacement of incandescent lights with fluorescent lights; (6) roof re-insulation with fiberglass; and (7) implementation of a four-day school week.

In addition to demonstrating conservation retrofits, the pilot projects will serve to educate public school administrators in the need for promoting energy conservation in the state's schools.

1. Communications and Training

The Energy Resources Board, Conservation Division, will prepare a quarterly newsletter for distribution to all public school districts during 1978-1980. The newsletter will provide the schools with current information on energy conservation techniques and serve as a vehicle for reporting on energy conservation programs undertaken by individual school districts. Thus, it will provide a continuous source of new ideas and information for the public schools to help them maintain the vigor and applicability of their energy management programs.

During 1977, the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico developed a self-instructional Energy Management Training Program for all users and staffs of public school facilities. A key element in the training program is the preparation and dissemination of Energy Management Manuals and other instructional materials to (1) assist the public school building and maintenance staffs with implementing specific retrofit actions governing the energy efficient operation of their heating, lighting and mechanical systems; (2) assist administrative staff, students and other building users with implementing energy conservation practices in all appropriate areas; (3) assist transportation officials, staff, parents and secondary-level students with implementing energy conservation strategies in the transportation sector; and (4) assist school purchasing agents with the application of energy efficiency standards in purchasing practices.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

2. Implementation of ESP Computer Recommendations

During 1978-1980, public schools throughout the state will implement the computer recommendations made by the Energy Savings Program (ESP) for Public Schools to increase the thermal and lighting efficiencies of public school buildings. Self-instructional training program materials prepared by the Energy Resources Board, Conservation Division, will assist school personnel with implementing all facets of their Energy Management Programs, including the ESP recommendations.

In 1978, the ERB, Conservation Division, will conduct training workshops directed toward the implementation of no cost or low cost energy conservation improvements in the public schools. Additionally during 1978 the ERB, Conservation Division, will conduct separate energy conservation workshops for boiler inspectors.

The Energy Resources Board, Conservation Division, will continue to make information available on new technologies and alternatives for reducing energy consumption in building envelopes and mechanical systems, as it is developed.

Following implementation of energy conservation retrofit actions in existing public school buildings, and inclusion of energy conservative design in plans for new and renovated buildings, all energy consumption in the public schools will be monitored by the computer consumption model to determine actual energy and cost-savings.

3. Transportation

Transportation management to reduce energy consumption in the public school sector will concern itself primarily with the operation and scheduling of school buses. Measures may be taken at the local level to insure maximum occupancy through rescheduling of time and route, as necessary. Local school bus drivers also will receive self-instructional training materials to assure maximum efficiency of operation and maintenance of all public school buses.

Gasoline consumption statistics will be maintained by the State Department of Education, School Transportation Division, to monitor the effects of the Energy Management Program in the transportation area.

4. Purchasing

During 1978-1980, guidelines for the purchasing of energy-efficient equipment and products in the public schools, will be developed and implemented

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

as relevant information becomes available. Results of the Federal Energy Administration's appliance efficiency tests, will be incorporated into the purchasing guidelines for the public schools.

The Energy Resources Board, Conservation Division, will assist local public school purchasing agents with applying the principle of life-cycle costing (ie., the cost of a product or appliance, including motor vehicles, over its entire useful period, with consideration of the initial purchase price, projected maintenance expense, and energy consumption costs) to public school purchases in all cases where life-cycle costing information can be obtained.

Since it is the general practice for public schools in New Mexico to utilize state government purchasing specifications in purchasing items at the local level, and due to the fact that incorporation of life-cycle costing information into bid specifications is presently the practice for State government purchases in New Mexico, the consideration of energy efficiency in all purchases made by the public schools will become a routine practice during 1978-1980.

5. Monitoring

A computer consumption model will be developed during 1978 by the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico, to monitor energy consumption in publicly funded operations. Thermal and lighting consumption data on public buildings, from primary and/or secondary sources; fuel consumption data on public vehicles; and purchasing information on public purchases will be analyzed by the computer consumption model.

The computer analysis of consumption will be delivered to local public school officials; the Energy Resources Board, Conservation Division; the State Department of Finance and Administration (DFA), Public School Finance Division; and the State Department of Education, as appropriate.

Such energy consumption information will be used as a management tool by state and local school officials in evaluating capital improvement requests, new building construction plans, and other budgetary requests. The Energy Resources Board, Conservation Division, will utilize the consumption information to determine the most effective methods of reducing energy consumption in the public schools statewide.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

Public Colleges and Universities

1. Communications & Training

During 1977-1980, the Energy Resources Board, Conservation Division, will provide continuing assistance to public colleges and universities in the state for developing effective information and communications programs to promote energy conservation on their campuses. Through periodic newsletters or special reports, the Energy Resources Board, Conservation Division, will make information available on new technologies and new alternatives for reducing energy consumption.

During 1977, the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico developed a self-instructional Energy Management Training Program for all users and staffs of public colleges and universities in the state. A key element in the training program is the preparation and dissemination of energy management manuals and other instructional materials to (1) assist college and university physical plant and other maintenance staff with implementing specific actions governing the energy efficient operation of the buildings and mechanical systems; (2) assist administrative staff, students and other building users with implementing energy conservation practices in all appropriate areas; (3) assist transportation planners and parking officials with implementing energy conservation strategies in the transportation sector; and (4) assist purchasing officials with the application of energy efficiency standards in purchasing practices.

During 1978-1980, the Energy Resources Board, Conservation Division, will coordinate an annual energy conservation seminar for all institutions of higher learning in the state, as a forum for the exchange of information on energy conservation research and development projects, pilot demonstration projects, and practical applications in energy management. The annual energy conservation seminar may be held in conjunction with the New Mexico State Teachers Convention, to encourage attendance by elementary and secondary public school personnel as well.

2. Implementation of ESP Computer Recommendations

During 1978-1980, public colleges and universities throughout the state will implement the computer recommendations made by the Energy Savings Program (ESP) to increase the thermal and lighting efficiencies of public colleges and university buildings. Self-instructional training program materials prepared by the Energy Resources Board, Conservation Division, will assist college and university personnel with implementing their energy management programs, including the ESP recommendations.

The Energy Resources Board, Conservation Division, will continue to make

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

information available on new technologies and alternatives for reducing energy consumption in college and university building operations, as it is developed.

Following implementation of energy conservation retrofit actions in existing college and university buildings, and inclusion of energy conservative design in plans for new and renovated buildings, all energy consumption in college and university buildings will be monitored by the computer consumption model to determine actual energy and cost-savings.

3. Transportation

Institutions of higher learning in New Mexico present excellent opportunities for energy conservation through car and vanpooling programs. The unique populations of colleges and universities (teaching staff, administrative staff, and students) who must travel some distance daily to reach a common destination, coupled with limited parking facilities available on most campuses, offer good arguments in favor of ride-sharing programs.

The Energy Resources Board, Conservation Division, will offer technical assistance to (1) college and university administrations for initiating car and vanpooling programs for their staff and employees; or (2) groups of staff members and employees who wish to form non-profit commuter organizations to implement car and vanpooling programs. Technical assistance from the Energy Resources Board may include help in developing "matching" techniques, operational guidance, funding assistance, or help in obtaining suitable insurance or non-profit group status.

4. Purchasing

During 1978-1980, guidelines for the purchasing of energy-efficient equipment and products in public colleges and universities, will be developed and implemented as the relevant information becomes available. Results of the Department of Energy appliance efficiency tests expected to be completed during 1978, will present some of the material to be incorporated into the purchasing guidelines for the colleges and universities.

The Energy Resources Board, Conservation Division, also will supply life-cycle costing information (ie., the cost of a product or appliance, including motor vehicles, over its entire useful period, with consideration of the initial purchase price, projected maintenance expense, and energy consumption costs) to college and university purchasing offices.

Since it is the general practice for public colleges and universities in New Mexico to utilize State government purchasing specifications in purchasing items at the local level, and that incorporation of life-cycle

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES, AND LIBRARIES

OVERVIEW:

costing information into bid specifications has become the practice for state purchasing in New Mexico, the consideration of energy efficiency in all purchases made by public colleges and universities will become a routine practice during 1978-1980.

5. Monitoring

A computer consumption model will be developed during 1978 by the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico, to monitor energy consumption in publicly-funded operations. Thermal and lighting consumption data on public buildings, from primary and/or secondary sources; fuel consumption data on public vehicles; and purchasing information on public purchases will be analyzed by the computer consumption model.

The computer analysis of consumption will be delivered to public college and university, business offices; the Energy Resources Board, Conservation Division; and the State Board of Educational Finance, as appropriate.

Such energy consumption information will be utilized by state and local college and university officials to assist them in evaluating capital improvement requests, new building construction plans, and other budgetary requests. The Energy Resources Board, Conservation Division, will utilize the consumption information to determine the most effective methods of reducing energy consumption in colleges and universities in the state.

Libraries Attached to State, County or Municipal Governments

Energy management strategies for libraries--including communications and training programs, building and mechanical system retrofits, purchasing of energy-efficient products and equipment, car and vanpooling where feasible, and monitoring of energy consumption--will be implemented through the Energy Management Program (EMP's) for State government office buildings and county and municipal government office buildings.

In developing the Energy Management Manual and other instructional materials for State, county and municipal government employees, special attention will be given to the particular needs and requirements of libraries and library staff and users in all of these areas.

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS AND UNIVERSITIES

ENERGY SAVINGS ESTIMATE:

Assumptions:

1. The Energy Management Program for Public Schools and Universities is the program which implements the Energy Savings Program for Public Schools and Libraries, and the Promotion of Car and Vanpooling and Public Transportation and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions programs within Public Schools and Universities operations.
2. Savings from the ESP for Public Schools and Libraries is indicated in the calculation summaries in brackets to show its value to an overall management program, but the savings are excluded from the total savings of this program to avoid duplication in the total savings and environmental impact of the State Energy Conservation Program.
3. Savings from the Promotion of Car and Vanpooling and Public Transportation program and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions program that will occur through the implementation of this program are included in this program, and excluded in the total savings of the other two programs.
4. The methodologies used to determine the amount of savings from the Transportation and Procurement programs are included in the detailed descriptions of those programs.

Calculations:

Savings from the Energy Savings Program for Public Schools and Libraries	= $(5.697 \times 10^{12} \text{ BTU})$
Savings from Transportation Programs for Schools and Universities (Expanded Vanpooling pilots)	= $0.014 \times 10^{12} \text{ BTU}$
Savings from Procurement Programs for Schools and Universities	= $0.033 \times 10^{12} \text{ BTU}$
TOTAL SAVINGS FROM ENERGY MANAGEMENT PROGRAM FOR PUBLIC SCHOOLS AND UNIVERSITIES	= $0.047 \times 10^{12} \text{ BTU}$
SAVINGS INCLUDING ESP PROGRAM	= $(5.744 \times 10^{12} \text{ BTU})$

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR PUBLIC SCHOOLS, COLLEGES
AND UNIVERSITIES, AND LIBRARIES

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C), or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Others, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR WATER HEATING DEMONSTRATION FOR EXISTING SECONDARY SCHOOL BUILDINGS

OVERVIEW

In New Mexico, there are 214 public secondary schools¹ located in 88 school districts around the state. The vast majority of these schools are dependent upon natural gas or propane for fueling their hot water heaters.² Average consumption for secondary schools--with gym and shower facilities--is estimated to be two gallons of water per student per day.³

Between 1971-1976, heating costs rose 158.9 percent and electricity costs rose 57.5 percent in the public schools and indications are that these prices will continue to rise.

In an effort to: (1) reduce the long-term energy costs for the public schools, and (2) encourage the application--within the state-- of incident solar energy as an alternative energy capability, the New Mexico Energy Resources Board, Conservation Division, has recommended the replacement of existing water heaters in all public junior, middle and senior high schools in New Mexico with solar water heaters.

The Energy Resources Board's Conservation Division has determined that, based on life-cycle costing, the solar water heaters would be a cost-effective method of conserving conventional energy supplies, particularly in secondary schools where hot water consumption is relatively high due to gym and shower facilities. Given an estimated one-time cost of \$6,251,310⁵ for installation of the solar water heaters in 214 secondary schools, and assuming a 15 per cent annual increase in the price of natural gas and propane, the pay-back period would be 17.9 years for conversion from natural gas heaters, and 11.4 years for conversion from propane heaters.⁶

¹Department of Public School Finance and Cultural Affairs

²Of the total number of public secondary schools, 188 are located in areas serviced with natural gas, and 26 are located in areas where natural gas is not readily available. It is reasonable to deduce that the majority of these schools utilize propane to fuel their hot water heaters, while a relatively insignificant number may utilize electricity.

³Larry W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico, based on studies at Sandia High School, Albuquerque.

⁴Statistical reports for fiscal years 1971-72 and 1974-75, prepared by the Public School Finance Division, State Department of Finance and Administration.

⁵Larry W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico, calculation based on a maximum installation cost of \$45/student for 138,918 junior and senior high school students in 1974-75.

⁶Larry W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico; estimate includes 5% discount per year to adjust for revenues which would be received by the state if this amount were invested.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR WATER HEATING DEMONSTRATION FOR EXISTING SECONDARY SCHOOL BUILDINGS

The citizens of New Mexico will benefit from the solar water heater retrofit program in the schools from another point of view as well. By reducing their consumption of non-renewable energy sources, the public secondary schools will be prolonging the traditional energy supply for everyone.

During 1978 the New Mexico Solar Energy Institute will fund the retrofitting of two solar water heaters in public secondary schools expected to be completed by July 15, 1978. From that time, throughout the remainder of the year, the schools will be monitored. If the solar water heaters prove successful, the Energy Resources Board, Conservation Division, will present to the 1979 legislature a plan to retrofit the remainder of New Mexico's secondary public schools.

Legislation to enable the complete retrofit of all public secondary schools in the state with solar-powered water heaters was introduced in the 1977 New Mexico State Legislature. A bill under consideration would have authorized the expenditure of \$6.5 million in state funds to install solar water heaters in all public secondary schools in New Mexico in 1978-1980.¹

The State Board of Finance would be charged with the responsibility of issuing and selling severance tax bonds for the necessary capital to purchase and install the solar water heaters. The Emergency Capital Outlay Advisory Committee of the State Department of Finance and Administration (DFA) would establish regulations and procedures for implementing the program in the schools. The Energy Resources Board, Conservation Division, would assist the Department of Finance and Administration Emergency Capital Outlay Committee in preparing application procedures.

Public secondary schools would apply for retrofit of their conventionally-fueled water heaters with solar water heaters. Applications would be reviewed jointly by the Energy Capital Outlay Committee and the Energy Resources Board's Conservation Division, and installation of the solar water heaters will begin January 1 of the year following the passage of legislation and continue through 1980.

¹This bill was killed in the last day of the legislature in the 1977 session. Because of the national emphasis placed on the use of solar energy, it is anticipated it will be reintroduced in the 1979 legislative session.

Calendar Milestones:

6

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR WATER HEATING DEMONSTRATION FOR EXISTING SECONDARY SCHOOL BUILDINGS

Monitoring of all public secondary schools' energy consumption would continue to be performed by the Department of Finance and Administration, Public School Finance Division, in conjunction with the Energy Resources Board's Conservation Division.

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on current solar energy literature and the studies of Larry W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico.

TOTAL ENERGY SAVINGS OF SOLAR WATER HEATING DEMONSTRATION FOR
EXISTING SCHOOL BUILDINGS = 0.072 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Water in existing secondary schools is presently heated by natural gas or propane.
2. Should a school become obsolete, the solar water heater can easily be removed and reinstalled on another school.
3. A natural gas and propane conversion efficiency of 50% takes into consideration high altitude and sub-standard maintenance which is experienced in many of the schools.
4. The average temperature for ground water in New Mexico is 55° F.¹

¹Ted Patterson, Earth Environmental Consultants, February, 1977.

Calculations:

Hot water consumption: 2 gallons/student/day¹

Assuming water is heated from 55° F to 120° F. (the temperature required for surgical scrubbing is 110° F):

$$\begin{aligned} E &= mcp \Delta T \\ &= 8.33 \text{ lb/gal} \times 2 \text{ gal/student/day} \times 1 \text{ BTU/lb/°F} \times 65° \text{ F} \\ &= 1082.9 \text{ BTU/student/day} \end{aligned}$$

This figure can then be converted to reflect an assumed 75% delivery efficiency to account for heat losses occurring during water storage and piping to the showers.²

¹Based on studies, Sandia High School, Albuquerque, in which water consumption was divided by the number of students in physical education classes to determine shower water usage per student. Figure closely supported by the 1976 ASHRAE Systems Guide.

²J.J. Mutch, "Residential Water Heating; Fuel Conservation, Economics and Public Policy". Rand Research Report R-1498-NSF. 1974.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR WATER HEATING DEMONSTRATION FOR EXISTING SECONDARY SCHOOL BUILDINGS

$$\begin{aligned} E' &= 1082.9 \text{ BTU/student/day} \div 0.75 \\ &= 1444 \text{ BTU/student/day} \end{aligned}$$

Converting this into BTU's/student/year:

$$1444 \text{ BTU/student/day} \times 5 \text{ days/week} \times 36 \text{ weeks/year} = 0.2 \times 10^6 \text{ BTU/student/year}$$

For natural gas and propane¹, at 50% efficiency²:

$$0.26 \times 10^6 \div 0.50 = 0.52 \times 10^6 \text{ BTU/student/year}$$

There were 138,918 junior and senior high school students in 88 school districts in New Mexico in 1974-75.³ Therefore, savings can be calculated at:

$$\begin{aligned} 138,918 \text{ students} \times 0.52 \times 10^6 \text{ BTU/student/year} &= 72,237,360,000 \\ &\text{BTU's annually or} \\ &\underline{\underline{0.072 \times 10^{12} \text{ BTU's}}} \end{aligned}$$

¹See assumption 1.

²See assumption 3.

³Public School Finance, Statistics, 1974-1975, Department of Finance and Administration, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR WATER HEATING DEMONSTRATION FOR EXISTING SECONDARY SCHOOL BUILDINGS

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: Solar Water Heating - Schools

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$100,000	\$100,000		\$100,000			
OTHER	*	**							
Total Direct			\$100,000	\$100,000		\$100,000			
Indirect									
TOTAL BUDGET	-	-	\$100,000	\$100,000		\$100,000			

* - Refer to administrative package, 2.0% of EPCA budget

** - Refer to administrative package, 1.2% of ECPA budget

1. NMSI (state)

PROGRAM MEASURE: EMP - Public Schools

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	\$40,000		\$40,000					
OTHER	*	**							
Total Direct	-	\$40,000		\$40,000					
Indirect	-								
TOTAL BUDGET		\$40,000		\$40,000					

* Refer to administrative budget, 3.0% of EPCA budget

** Refer to administrative package 3.1% of ECPA budget

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

OVERVIEW:

Utility Costs & Space Needs

Between 1971-1975, utility costs to New Mexico's public schools have increased 71 per cent¹, and national projections of declining traditional fuel supplies indicate that these costs will continue to rise at an alarming rate.

Furthermore, it is not clear that natural gas will continue to be available to schools at any price in the future. There is a good chance that schools will be considered a low priority² gas user simply because they can be closed during severe cold periods..

Because of pressing needs for classroom space throughout New Mexico's 88 school districts, and lack of capital to initiate new permanent construction, many school districts have invested in portable classrooms during recent years. By 1978, there will be approximately 1,400 portable classrooms in the state. Current construction cost of a double, metal portable classroom (1600 square feet) is \$40,000.

In an effort to: (1) reduce the long-term energy costs for the public schools, and (2) stimulate a new solar manufacturing industry in the State of New Mexico, the New Mexico Energy Resources Board, Conservation Division, and the State Department of Finance and Administration, Public School Finance Division, have collaboratively proposed that, if proven cost-effective, all portable classrooms purchased by New Mexico's public schools after 1979, be equipped for solar space heating.

Based on the number of portable classrooms purchased annually by New Mexico public schools during the past three years, it is projected that 100 portable classrooms annually will be added to the public schools in 1979 and 1980.

The Energy Resources Board, Conservation Division, has determined several

¹ Statistical reports for Fiscal Years 1971-72 and 1974-75, prepared by the State Department of Finance and Administration, Public School Finance Div.

² L. W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico, "Proposal to Retrofit a Solar Heating System to One Portable Classroom Building at Tomasita Elementary School, Albuquerque, New Mexico", prepared for the New Mexico Energy Institute at the University of New Mexico, January 25, 1977.

³ Cost to Albuquerque Public Schools, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

OVERVIEW:

reasons why metal portable classroom buildings represent a good opportunity for solar space heating:

1. Current portable classroom design, which includes insulation and metal exterior skins, lends itself to relatively easy adaptation to solar heating, with structurally-integrated, air-cooled collectors. The incremental cost of making the south wall a solar collector is potentially quite low over the cost of conventional construction.
2. Since classrooms are used only during the day, thermal storage requirements are minimal. Basically, the system only needs to store enough energy for an early morning warm-up since the collector panel can easily make up the building losses on all but the worst solar days.
3. The placement of solar-heated portable classrooms throughout the state would serve to educate the public in the potential of solar energy.
4. The State of New Mexico is by law required to consider life-cycle costs in purchasing portable classroom buildings. At the present time, a solar energy heating system indicates a payback time of 10-15 years when compared with electricity and LPG (propane), and thus is highly competitive on a life-cycle basis. Mass production of solar portable classrooms would increase the cost-effectiveness.

LASL Model

A wealth of technical data on solar heating of modular homes in New Mexico currently is available from the University of California's Los Alamos Scientific Laboratories (LASL), located in Los Alamos, New Mexico. During 1976, LASL completed construction and conducted simulation monitoring of a demonstration solar-heated modular home. The project was sponsored by the Energy Research and Development Administration to determine and develop cost-effective approaches to the incorporation of solar energy into factory-built houses. Because a portable classroom is very similar to a modular home in terms of size, configuration, construction, siting and other factors, much of the data developed by LASL can be applied to the construction of solar portable classrooms. Thus, the State can save a considerable portion of development and engineering costs which might otherwise be incurred.

LASL scientists believe they have been successful in demonstrating a viable system of solar heating modular homes at a cost far less than the installed

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

OVERVIEW:

cost of solar energy systems on site-built houses.⁴ As of February, 1977, during its first winter heating period, LASL estimated that 66 per cent of the heating energy required by the building was provided by the solar system.⁵ LASL engineers predict that a number of small design changes could increase the performance by at least 10 per cent.⁶

Further, LASL encourages extension of the solar project to the commercial sector to the greatest extent possible, and recommends modular classroom buildings as an excellent vehicle for establishing the visibility and credibility of solar-powered factory-built structures. LASL scientists have provided the ERB, Conservation Division, with the design for developing a prototype solar portable classroom and the technical expertise available with respect to monitoring its energy consumption.

Solar Classroom Retrofit

Utilizing the technology developed by LASL for modular housing, the Energy Resources Board, Conservation Division, has funded the solar retrofit of a portable classroom located at Chelwood Elementary School, Albuquerque, during 1977. The project was undertaken by the New Mexico Energy Institute at the University of New Mexico, and it is anticipated that retrofit work will enable refinement of the design concepts for a solar portable classroom and will provide more specific information on performance and actual costs. Such information will be directly applicable to the construction of a prototype solar portable classroom during 1978.

Prototype Solar Classroom

As monitoring is under way on the solar retrofit of an existing portable classroom in Albuquerque, the Energy Resources Board, Conservation Division, and the Department of Finance and Administration, Public School Finance Division, will finance construction of a new solar portable classroom in another area of the state. The DFA Public School Finance Division will pay for the cost of constructing a conventional portable classroom (estimated at \$36,000 without a major back-up heating system), and the Energy Resources Board, Conservation Division, will pay for the addition of solar devices, including a collector wall, air handling unit and control, storage tank, pump and coil, and sheet metal duct work (estimated at \$6,650).

Monitoring of both the solar retrofit classroom and the prototype solar portable classroom during the 1977-78 and 1978-79 heating seasons will enable further

⁴Dr. J. Douglas Balcomb, Assistant Division Leader for Solar, Los Alamos Scientific Laboratories, 1977.

⁵Ibid.

⁶Ibid.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

OVERVIEW:

refinement of design and engineering techniques for large-scale manufacture of solar portable classrooms. Los Alamos Scientific Laboratories will perform computerized monitoring, utilizing simulated weather conditions, on the prototype classroom in order to determine its cost-effectiveness on a life-cycle basis.

Cost Effectiveness

The required initial investment for "solarizing" a conventional 1600 square-foot portable classroom with two air handling units and two storage tanks, is estimated at \$6,653.⁷ Pay back periods would average 19 years for conversion from natural gas, 12 years for conversion from LPG, and 10 years for conversion from electricity.⁸

However, if only one air handling unit and one storage tank were utilized, and if mass production--approximately 100 classrooms--took place, the cost would be reduced to an estimated \$3,891 per building. Pay back periods would drop accordingly to 14 years for conversion from natural gas, 9 years for conversion from LPG, and 7 years for conversion from electricity.⁹

These projected pay back periods assume that natural gas, LPG, and electricity will all be available and will increase in price at an average rate of 16 per cent per year (6% inflation plus 10% escalation). More rapid price increases would, of course, give shorter pay back times.

These same projected pay back periods may initially be applied to new solar portable classroom construction as well. Based on current available information, the Energy Resources Board, Conservation Division, estimates that a new solar portable classroom (1600 square feet) may be constructed.

⁷L. W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico, "Proposal to Retrofit a Solar Heating System to One Portable Classroom Building at Tomasita Elementary School, Albuquerque, New Mexico", prepared for the New Mexico Energy Institute at the University of New Mexico, January 25, 1977.

⁸Ibid.

⁹L. W. Bickle & Associates, Consulting Engineers, Albuquerque, New Mexico, "Proposal to Retrofit a Solar Heating System to One Portable Classroom Building at Tomasita Elementary School, Albuquerque, New Mexico", prepared for the New Mexico Energy Institute at the University of New Mexico, January 25, 1977.

¹⁰Ibid.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

OVERVIEW:

for \$40,000 in 1979, assuming the following:

- 1) The manufacturing cost for a conventional portable classroom without a major back-up heating system, and utilizing evaporative coolers instead of refrigerated air coolers, will be \$36,000 in 1979 and,
- 2) Based on mass production of a minimum of 100 solar portable classrooms, and utilizing refined design and engineering techniques, the incremental cost of adding solar devices will be \$4,000 in 1979.

The solar retrofit of the existing Albuquerque portable classroom and the construction of the prototype model, will however, provide much more specific consumption data and information on construction costs and trade-offs, in order to refine estimates of payback times before mass production of the solar portable classrooms begins in 1978.

Placement of Solar Portables

As the cost-effectiveness of solar portable classrooms is demonstrated through monitoring of the solar retrofit unit and prototype model, contracts will be let for the construction of 100 new solar portable classrooms during 1979-1980. The solar portables will be placed throughout the state, with at least one going to each of the state's 88 school districts, as needed.

Prior to manufacture and placement of the solar portables, the Energy Resources Board, Conservation Division, will petition the Property Management Control Division of the Department of Finance and Administration to modify portable classroom specifications to require the installation of solar heating systems.

Monitoring will be ongoing by the Energy Resources Board, Conservation Division; the Department of Finance and Administration, Public School Finance Division; the State Board of Education; and local school boards.

If proven cost effective, the Department of Finance and Administration, Public School Finance Division, will also encourage solar retrofit of up to 25 % of the 1,400 existing portable classrooms by 1980.

Program Measure: SOLAR PORTABLE CLASSROOM DEMONSTRATION

Calendar Milestones:

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATION

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on data and strategies being used in an Energy Resources Board research and development project to retrofit a solar heating system to one portable classroom building at Chelwood Elementary School, Albuquerque, New Mexico currently in progress. This work is being carried out by L. W. Bickle and Associates, Consulting Engineers, Albuquerque, New Mexico.

TOTAL ENERGY SAVINGS FROM SOLAR PORTABLE CLASSROOMS = 0.037 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Current solar heating technology allows a solar heating system to utilize the sun's energy to replace 70% of that energy presently supplied by traditional fossil fuels.¹
2. New Mexico school systems will continue to purchase portable classrooms at the rate of 100 per year, as indicated by past purchases, in lieu of building more permanent structures.

¹L. W. Bickle and Associates, Consulting Engineers, Proposal to Retrofit a Solar Heating System to One Portable Classroom Building at Chelwood Elementary School, Albuquerque, New Mexico, January, 1977.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

Calculations:

Determining Energy Saved Directly from the Solar Portable Classroom Demonstration Program

A 1600 square foot portable classroom in Albuquerque¹ with 4550 degree days/year has a building load characteristic of 10 BTU/square feet - Degree Day.²

Size of Portable Classroom	X	Building Load Characteristic	X	Degree Days/year	=	Yearly Consumption per Portable Classroom
1600 sq. ft.	X	10 BTU/sq. ft.	X	4550 D.D./yr.	=	72.8×10^6 BTU/yr.

Solar equipment will displace 70% of current fuel consumption.³

Number of Solar Classrooms in use in 1980 ⁴	X	% of Displacement	X	Yearly Consumption per Classroom	=	BTU SAVED DIRECTLY FROM SOLAR CLASSROOM PROGRAM
440	x	0.70	x	72.8×10^6 BTU/Yr.	=	0.022×10^{12} BTU

END USE ENERGY SAVINGS DIRECTLY FROM SOLAR PORTABLE CLASSROOM PROGRAM BY 1980 =	0.022×10^{12} BTU
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¹Used as a typical average yearly Degree Day rating for the entire state.

²L. W. Bickle and Associates, Consulting Engineers, Albuquerque, New Mexico, January, 1977.

³Ibid.

⁴Assumes 200 classrooms purchased in 1979 and 1980, and if proven cost-effective, solar retrofit of 25% of the existing 1,102 portable classrooms.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by Solar Portable Classroom Program

Reduced Thermal Demand

Total BTU Fossil Fuel Saved by 1980 ¹	X	% of Fuel Used By Schools ²	÷	Heating Plant Efficiency	=	BTU SAVED PER PRIMARY ENERGY SOURCE FOR HEATING
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STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

Energy Source	End Use BTU Saved	% of Source	Heating Plant Efficiency	Total BTU's Primary/End Use
Natural Gas	0.022×10^{12}	97.5%	0.6	0.036×10^{12}
Propane	0.022×10^{12}	2.5%	0.5	0.001×10^{12}

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION IN THERMAL DEMAND = 0.037×10^{12} BTU

¹ Assuming that schools are predominantly heated by natural gas or propane.

² Based on preliminary studies by the Energy Resources Board, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR PORTABLE CLASSROOM DEMONSTRATIONS

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

In New Mexico, approximately 10,766,416 square feet¹ of usable space is contained in office buildings owned, leased or rented by county and municipal Governments. The buildings are attached to 32 county governments and 95 municipal governments located throughout the State of New Mexico.

While the buildings share similar characteristics, they vary in terms of lighting and thermal efficiencies. The variance is accounted for by type and year of construction, regional location, degree day data, energy cost differentials, opportunities for retrofit, local funding base and other factors.

During 1975-76, in the course of developing a preliminary energy conservation program for state government office buildings, it became apparent that the energy-conservation techniques under study or being implemented on a pilot basis, could be applied effectively to county and municipal government buildings as well. However, it also became clear that a much more precise and specific method was needed to assess energy efficiency and make recommendations for improvement in physical building structures and mechanical systems. Thus, the New Mexico Energy Resources Board, Conservation Division, conceived the idea for a computerized approach to information gathering and assessment. This approach, known as an ENERGY SAVINGS PROGRAM (ESP) will be applied to county and municipal government office buildings in New Mexico.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting, as total energy efficiency is dependent upon both functions and their interrelationship.

To accomplish this task, a computer energy model currently is being developed by the New Mexico Energy Resources Board, Conservation Division. Upon receiving data input from the county or city manager and/or architect, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING

¹Figure derived from the Rand Corporation, "Energy Conservation in Non-Residential Buildings", October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

buildings (including those being considered for rental or lease by county or municipal governments); and

- 2) The energy efficiency and building code compliance² in construction plans for NEW and RENOVATED buildings.

In-Put

The data (mechanical, structural, and energy consumption building information) going into the computer model for analysis of EXISTING county and municipal government office buildings will be supplied by the city or county manager (or an appointed administrative official or maintenance person). A data input form will be developed to allow this official to supply the energy audit information to the computer in non-technical language.

For analysis of buildings under consideration for rent or lease by county or municipal governments, the county or city manager, in cooperation with the building owner or leasing agency, will supply the energy audit information to the computer.

Simultaneously, degree day data will be acquired from weather bureau services to enable input of accurate temperature information for each building, according to its location.

For analysis of construction plans for NEW and RENOVATED buildings, county, municipal or private architects will supply the necessary data to the computer model.

Output

Upon receiving the data-feed on EXISTING county or municipal government office buildings, the computer model will respond with a "print-out" or assessment, of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

For example, if the computer model's assessment indicates that a thermal inefficiency exists in a particular office building, the corresponding computer recommendation may call for weatherstripping, insulating, putting in storm windows or initiating other retrofit alternatives designed to increase the thermal efficiency of the building. These recommendations will consider the cost-effectiveness of each action on an individual building basis, and the computer model will have the capability of updating the recommendations as new conservation techniques become known.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

Similarly, the computer energy model will be utilized to assess energy efficiency in buildings under consideration for rental or lease by county and municipal governments before rental or lease agreements are signed. The computer output will provide an information base for negotiating the implementation of energy-conserving retrofits in the building envelope and/or mechanical system, before actual occupancy by the county or city.

The computer energy model also will be utilized to assess the energy efficiency of construction plans for NEW and RENOVATED buildings, and offer construction options before new county and municipal structures are built. Thus the construction of sound, energy-efficient local government office buildings can be assured from 1978 forward through this program.

Assessments and recommendations for increasing the energy efficiency of existing buildings and construction plans for new and renovated buildings, will be disseminated as the ESP is implemented in the Energy Management Program for county and municipal governments. The information will be delivered to the New Mexico Energy Resources Board, Conservation Division; the State Department of Finance and Administration, Local Government Division; County and City Managers and fiscal directors; and/or other fiscal authorities. The analyses of construction plans for new and renovated buildings will go to the county, city or private architects, and the appropriate building code officials.

Information gathered through the ESP will enable the county or city manager to more accurately determine the utility-cost budgeting needs for every local government building. That is, the county or city manager will be able to recognize legitimate energy-budgeting needs from all divisions of local government, and he will have the option of refusing increased funding to inefficiently run departments. The ESP information also will provide firm evidence to support departmental funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective.

Likewise, the ESP information will be utilized by county and municipal governments to support their requests to the Department of Finance and Administration for expenditures of funds for building operations. The same information will be made available to the New Mexico State Legislature and other funding authorities, to substantiate funding requests for county and municipal government building programs and operational budgets.

Training Program

When a county or municipal government office building receives its computerized assessments and recommendations for retrofit, a prepared set of self-instructing training materials will be included to: (1) assist the county or city manager, or appointed officer, with initiating certain

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

retrofit actions; and (2) assist administrative officials, professional staff and other building users with understanding and implementing energy conservation practices in the building.

The self-instructional program will include workbooks and training session materials, and possibly audiovisual materials, specifically designed for each audience.

When the ESP is fully developed, it will be implemented as a management tool in the Energy Management Program for County and Municipal Governments.

Program Measure: ENERGY SAVINGS PROGRAM (ESP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing County and Municipal Buildings.

PRIMARY FUEL ENERGY SAVINGS FROM:

Lighting in New, Renovated and Existing Buildings	=	0.270 TBTU
Thermal and Mechanical in New and Renovated Buildings	=	0.195 TBTU
Thermal and Mechanical in Existing Buildings	=	<u>1.088 TBTU</u>

TOTAL ENERGY SAVINGS OF ESP/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS	=	1.553 TBTU
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ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent County and Municipal Governments' share of the overall savings.
3. The County and Municipal Governments' share can be established by determining the proportion of floor space owned or leased by these governments of the total amount of floor space in the New Mexico estimate of Commercial and Public Buildings, Public and Other Buildings category.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by these buildings.
5. Since energy conservation programs in County and Municipal governments will initially not permeate all such governmental structures unless a statewide and severe energy supply crisis occurs, it is assumed that participation will be only 50%.

¹ Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/Office Buildings - County and Municipal Governments

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
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1106 (thousand)	÷	9150 (thousand)	=	12.09%
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% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ^{2 & 3}
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12.09%	=	12.09%
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Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	X	% of Floor Area for Public & Other Buildings	=	Savings from Public Buildings
1.765×10^{12}	x	0.213	=	0.376×10^{12} BTU
Estimated Floor Space of County and Municipal Governments ⁴		Estimated Floor Space for State and County and Municipal Buildings ⁴	=	% of Space for County and Municipal Governments
10,766,416 sq. ft.	÷	14,985,861 sq. ft.	=	71.8%
Savings from Public Buildings	X	% of Space for County and Municipal Governments	=	SAVINGS FROM OFFICE BUILDINGS/COUNTY AND MUNICIPAL GOVERNMENTS FOR LIGHTING EFFICIENCY
0.376×10^{12} BTU	X	0.718	=	0.270×10^{12} BTU

¹U. S. Department of Commerce, Statistical Abstract of the United States.

²See Assumption 1.

³Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

⁴Derived from estimated floor space of Public and Other Buildings (See Table 2.) and actual floor space for State Agencies and Federal Agencies.

Table 1

ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970

(Millions of square feet)

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	187	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source: Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

Table 2
ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other ³	TOTAL
West								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

³Includes State, County and Municipal, and Federal Government floor area.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/Office Buildings - County and Municipal Governments

New and Renovated Structures

1974 Commercial Consumption ¹	÷	1974 Total Consumption for Commercial and Residential	=	% of Consumption in Commercial Buildings
50.0 TBTU	÷	92.2 TBTU	=	54.2%
		% of Consumption in Commercial Buildings	=	% of Savings in Commercial Buildings ²
		54.2%	=	54.2%
Total Savings From Thermal Efficiency Standards (See Appendix B, FEA methodology)	X	% of Total Savings for Commercial Buildings	=	Savings from Commercial Buildings
2.35×10^{12} BTU	X	0.542	=	1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Public & Other Buildings	=	Savings from Public Buildings
1.27×10^{12} BTU	X	0.213	=	0.271×10^{12} BTU
Savings from Public Buildings	X	% of Space for County and Municipal Governments	=	PRIMARY FUEL SAVINGS FROM OFFICE BUILDINGS-COUNTY AND MUNICIPAL GOVT. FOR THERMAL EFFICIENCY IN NEW AND RENOVATED BUILDINGS
0.271×10^{12} BTU	X	0.718	=	<u>0.195×10^{12} BTU</u>

¹ FEA Strawman Data, May, 1976.

² Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

Existing Structures

The annual energy consumption for conventional office buildings in the west is projected at 248,000 BTU/Sq. Ft.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS -- COUNTY AND MUNICIPAL GOVERNMENTS

Estimated Floor Space in New Mexico Public and Other Buildings	Sq. Ft. of State and Federal Agency Space	=	Estimated Floor Space of County and Municipal Buildings
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22,900,000 Sq. Ft. - 12,133,584 Sq.Ft. = 10,766,416 Sq. Ft.

Annual Energy Consumption/ Conventional Office Buildings	x	Estimated Area of C/M Office Space	=	Annual Consumption of C/M Office Space
248,600 BTU/Sq. Ft.	x	10,766,416 Sq. Ft.	=	2.677 x 10 ¹² BTU

<u>TYPE OF ENERGY</u>	<u>% DISTRIBUTION BY TYPE⁴</u>	<u>ANNUAL BTU CONSUMPTION</u>
Electricity	3.5%	0.094 x 10 ¹² BTU
Natural Gas	96.2%	2.575 x 10 ¹² BTU
Propane	0.3%	0.008 x 10 ¹² BTU

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, subtract 12.6%⁵ from 40.5% = 27.9% electrical savings, excluding lighting.

Average Energy Consumption for County and Municipal Governments/year	x	% of Savings. Possible/Energy Type	x	0.50	= SAVINGS PER ENERGY TYPE FOR EXISTING OFFICE BUILDINGS/ COUNTY AND MUNICIPAL GOVERNMENTS
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Electricity

0.094 x 10¹² BTU x 0.279 x 0.50 = 0.013 x 10¹² BTU

Natural Gas

2.575 x 10¹² BTU x 0.486 x 0.50 = 0.626 x 10¹² BTU

Propane

0.008 x 10¹² BTU x 0.486 x 0.50 = 0.002 x 10¹² BTU

END USE SAVINGS FROM EXISTING OFFICE BUILDINGS/COUNTY AND
MUNICIPAL GOVERNMENTS FOR THERMAL EFFICIENCY = 0.641 x 10¹² BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS

¹Table III-5, "Annual Energy Consumption for Conventional Office Buildings", An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

²See Table 2.

³From 1968 Inventory of State Agency Space, Department of Finance & Administration, State of New Mexico and federal inventories.

⁴From historic consumption data 1973-1975 gathered by the Energy Resources Board, State of New Mexico, 1976, assuming same distribution of energy sources as for State Office Buildings.

⁵Figure V-1, "1970 Energy Demand by End Use" An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

⁶Assuming 50% Compliance.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/Office Buildings - County and Municipal Governments

Reduced Non-Electrical Demand

Total BTU Fossil Fuel
Saved by 1980 through
ESP/Office Buildings-
County and Municipal
Governments.

÷

Heating
Plant
Efficiency

=

BTU SAVED PER
PRIMARY ENERGY
SOURCE FOR
HEATING/COOLING

(See chart below.)

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	0.626×10^{12}	0.6	1.043×10^{12}
Propane	0.002×10^{12}	0.5	0.004×10^{12}

TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 1.047×10^{12}

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/OFFICE BUILDINGS - COUNTY AND MUNICIPAL GOVERNMENTS

Reduced Electrical Demand

0.013×10^{12} BTU 3413 BTU/KWH = 3,808,966 KWH Saved of End Use Energy

Total KWH Electricity Saved by 1980 through ESP/Office Buildings- County and Municipal Governments X % of Power Generated by Type of Generation¹ = KWH Saved by Type of Generation

<u>3,808,966</u>	KWH X 0.1% Gas-fired Gas Turbine	=	<u>3,809</u>	KWH
<u>3,808,966</u>	KWH X 0.3% Oil-fired Gas Turbine	=	<u>11,427</u>	KWH
<u>3,808,966</u>	KWH X 23.2% Gas-fired Steam Turbine	=	<u>883,680</u>	KWH
<u>3,808,966</u>	KWH X 72.6% Oil-fired Steam Turbine	=	<u>2,765,309</u>	KWH
<u>3,808,966</u>	KWH X 3.8% Coal-fired Steam Turbine	=	<u>144,741</u>	KWH

KWH Saved by Type of Generation	X	Conversion Factor per Type of Fuel	=	Amount of Primary Fuel Saved
<u>887,489</u>	KWH in Natural Gas X 10.4 Cu.Ft./KWH	=	<u>9,229,886</u>	Cu.Ft.
<u>2,776,736</u>	KWH in Oil X 0.076 Gallons/KWH	=	<u>211,032</u>	Gallons
<u>144,741</u>	KWH in Coal X 0.88 Pounds/KWH	=	<u>127,372</u>	Pounds

Unit of Primary Energy Source	X	Conversion Factor to BTU's	=	BTU Saved/Source of Fuel for Generation
<u>9,229.9</u>	MCF of Natural Gas X 1,000,000 BTU/MCF	=	<u>0.009</u>	$\times 10^{12}$ BTU
<u>211,032</u>	Gallons of Oil X 140,000 BTU/Gallon	=	<u>0.030</u>	$\times 10^{12}$ BTU
<u>63.7</u>	Tons of Coal x (26.2 x 10 ⁶) BTU/Ton	=	<u>0.002</u>	$\times 10^{12}$ BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH REDUCTION OF ELECTRICAL DEMAND = 0.041×10^{12} BTU

Primary Fuel Savings for Natural Gas and Propane = 1.047×10^{12} BTU
 Primary Fuel Savings for Electricity = 0.041×10^{12} BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND MECHANICAL IN EXISTING BUILDINGS= 1.088×10^{12} BTU

¹ Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/OFFICE BUILDINGS-COUNTY
AND MUNICIPAL GOVERNMENTS

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as FEA-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: ESP - Counties and Municipalities

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	x	xx							
FRINGE BENEFITS	x	xx							
TRAVEL	x	xx							
EQUIPMENT									
SUPPLIES	x	xx							
CONTRACTUAL	\$55,000	-	\$90,000	145,000		(1) \$90,000			
OTHER	x	xx							
Total Direct	55,000		90,000	145,000		90,000			
Indirect									
TOTAL BUDGET	55,000		90,000	145,000		90,000			

x - Refer to Administrative Budget, 10.0% of EPCA Budget

xx - Refer to Administrative Budget, 13.5% of ECPA Budget

(1) Local Government Units

PROGRAM MEASURE: Solar Portable Classrooms

YEAR: 1978

	FEA		NON-FEA	TOTAL	FEA				
	EPCA (Base)	ECPA (Supp.)			Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$15,000	\$15,000		\$15,000			
OTHER	*	**							
Total Direct	-	-	\$15,000	\$15,000		\$15,000			
Indirect									
TOTAL BUDGET	-	-	\$15,000	\$15,000		\$15,000			

* - Refer to Administrative Package,
1.0% of EPCA Budget

** - Refer to Administrative Package,
0.2% of ECPA Budget

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

The Energy Management Program (EMP) for County and Municipal Governments is designed to reduce overall energy consumption, and reduce or stabilize energy costs by:

1. Implementing information and training programs to obtain the support and cooperation of all building users in practicing energy conservation actions.
2. Implementing the ESP (Energy Savings Program) computer recommendations to increase the thermal and lighting efficiencies of county and municipal government office buildings.
3. Implementing transportation strategies such as carpooling and vanpooling by county and municipal government employees who drive to work, and increasing the efficiency of county and municipal government transportation for employees on official business.
4. Purchasing energy-efficient equipment and products by utilizing life-cycle costing information.
5. Monitoring energy consumption for evaluation of the most effective energy conservation actions.

The New Mexico Energy Resources Board, Conservation Division, will act as a "facilitator" for the county and municipal government energy management programs by providing information and consultation to county and municipal officials as they implement these management strategies. The Energy Resources Board, Conservation Division, also will coordinate the drafting of State legislation or regulations which are necessary for the successful implementation of such programs.

Beginning in 1978, the City of Albuquerque will be the first pilot site for implementation of the EMP. The Energy Resources Board, Conservation Division, also will recommend one or two additional county or municipal government sites for initial implementation of the EMP. These sites will be selected on the basis of location, historical consumption, political climate and local support.

EMP actions implemented by county and municipal government agencies in the pilot sites will be reported to the Energy Resources Board, Conservation Division, so that they can be assessed and evaluated for application to other county or municipal government operations in New Mexico. There are 32 county governments and 95 municipal governments in the state.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

1. Information and Training

During 1978-1980, the Energy Resources Board, Conservation Division, will supply information to all county and municipal governments on energy conservation techniques which can be implemented in their agency operations. All energy management actions undertaken by county and municipal governments will be reported to the Energy Resources Board, Conservation Division, so that actions implemented in one agency can be evaluated for application to others.

During 1977, the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico developed a self-instructional Energy Management Training Program for all users and staffs of county and municipal government agencies in the pilot locations. A key element in the training program will be the preparation and dissemination of energy management manuals and other instructional materials to (1) assist local government energy management and maintenance staffs with implementing specific retrofit actions governing the energy efficient operation of their office heating, lighting and mechanical systems; (2) assist all other local government staff and building users with implementing energy conservation practices in all appropriate areas; (3) assist county and municipal government transportation officials and local government employees with implementing conservation strategies in the transportation sector; and (4) assist county and municipal purchasing agents with the application of energy efficiency standards in purchasing practices.

2. Implementation of ESP Computer Recommendations

During 1978-1980, the City of Albuquerque and one or two other pilot county or municipal governments will implement the computer recommendations made by the Energy Savings Program (ESP) for County and Municipal Government Office Buildings to increase their thermal and lighting efficiencies. Self-instructional training program materials prepared by the Energy Resources Board, Conservation Division, will assist the county and municipal government staffs with implementing all facets of their EMP, including the ESP recommendations. In addition, during 1978, the ERB, Conservation Division, will conduct energy conservation workshops for boiler inspectors.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

The Energy Resources Board, Conservation Division, will continue to make information available on new technologies and new alternatives for reducing the energy consumption in building envelopes and mechanical systems, as it is developed.

Following implementation of energy conservation retrofits in existing county and municipal government office buildings, and following inclusion of energy conservative design in plans for new and renovated buildings, all energy consumption in these county and municipal government buildings will be monitored by the computer consumption model to determine actual energy and cost-savings. (SEE MONITORING).

3. Transportation

The energy-efficient transportation of county and municipal government employees--travelling on official business as well as travelling to and from place of employment--poses considerable potential for energy savings by local government in New Mexico.

During 1977-1980, the Energy Resources Board, Conservation Division, will provide consultation to county and municipal governments for increasing the energy-efficient transportation of employees on official business, where feasible. While it is acknowledged that large numbers of local government employees do not routinely travel long distances in official vehicles, it is feasible that energy-efficiency could be augmented in other areas, such as municipal garbage collection, municipal traffic patterns or traffic signals.

During 1977-1980, the Energy Resources Board, Conservation Division, also will assist in the promotion of car and vanpooling by county and municipal government employees. The Conservation Division will provide technical assistance in developing "matching" techniques, operation guidance and funding assistance, as well as help with employee-information programs to promote car and vanpooling. The Energy Resources Board, Conservation Division, will offer such technical assistance to county and municipal government administrations for employer-organized car and vanpooling operations, and to local government employees in obtaining suitable insurance or non-profit group status for operating car and vanpooling programs.

SEE STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION for details of these transportation strategies for county and municipal governments.

4. Purchasing

During 1978-1980, guidelines for the purchasing of energy-efficient equipment and products by publicly-funded agencies will be developed and implemented

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

OVERVIEW:

as the relevant information becomes available. Results of the Department of Energy's appliance efficiency tests will be incorporated into public purchasing practices in New Mexico.

The Energy Resources Board, Conservation Division, will assist county and municipal government purchasing agents with applying the principle of life-cycle costing (i.e., the cost of a product or appliance, including motor vehicles, over its entire useful period, with consideration given to the initial purchase price, projected maintenance expense, and energy consumption costs) to local government purchases in all cases where life-cycle costing information can be obtained.

Since it is the general practice for county and municipal governments in New Mexico to utilize State government purchasing specifications in purchasing items at the local level, and due to the fact that incorporation of life-cycle costing information into bid specifications is being practiced in State government purchases in New Mexico, the consideration of energy efficiency in purchases made by county and municipal governments will become a routine practice during 1978-1980.

5. Monitoring

A computer consumption model is being developed during 1978 by the Energy Resources Board, Conservation Division, and the Energy Institute at the University of New Mexico, to monitor energy consumption in publicly-funded operations. Thermal and lighting consumption data on public buildings, from primary and/or secondary sources; fuel consumption data on public vehicles; and purchasing information on public purchases, will all be analyzed by the computer consumption model.

The computer analysis of consumption in the pilot sites will be delivered to county and city managers and fiscal officers; the State Department of Finance and Administration (DFA), Local Government Division; and the Energy Resources Board, Conservation Division.

Such energy consumption information can be used as a management tool by the DFA Local Government Division and county and municipal officials in evaluating capital improvement requests, construction plans for new and renovated buildings, and other budgetary requests. The ERB, Conservation Division, will utilize the consumption information to determine the most effective methods of reducing energy consumption in local government operations.

This information also will be made available to the New Mexico State Legislature and/or other funding authorities to substantiate funding requests for county and municipal government buildings programs and operational budgets.

Calendar Milestones:

TASK	1976 Quarter	1977 Quarter	1978 Quarter	1979 Quarter	1980 Quarter
Transportation Strategies Studied	[Timeline bar from Q1 1976 to Q3 1977]				
DOE Appliance Efficiency Testing	[Timeline bar from Q1 1976 to Q3 1977]				
Gathering of Life-Cycle Costing Information	[Timeline bar from Q2 1976 to Q4 1980]				
Computer Energy Model in Development for ESP	[Timeline bar from Q3 1976 to Q3 1978]				
EMP Self-Instructional Training Materials in Development	[Timeline bar from Q4 1976 to Q4 1978]				
Computer Consumption Model in Development	[Timeline bar from Q4 1977 to Q2 1978]				
Site Selection for County/Municipal Pilot EMP's	[Timeline bar from Q4 1977 to Q2 1978]				
Implementation of EMP in County & Municipal Governments	[Timeline bar from Q3 1978 to Q4 1980]				
--Employee Training & Public Information	[Timeline bar from Q3 1978 to Q4 1980]				
--ESP Recommendations Implemented	[Timeline bar from Q3 1978 to Q4 1980]				
--Transportation Strategies Implemented	[Timeline bar from Q3 1978 to Q4 1980]				
--Life-Cycle Costing Incorporated into Purchasing	[Timeline bar from Q3 1978 to Q4 1980]				
--Training Workshops for Boiler Inspectors	[Timeline bar from Q3 1978 to Q4 1980]				
--Computer Consumption Monitoring	[Timeline bar from Q4 1979 to Q4 1980]				

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM FOR COUNTY AND MUNICIPAL GOVERNMENTS

ENERGY SAVINGS ESTIMATE:

Assumptions:

1. The Energy Management Program for County and Municipal Governments is the program which implements the Energy Savings Program for County and Municipal Governments, and the Promotion of Car and Vanpooling and Public Transportation and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions programs within County and Municipal Government operations.
2. Savings from the ESP for County and Municipal Governments is indicated in the calculation summaries in brackets to show its value to an overall management program, but the savings are excluded from the total savings of this program to avoid duplication in the total savings and environmental impact of the State Energy Conservation Program.
3. Savings from the Promotion of Car and Vanpooling and Public Transportation program and the Improvement of Energy Efficiency in Procurement Practices of State Government and Its Political Subdivisions program that will occur through the implementation of this program are included in this program, and excluded in the total savings of the other two programs.
4. The methodologies used to determine the amount of savings from the Transportation and Procurement programs are included in the detailed descriptions of those programs.

Calculations:

Savings from the Energy Savings Program for County
and Municipal Governments = $(1.553 \times 10^{12} \text{ BTU})$

Savings from Transportation Programs for County
and Municipal Governments = $0.011 \times 10^{12} \text{ BTU}$

Savings from Procurement Programs for County and
Municipal Governments = $0.237 \times 10^{12} \text{ BTU}$

TOTAL SAVINGS FROM ENERGY MANAGEMENT PROGRAM FOR
COUNTY AND MUNICIPAL GOVERNMENTS = $0.248 \times 10^{12} \text{ BTU}$

SAVINGS INCLUDING ESP PROGRAM = $(1.801 \times 10^{12} \text{ BTU})$

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY MANAGEMENT PROGRAM (EMP) FOR COUNTY AND MUNICIPAL GOVERNMENTS

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: EMP - Counties and Municipalities

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	x	xx							
FRINGE BENEFITS	x	xx							
TRAVEL	x	xx							
EQUIPMENT									
SUPPLIES	x	xx							
CONTRACTUAL	-	\$21,700	-	\$21,700					
OTHER	x	xx							
Total Direct	-	21,700	-	21,700					
Indirect									
TOTAL BUDGET		21,700		21,700					

x - Refer to Administrative Package, 3.0% of EPCA Budget.

xx - Refer to Administrative Package, 3.7% of ECPA Budget

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

OVERVIEW:

In New Mexico, approximately 50,300,000 square feet¹ of space is contained in buildings owned, leased or rented by commercial businesses. The commercial buildings included in this sector are stores, offices, banks, hotels and garages.

These buildings are located throughout the State of New Mexico (121,666 square miles), and while they share similar characteristics, they vary in terms of lighting and thermal efficiencies. The variance is accounted for by type and year of building construction, regional location, degree-day data, energy cost differentials, financial status, opportunities for retrofit, and other factors.

During 1975-76, the New Mexico Energy Resources Board (ERB), Conservation Division, developed a preliminary energy conservation program for public buildings in the state. It readily became apparent that energy-saving techniques under study or being implemented on a pilot basis in government buildings could be applied effectively to buildings in the private sector as well. However, the Energy Resources Board, Conservation Division, recognized that a much more precise and specific method was needed to assess energy efficiency and make recommendations for improvements in all physical building structures and mechanical systems. Thus, the idea for a computerized approach to information gathering and assessment was conceived.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting, as total energy efficiency is dependent upon both functions and their interrelationship.

To accomplish this task, a computer energy model currently is being developed. Upon receiving data input from a designated building official and/or a commercial architect, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING buildings (including those being considered for rent or lease by commercial businesses in New Mexico), and
- 2) The energy efficiency and building code compliance² in construction plans for NEW and RENOVATED buildings.

¹Figure derived from the Rand Corporation report, "Energy Conservation in Non-Residential Buildings, October, 1976.

²New Mexico Construction Industries Commission has already adopted Chapter 53, Uniform Building Codes. This affects all new construction and all renovations over \$500.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

OVERVIEW:

IN-PUT

If a commercial business chooses to participate in the ESP, a company representative may contact the Energy Resources Board, Conservation Division, or a local Energy Extension Service office to obtain the necessary materials and receive an estimate of the cost for the computer analysis service in that building. The cost-estimate will be based on the size of the building and general information regarding the mechanical systems utilized in the building. (The fee, however, will be minimal since the primary cost of developing the computer energy model will have been absorbed through the public buildings program).

The data (mechanical, structural and energy consumption building information) going into the computer model for analysis of EXISTING commercial business buildings, will be supplied by the building owner or manager, or a designated administrative or maintenance official in each building. A data input form will be developed to allow this official to supply the energy audit information to the computer in non-technical language.

For analysis of buildings under consideration for rent or lease by a commercial business, the designated commercial building official, in cooperation with the building owner or leasing agency, will supply the energy audit information to the computer.

Simultaneously, degree day data acquired from weather bureau services will enable input of accurate temperature information for each building, according to its location.

In addition and until the E.S.P. Commercial is available, the E.E.S. will be providing Class A and C audits and conducting workshops for this sector through its small business program.

OUT-PUT

Upon receiving the data-feed on EXISTING commercial business buildings, the computer model will respond with a "print-out" or assessment, of the energy efficiency (thermal and lighting).of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

OVERVIEW:

For example, if the computer model's assessment indicates that a thermal inefficiency exists in a commercial business building, the corresponding computer recommendation may call for weatherstripping, insulating, putting in storm windows or implementing other retrofit alternatives designed to increase the thermal efficiency of the building. These recommendations will consider the cost-effectiveness of each action on an individual building basis, and the computer model will have the capability of updating the recommendations as new conservation techniques become known.

Similarly, the computer energy model will be utilized to assess energy efficiency in buildings in New Mexico which are under consideration for rental or lease by commercial businesses, before rental or lease agreements are signed. The computer output will provide an information base for negotiating the implementation of energy-conserving retrofits in the building envelope and/or mechanical system, before actual occupancy by the commercial business.

The computer energy model also will be utilized to assess the energy efficiency of construction plans for NEW and RENOVATED buildings, and offer construction options before new structures are built. In this way, the construction of sound, energy-efficient commercial business buildings can be assured from 1978 forward.

Assessments and recommendations for increasing the energy efficiency of EXISTING buildings will be delivered to the commercial business which contracted for the ESP service and the building owner or manager, as requested. Assessments and recommendations for NEW and RENOVATED Buildings' construction plans will be delivered to the commercial architect or builder and the building code inspector as required. All ESP information on commercial businesses will be disseminated in quarterly reports to the Energy Resources Board, Conservation Division, to enable monitoring of the program.

Information gathered through the ESP will enable commercial businesses in New Mexico to more accurately determine their utility-cost needs. The information can be utilized as a management control for budgeting operating expenses and new construction costs. And most importantly, the application of the ESP recommendations can save energy and money for commercial businesses.

Training Program

When a commercial business receives its computerized assessments and recommendations for building retrofits, a prepared set of self-instructional training materials will be included to: (1) assist the building owner or building manager with initiating certain retrofit actions; and (2) assist

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

OVERVIEW

administrative officials, staff and other building users with understanding and implementing energy conservation practices in the building.

The self-instructional program will include workbooks and training session materials, and possibly audiovisual materials, specifically designed for each audience. Additional quantities of the training materials will be provided by the Energy Resources Board, Conservation Division, at cost.

The ESP for commercial businesses will be carried out through the New Mexico Energy Extension Service which projects contacting 5,000 small businesses by April, 1979. If the EES continues to operate after that date, the remainder of the audits for commercial businesses will be initiated through that organization. Otherwise, at that point, the program will continue to operate through the ERB, Conservation Division.

Program Measure: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration (now DOE) for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing commercial buildings.

PRIMARY FUEL ENERGY SAVINGS FROM:

Lighting in New, Renovated and Existing Buildings	=	0.822 TBTU
Thermal and Mechanical in New & Renovated Buildings	=	0.594 TBTU
Thermal and Mechanical in Existing Buildings	=	4.277 TBTU
TOTAL ENERGY SAVINGS OF ESP/COMMERCIAL BUILDINGS	=	5.693 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent Commercial Businesses "share" of the overall savings.
3. The Commercial Businesses share can be established by determining the proportion of floor space used by the Stores, Offices and Banks, Hotels and Garages categories of the total amount of floor space in the New Mexico estimate of Commercial and Public Buildings.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by Commercial Businesses.
5. Since energy conservation programs in Commercial Businesses will initially permeate those businesses that are economically affected by rising utility costs, it is assumed that participation will be only 40%.

¹Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/Commercial Businesses.

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
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1106 (thousand)	÷	9150 (thousand)	=	12.09%
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% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ² & ³
--	---	---

12.09%	=	12.09%
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Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	X	% of Floor Area for Commercial Businesses ³ & ⁴	=	PRIMARY FUEL SAVINGS FROM COMMERCIAL BUSINESSES FOR LIGHTING EFFICIENCY
1.765×10^{12}	x	0.466	=	0.822×10^{12} BTU

¹U. S. Department of Commerce, Statistical Abstract of the United States.

²See Assumption 1.

³Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

⁴See Table 2, Sum of Stores, Offices & Banks, Hotels, Garages - 5% of Industrial Office Space (assumed in ESP/Ind.)

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/

New and Renovated Structures

1974 Commercial Consumption ¹	÷	1974 Total Consumption for Commercial and Residential ¹	=	% of Consumption in Commercial Buildings
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50.0 TBTU	÷	92.2 TBTU	=	54.2%
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% of Consumption in Commercial Buildings	=	% of Savings in Commercial Buildings ²
54.2%	=	54.2%

Table 1

**ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970**

(Millions of square feet)

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	187	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source: Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

Table 2
ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices & Banks ³	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
West								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

³12.7% or 13.7 million sq. feet allotted to Commercial ESP; 5.0% or 5.4 million square feet allotted to Industrial ESP.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

Total Savings from Thermal Efficiency Standards (See Appendix B, FEA methodology)	X	% of Total Savings for Commercial Buildings	= Savings from Commercial Buildings
2.35×10^{12} BTU	X	0.542	= 1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Commercial Buildings	= SAVINGS FROM COMMERCIAL BUSINESSES FOR THERMAL EFFICIENCY IN NEW AND RENOVATED BUILDINGS
1.27×10^{12} BTU	X	0.466	= $\underline{\quad \quad \quad \times 10^{12} \text{ BTU} \quad \quad \quad}$

¹ FEA Strawman Data, May, 1976.

² Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

Existing Structures

The annual energy consumption for conventional office buildings is projected as 248,600 BTU/Sq.Ft. and retail stores as 274,700 BTU/Sq.Ft.¹ Since a weighted average can not be determined, the mean at 261,650 BTU/Sq. Ft. will be used.

Annual Mean Consumption X Estimated Area of Commercial Space² = Estimated Annual Consumption of Commercial Buildings

261,650 BTU/Sq. Ft. X 50,300,000 Sq. Ft. = 13.161×10^{12} BTU

Assuming this total consumption should be distributed proportionally by energy source as shown by State Agency distribution:

TYPE OF ENERGY	% DISTRIBUTION BY TYPE ³	ANNUAL BTU CONSUMPTION
Electricity	3.5%	0.461×10^{12} BTU
Natural Gas	96.2%	12.661×10^{12} BTU
Propane	0.3%	0.039×10^{12} BTU

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, subtract 12.6%⁴ from 40.5% = 27.9% electrical savings, excluding lighting.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

Estimated Energy Consumption for Commercial Businesses	X	% of Savings Possible/Energy Type	X	% of Compliance ⁵	=	SAVINGS PER ENERGY TYPE FOR EXISTING COMMERCIAL BUSINESSES
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Electricity

$$0.461 \times 10^{12} \text{ BTU} \quad X \quad 0.279 \quad X \quad 0.400 \quad = \quad 0.051 \times 10^{12} \text{ BTU}$$

Natural Gas

$$12.661 \times 10^{12} \text{ BTU} \quad X \quad 0.486 \quad X \quad 0.400 \quad = \quad 2.461 \times 10^{12} \text{ BTU}$$

Propane

$$0.039 \times 10^{12} \text{ BTU} \quad X \quad 0.486 \quad X \quad 0.400 \quad = \quad 0.008 \times 10^{12} \text{ BTU}$$

END USE SAVINGS FROM EXISTING COMMERCIAL BUSINESSES

$$\text{FOR THERMAL EFFICIENCY} = \underline{2.520 \times 10^{12} \text{ BTU}}$$

¹ Tables III-5 and III-7, An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

² See Table 2, Sum of 20.8, 13.7, 9.3, 6.5 million Sq. Ft.

³ From historic consumption data 1973-1975 gathered by the Energy Resources Board, State of New Mexico, 1976.

⁴ Figure V-1, "1970 Energy Demand by End Use," An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

⁵ Assuming 40% compliance.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/Commercial Businesses.

Reduced Non-Electrical Demand

Saved by 1980 through
ESP/Commercial Businesses¹

÷

Heating Plant
Efficiency

=

BTU SAVED PER
PRIMARY ENERGY
SOURCE FOR
NATURAL GAS
AND PROPANE

(See chart below.)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	2.461×10^{12}	0.6	4.102×10^{12}
Propane	0.008×10^{12}	0.5	0.016×10^{12}

TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 4.118×10^{12}

Reduced Electrical Demand

$$0.051 \times 10^{12} \text{ BTU} \div 3413 \text{ BTU/KWH} = 14,942,866 \text{ KWH Saved of End Use Energy}$$

Total KWH Electricity
Saved by 1980 through
ESP/Commercial Business

X % of Power
Generated by
Type of Generation¹

= KWH Saved by Type
of Generation

14,942,866	KWH X 0.1% Gas-fired Gas Turbine	=	14,943	KWH
14,942,866	KWH X 0.3% Oil-fired Gas Turbine	=	44,829	KWH
14,942,866	KWH X 23.2% Gas-fired Steam Turbine	=	3,466,745	KWH
14,942,866	KWH X 72.6% Oil-fired Steam Turbine	=	10,848,521	KWH
14,942,866	KWH X 3.8% Coal-fired Steam Turbine	=	567,829	KWH

KWH Saved by Type
of Generation

X Conversion Factor
per Type of Fuel

= Amount of Primary
Fuel Saved

3,481,688	KWH in Natural Gas X 10.4 Cu.Ft./KWH	=	36,209,555.2	Cu.Ft.
10,893,350	KWH in Oil X 0.676 Gallons/KWH	=	827,894.6	Gallons
567,829	KWH in Coal X 0.88 Pounds/KWH	=	499,689.5	Pounds

Unit of Primary
Energy Source

X Conversion Factor
to BTU's

= BTU Saved/Source of
Fuel for Generation

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/COMMERCIAL BUSINESSES

<u>36,209.6</u>	MCF of Natural Gas X 1,000,000 BTU/MCF =	<u>0.036</u>	$\times 10^{12}$	BTU
<u>827,894.6</u>	Gallons of Oil X 140,000 BTU/Gallon =	<u>0.116</u>	$\times 10^{12}$	BTU
<u>249.8</u>	Tons of Coal x (26.2 x 10 ⁶) BTU/Ton =	<u>0.007</u>	$\times 10^{12}$	BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 0.159 $\times 10^{12}$ BTU

Primary Fuel Savings for Natural Gas and Propane = 4.118 $\times 10^{12}$ BTU
Primary Fuel Savings for Electricity = 0.159 $\times 10^{12}$ BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND
MECHANICAL IN EXISTING BUILDINGS = 4.277 $\times 10^{12}$ BTU

¹Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR COMMERCIAL BUSINESSES

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR RESIDENTIAL STRUCTURES

OVERVIEW:

Over the last several years, heating and cooling costs for single-family residences have increased dramatically, particularly in New Mexico. This trend shows no sign of reversal in the near future and as supplies of fossil fuels dwindle, prices will continue to rise. The Federal Energy Administration, now Department of Energy, has estimated that approximately 12 per cent of the total United States energy is used to heat and cool single family homes, and about 80 per cent of these homes are inadequately insulated.

During 1976, New Mexico was selected as one of two states in the nation to participate in the Federal Energy Administration's Project Conserve, a pilot information project designed to help homeowners of permanent structures save money on fuel bills through making simple, low-cost home improvements. Home energy audit questionnaires were mailed to New Mexico homeowners, requesting information on heating and cooling bills, thermal characteristics and usage patterns. The responses were subjected to computer analysis to determine potential dollar savings from such recommended retrofit actions as adding storm windows, storm doors, ceiling insulation, caulking, weatherstripping and adjusting thermostat settings. The recommendations included cost ranges for each action, and estimates of the savings potential and payback period. Approximately, 11.1 per cent, or about 28,000 New Mexico homeowners responded.

While initial feedback indicates that Project Conserve has achieved some degree of success in reducing home heating and cooling bills, the Energy Resources Board, Conservation Division, calculates that there will remain about 215,000 permanent homeowners who will not have participated in the home energy audit system by 1978. The Energy Resources Board's Conservation Division feels that the audit capability should continue to be made available to these homeowners since more homeowners will be encouraged to participate as: (1) home fuel bills continue to increase, (2) cost-savings resulting from home retrofits are demonstrated, (3) tax credits increase the cost-effectiveness of home retrofits, and (4) preferred interest rates are offered by lending institutions for energy-conserving purposes.¹

¹Certain lending institutions, such as the United Southwest National Bank of Santa Fe, New Mexico, are now offering preferred interest rates on loans made for energy-conserving purposes.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR RESIDENTIAL STRUCTURES

In evaluating the original pilot Project Conserve Program, the Energy Resources Board, Conservation Division, has determined a need to continue to supply homeowners with this essential audit and recommendation system. It was originally anticipated the ERB, Conservation Division, would use the information from the initial Project Conserve Program to develop a Class C successor. It was determined, however, the information was inadequate to develop a successor and that the Energy Institute at the University of New Mexico should perform the task. The guide is to be available by June, 1978, and it is anticipated 30,000 homeowners will be contacted with Class C audit materials and that 10,000 will participate.

Additionally, the Energy Extension Service projects it will contact 40,000 single-family dwellings to participate in either Class A or Class B audits by April, 1977. Twenty thousand homeowners are expected to participate.

Finally, by April, 1979, several thousand pamphlets, bill stuffers and tips will be distributed to homeowners through the Energy Extension Service.

Program Measure: ENERGY SAVINGS (ESP) FOR RESIDENTIAL STRUCTURES

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/RESIDENTIAL STRUCTURES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on data and strategies from the Final Report, Project Conserve, Federal Energy Administration, Washington as supplied or used in the pilots carried out in Danbury, Connecticut and Topeka, Kansas. New Mexico housing and energy use characteristics, no doubt, differ from these data, but state-specific data are not currently available.

TOTAL PRIMARY FUEL ENERGY SAVINGS OF ESP RESIDENTIAL = 5.303 TBTU

Assumptions:

1. Savings for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent Residential "share" of overall savings.
2. ASHRAE 90-75 standards will be applied to all new and renovated permanent structures including single and multiple-family residences.
3. Project Conserve was run in New Mexico in 1976 with 226,000 homeowners receiving questionnaires by direct mail from FEA, Washington. Approximately 25,000 (11.1%) returned questionnaires and received retrofit reports.

The 11.1 percent, coupled with the 30,000 homeowners expected to participate in the home audits performed by the EES yields a combined participation of 22 percent.

4. All homeowners receiving retrofit reports will take at least one recommended action, since adjusting the thermostat is a "no cost" item. Rapidly rising utility costs in New Mexico will continue to serve as an incentive to save money.
5. Based on average reactions of homeowners in the initial Danbury and Topeka pilot studies, the following homeowners' response occurred:

61.2%	Increased insulation
39.5%	Added storm windows
35.9%	Added storm doors
59.7%	Caulked and weatherstripped doors and windows
60.8%	Reduced/increased thermostat, as appropriate for the season
6. Housing built prior to 1977 was constructed under the old (pre-ASHRAE 90-75) Uniform Building Codes, and as such, even if the structure is relatively new, any or all of the above recommended actions would be appropriate for owners of new homes as well as for owners of old homes. Therefore, to determine the inventory of state single-family housing, a percent of the net change in

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ESP Residential

ENERGY SAVINGS ESTIMATE:

Inventory from 1970 to 1980 should be added to the 1970 inventory.
Note: Chapter 53, Uniform Building Codes, incorporating
ASHRAE 90-75 standards, were enforced in New Mexico by July, 1977,
therefore, housing constructed after that date may be assumed
to have adequate insulation.

Determining State Inventory of Single-Family Residences

Regional Single Family Inventory- West Region ¹	+	65% ² of Net Con- struction/Removal 1970-1980	=	1976 Regional Inventory
8079 (thousand)	+	417 (thousand)	=	8496 (thousand)
1976 Regional Inventory	X	State Population Ratio ³	=	State Inventory of Single Family Residences
8496 (thousand)	X	0.0302	=	256.6 (thousand)

Determining Energy Saved per Each Action Recommended by Project Conserve

State Inventory of Single-Family Residences	X	22% Combined Participation Rate (by 1977)	=	Homeowners Receiving Audit Information		
256,600	x	0.22	=	58,226		
Homeowners Receiving Audit Information	X	Per cent Taking Each Action ⁴	x	Therms Saved per Action ⁵	=	Therms Saved per Homeowners Taking Each Action

(See chart below.)

	Total # of Owners Taking ⁶ Any Action(s)	% Taking Action	# Owners Taking Action	Therms Saved/ Action	END USE THERMS SAVED
Increasing insulation to 6 inches in ceiling	58,226	61.2	35,634	262	9,336,108
Adding storm windows	58,226	39.5	22,999	100	2,299,900
Adding storm doors	58,226	35.9	20,903	76	1,588,628
Caulking and weather- stripping	58,226	59.7	34,760	72	2,502,720
Reducing thermostat winter 3.5°F.	58,226	60.8	35,401	284	10,053,884

END USE ENERGY SAVINGS DIRECTLY FROM PROJECT CONSERVE 25,781,240
BY 1978 = 2.578 TBTU (2.578 x 10¹² BTU)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ESP Residential

ENERGY SAVINGS ESTIMATE:

Determining Energy Saved with Primary Energy Resources through Reduction In Demand by Residential Sector

Total BTU Saved by 1978 through Project Conserve	X	% of Fuel Used by Owned Residences ⁷	÷	Heating Plant Efficiency	=	PRIMARY FUEL BTU SAVED PER PRIMARY ENERGY SOURCE FOR HEATING FUELS
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(See chart below.)

Energy Source	End Use BTU Saved ⁸	% of Source	Heating Plant Efficiency	Primary Fuel BTU/Source
Natural & LP Gas	2.578×10^{12}	89.9	0.6	3.861×10^{12}
Fuel Oil	2.578×10^{12}	1.4	0.5	0.072×10^{12}
Electricity	2.578×10^{12}	3.5	1.0	0.090×10^{12}
Other Sources	CANNOT BE CALCULATED			

ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH REDUCTION IN THERMAL DEMAND BY 1978 = 4.023×10^{12} BTU² (4.023 x 10¹² BTU)²

¹ Federal Energy Administration, Residential and Commercial Energy Use Patterns, 1970-1990, Project Independence, Volume I, November, 1974.

² For the years 1971-1976, and to July, 1977 inclusive.

³ U.S. Department of Commerce, Statistical Abstract of the United States.

⁴ Federal Energy Administration, Final Report, Project Conserve, October, 1974

⁵ Ibid.

⁶ See Assumption 2.

⁷ U. S. Bureau of the Census, 1970 Census of Population

⁸ Non-Electrical Savings only

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ESP Residential

Reduced Electrical Demand

$$\begin{aligned} & 2.578 \times 10^{12} \text{ BTU} \times 0.026 = 0.067 \times 10^{12} \text{ BTU} \\ & 0.067 \times 10^{12} \text{ BTU} \div 3413 \text{ BTU/KWH} = 19,630,823 \text{ KWH Saved of End Use Energy} \end{aligned}$$

Total KWH Electricity Saved by 1980 through Project Conserve	X	% of Power Generated by Type of Generation ¹	=	KWH Saved by Type of Generation
--	---	---	---	------------------------------------

19,630,823	KWH	x	0.1%	Gas-fired Gas Turbine	=	19,630	KWH
19,630,823	KWH	x	0.3%	Oil-fired Gas Turbine	=	58,892	KWH
19,630,823	KWH	x	23.2%	Gas-fired Steam Turbine	=	4,554,350	KWH
19,630,823	KWH	x	72.6%	Oil-fired Steam Turbine	=	14,251,977	KWH
19,630,823	KWH	x	3.8%	Coal-fired Steam Turbine	=	745,971	KWH

KWH Saved by Type of Generation	x	Conversion Factor per Type of Fuel	=	Amount of Primary Fuel Saved
4,515,089	KWH in Natural Gas	X 10.4 Cu. Ft./KWH	=	46,946,525 Cu. Ft.
14,134,192	KWH in Oil	X 0.076 Gallons/KWH	=	1,074,198 Gallons
588,924	KWH in Coal	X 0.88 Pounds/KWH	=	518,253 Pounds

Unit of Primary Energy Source	X	Conversion Factor to BTU's	=	BTU Saved/Source of Fuel for Generation
46,946.5	MCF of Natural Gas	X 1,000,000 BTU/MCF	=	0.047 x 10 ¹² BTU
1,074,198	Gallons of Oil	X 140,000 BTU/Gallon	=	0.150 x 10 ¹² BTU
259.1	Tons of Coal	x (26.2 x 10 ⁶) BTU/Ton	=	0.007 x 10 ¹² BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH REDUCTION OF ELECTRICAL DEMAND	=	0.204 x 10 ¹² BTU
Primary Fuel Savings for Heating Fuels	=	4.023 x 10 ¹² BTU
Primary Fuel Savings for Electricity	=	.204 x 10 ¹² BTU
PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND MECHANICAL IN EXISTING BUILDINGS	=	4.227 x 10 ¹² BTU

¹ Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/RESIDENTIAL STRUCTURES

Calculations:

New and Renovated Residential Structures

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/ Residential Structures

1974 Residential Consumption	÷	1974 Total Consumption for Commercial and Residential	=	% of Consumption in Residential Structures
42.2 TBTU	÷	92.2 TBTU	=	45.8%
		% of Consumption in Residential Structures	=	% of Savings in Residential Structures
		45.8%	=	45.7%
Total Savings from Thermal Efficiency Standards (See Appendix B, FEA methodology)	x	% of Total Savings for Residential Structures	=	PRIMARY FUEL SAVINGS FROM NEW & RENOVATED RESIDENTIAL STRUCTURES FOR THERMAL EFFICIENCY
2.35×10^{12}	x	0.458	=	1.076×10^{12} BTU
TOTAL ENERGY SAVINGS FROM NEW AND RENOVATED RESIDENTIAL STRUCTURES FOR THERMAL AND MECHANICAL EFFICIENCY			=	1.076×10^{12} BTU

¹FEA Strawman Data, May, 1976.

²Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND MECHANICAL IN EXISTING BUILDINGS=

4.227×10^{12} BTU

TOTAL ENERGY SAVINGS FOR ESP RESIDENTIAL:

5.303×10^{12} BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ESP RESIDENTIAL

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: ESP - Residential

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	x	xx							
FRINGE BENEFITS	x	xx							
TRAVEL	x	xx							
EQUIPMENT									
SUPPLIES	x	xx							
CONTRACTUAL	-	-	\$220,000	220,000		(1) \$220,000			
OTHER	x	xx							
Total Direct	-	-	220,000	220,000		220,000			
Indirect									
TOTAL BUDGET			220,000	220,000		220,000			

x - Refer to Administrative Package, 4.0% of EPCA Budget

xx - Refer to Administrative Package, 1.5% of ECPA Budget

(1) EES

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

OVERVIEW:

It is estimated that 80 per cent of single-family residences in the United States are inadequately insulated.¹ Many of these homes are owned by people with low or fixed incomes. Because of rising fuel prices, these residents are being forced to pay an increasingly high percentage of their incomes on energy used in the home, and national projections of declining fuel supplies and increasing prices indicate that this trend will not reverse. In Albuquerque alone, the Albuquerque Legal Aid Society determined that during 1976 the elderly poor paid 22 per cent of their budget for utility payments.²

In New Mexico, there are approximately 73,000 owner-occupied residences occupied by people with low and fixed incomes.³ The vast majority of these residences are inadequately insulated, and the homeowners do not have sufficient capital to insulate or weatherize their homes.

The Federal Energy Administration (now Department of Energy) has estimated that up to 20 per cent of the energy presently being consumed by low and fixed income homeowners could be conserved if the homes were adequately weatherized. Weatherization includes the application of wall insulation, pitched roof insulation, weather-stripping and caulking, window weatherization and other techniques designed to increase the thermal efficiency of a home.

During 1975-1976, in an initial attempt to assist New Mexico's low-and-fixed-income homeowners, the Community Services Administration made funds available for a pilot "winterization" (weatherization) program. The program was administered in New Mexico through the State Human Resources Division of the Governor's Office, and Community Action Associations located throughout the state. While the program achieved some degree of success in winterizing approximately 1,912⁴ low-income New Mexico homes, it had relatively little impact on the total number of homes needing weatherization in the state. Also, due to insufficient data and lack of funds to monitor the effects of the program, there is no firm evidence available to substantiate large funding requests needed for continuation and expansion of the weatherization program.

During 1977-1979, however, the Department of Energy will continue to make funds available for operating weatherization programs across the nation, as preliminary national studies indicate that weatherization can be a cost-effective method of reducing energy consumption.

¹ Federal Energy Administration, Final Report, Project Conserve, October, 1974.

² Summary of New Mexico Energy Resources Board, Energy Conservation Projects, October 15, 1976

³ "Data Base for Fixed and Low Income Owner-Occupied Housing Units" by Larry Adcock, Economic Consultant, Bureau of Business and Economic Research, University of New Mexico, January 7, 1977.

⁴ State Division of Human Resources, January 1, 1977. Winterization of these homes averaged \$157.08 per home.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

OVERVIEW:

In New Mexico, a Department of Energy grant of \$280,000 during 1977, and anticipated grants of \$584,100 during 1978, and \$584,100 during 1979, will enable continuation and expansion of the weatherization program. In addition, the New Mexico State Legislature has appropriated \$250,000 for fiscal year 1978, to the State Human Resources Division of the Governor's Office for weatherization programs and the Community Services Administration has authorized the expenditure of \$521,500 during 1977 and \$781,000 for 1978. An additional \$1,600,000 has been made available through the CETA program.

The Department of Energy weatherization grant will be administered through the Division of Human Resources with the ERB providing technical assistance and monitoring. The Division of Human Resources, will contract with Community Action Agencies, Councils of Government, and/or other recognized community action groups to implement the program at the community level. Low and fixed-income homeowners who wish to receive financial assistance for weatherizing their homes, may submit an application to the Division of Human Resources or the Community Action Agencies, throughout the state. All applications will be screened according to DOE criteria, guidelines developed by appropriate social service agencies in the State of New Mexico, and degree-day data acquired for geographical locations within the state.

Data gathered from the 1977-78 DOE Weatherization Program in New Mexico will be analyzed by the Energy Resources Board, Conservation Division, to determine the cost-effectiveness and energy savings resulting from weatherization techniques implemented in specific geographical locations in the state.

Program Measure: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE FAMILY STRUCTURES

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: WEATHERIZATION

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spend by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on data and strategies from the Final Report, Project Conserve, Federal Energy Administration, (now DOE) Washington, as supplied or used in the pilots carried out in Danbury, Connecticut and Topeka, Kansas. New Mexico housing and energy use characteristics, no doubt, differ from these data, but state-specific data are not currently available. Project Conserve techniques for retrofit are very similar to those used in the Weatherization program.

TOTAL PRIMARY FUEL ENERGY SAVINGS OF WEATHERIZATION = .689 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Project Conserve developed out of the original Weatherization Program, thus methodology for energy savings will be similar to that used by the Energy Resources Board in describing Project Conserve.
2. Not all homes owned by low and fixed-income residents need each retrofit action available through the Weatherization Program - weatherstripping and caulking, storm windows, wall insulation and pitched roof insulation.
3. Assume therms saved by adding poly-urethane foam wall insulation to be at a rate of 30,000 BTU/square foot of wall, and the average wall space per home to be approximately 900 square feet.

¹Bureau of Business and Economic Research, Data Base for Fixed and Low Income Owner-Occupied Housing Units, University of New Mexico, January, 1977.

²Larry Bickle & Associates, Albuquerque, New Mexico, March, 1977.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by Weatherization Program

Reduced Thermal Demand

Total BTU Saved by 1980 through Weatherization¹ X % of Fuel Used by Residences² ÷ Heating Plant Efficiency³ = BTU SAVED PER PRIMARY ENERGY SOURCE FOR HEATING/COOLING

ENERGY SOURCE	END USE BTU SAVED	% OF SOURCE	HEATING PLANT EFFICIENCY	Total BTU's Primary and End Use
Natural Gas	.390 x 10 ¹²	89.4	0.6	.582 x 10 ¹²
Propane	.390 x 10 ¹²	4.6	0.5	.036 x 10 ¹²
Heating Oil	.390 x 10 ¹²	0.4	0.6	.003 x 10 ¹²
Coal	.390 x 10 ¹²	0.3	0.5	.002 x 10 ¹²

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH REDUCTION IN THERMAL DEMAND = .623 x 10¹² BTU

¹ Savings from Fossil Fuels only.

² Based on analysis of 24,175 participant responses collected by the Energy Resources Board through Project Conserve.

³ Larry Bickel and Associates, Albuquerque, New Mexico, March, 1977.

Reduced Electrical Demand

Total BTU Saved by 1980 through Weatherization X % of Electricity Used = BTU of Electricity Used for Heating/Cooling
 .390 x 10¹² x 0.053 = .021 x 10¹² BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

Calculations:

Determining the Number of Residences Needing Each Retrofit Action

The following number of participants' residences have been derived from a recent Energy Resources Board research study¹:

RETROFIT ACTION	NUMBER OF HOMES NEEDING ACTION
Weatherstripping/Caulking	73,000
Storm Windows	73,000
Wall Insulation	11,400
Pitched-Roof Insulation	51,500

¹ Bureau of Business and Economic Research, Data Base for Fixed and Low Income Owner-Occupied Housing Units, University of New Mexico, January, 1977.

Determining Direct Savings from Weatherization Program

RETROFIT ACTION	Number of Homes Receiving Action	Therms Saved/ Action	Total Therms Saved
Weatherstripping/Caulking	9,790	72	704,880
Storm Windows	9,790	100	979,000
Wall Insulation	1,529	270 ¹	412,830
Pitched-Roof Insulation	6,907	262	1,809,634

TOTAL THERMS SAVED = 3,906,344

TOTAL ENERGY SAVINGS DIRECTLY FROM WEATHERIZATION PROGRAM-

BY 1980= .390 TBTU
(.390 x 10¹² BTU)

¹ Rough estimate; see assumption 3.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WEATHERIZATION OF LOW AND FIXED INCOME SINGLE-FAMILY STRUCTURES

Reduced Electrical Demand

$$.021 \times 10^{12} \text{ BTU} \div 3413 \text{ BTU/KWH} = 6,152,945 \text{ KWH Saved of End Use Energy}$$

Total KWH Electricity
 Saved by 1980 through Weatherization Program X % of Power Generated by Type of Generation¹ = KWH Saved by Type of Generation

6,152,945	KWH X 00.1% Gas-fired Gas Turbine =	6,153	KWH
6,152,945	KWH X 00.3% Oil-fired Gas Turbine =	18,459	KWH
6,152,945	KWH X 23.2% Gas-fired Steam Turbine =	1,427,483	KWH
6,152,945	KWH X 72.6% Oil-fired Steam Turbine =	4,467,038	KWH
6,152,945	KWH X 03.8% Coal-fired Steam Turbine =	233,812	KWH

KWH Saved by Type of Generation X Conversion Factor per Type of Fuel = Amount of Primary Fuel Saved

1,433,636	KWH in Natural Gas X 10.4 Cu. Ft/KWH =	14,909,814	Cu. Ft.
4,485,497	KWH in Oil X 0.076 Gallons/KWH =	340,898	
233,812	KWH in Coal X 0.88 Pounds/KWH =	205,755	

Unit of Primary Energy Source X Conversion Factor to BTU's = BTU Saved/Source of Fuel for Generation

14,909.8	MCF of Natural Gas X 1,000,000 BTU/MCF =	0.015 x 10 ¹²	BTU
340,898	Gallons of Oil X 140,000 BTU/Gallon =	.048 x 10 ¹²	BTU
102.9	Tons of Coal x (26.2 x 10 ⁶) BTU/Ton =	.003 x 10 ¹²	BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH REDUCTION OF ELECTRICAL DEMAND = .066 x 10¹² BTU

Primary Fuel Savings for Heating Fuels = .623 x 10¹² BTU
 Primary Fuel Savings for Electricity = .066 x 10¹² BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND MECHANICAL IN EXISTING BUILDINGS = .689 x 10¹² BTU

¹Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

PROGRAM MEASURE: Weatherization

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DCT	Other
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$3,215,100	\$3,215,100	\$584,100				\$2,631,000
OTHER	*	**							
Total Direct	-	-	\$3,215,100	\$3,215,100	\$584,100				\$2,631,000
Indirect									
TOTAL BUDGET	-	-	\$3,215,100	\$3,215,100	\$584,100				\$2,631,000

* - Refer to administrative budget 3.2% of EPCA budget

** - Refer to administrative budget 1.6% of ECPA budget

PROGRAM MEASURE: ESP Commercial

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$50,000	\$50,000		\$50,000			
OTHER	*	**							
Total Direct	-	-	\$50,000	\$50,000		\$50,000			
Indirect									
TOTAL BUDGET	-	-	\$50,000	\$50,000		\$50,000			

* Refer to administrative package, 3.0% of EPCA budget

** Refer to administrative package, 1.8% of ECPA budget

1 EES

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: SOLAR SUSTENANCE PROJECT

OVERVIEW:

The Solar Sustenance Project--ie., the construction of greenhouses attached to the south wall of existing residential structures, is a "grassroots" approach to energy conservation in New Mexico. The greenhouses are designed, constructed and operated in such a way that they achieve maximum use of the sun's energy for the production of both supplemental food and heat.

By definition, all greenhouses are in fact, solar. However, the construction of traditional greenhouses has not necessarily been directed toward the most effective collection of solar energy, nor toward the storage and circulation of heat produced by that energy.

During 1975, the Solar Sustenance Project obtained a grant from the Four Corners Regional Commission to conduct a pilot demonstration project on the solar sustenance concept. Eleven greenhouses were constructed for low-income families located throughout northern New Mexico, according to plans and specifications set forth by the Solar Sustenance Project staff.

The greenhouses were monitored to determine to what extent they were effective in (1) extending the short growing season in northern New Mexico, and (2) producing, storing and circulating heat for use in adjoining homes.

Results from the pilot greenhouses were so encouraging that the Solar Sustenance Project was expanded through a grant from the Energy Resources Board, Research and Development Division, in 1976.

The design and construction of these greenhouses addresses three basic concepts:

1. The most efficient collection of solar energy;
2. The storage of solar energy; and
3. The prevention of heat loss during and following collection periods.

Adherence to these basic concepts enables not only the growing of supplemental food year-round, but also:

--The production of surplus heat which can be used in the adjoining house or other structure through an air-circulation, venting system.

--A degree of independence from mechanical heating and cooling systems powered by fossil fuels.

--An optimum amount of insulation and thermal storage may be utilized on an efficient, cost effective basis.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: SOLAR SUSTENANCE PROJECT

OVERVIEW:

A number of workshops were held in communities throughout the state during 1976 to train residents in the theory and actual construction and operation of solar sustenance greenhouses. Participants in the workshops helped construct one greenhouse, thereby gaining the experience to build their own greenhouses. In April, 1977, the Solar Sustenance Project staff conducted a random survey of 10% of the 100 persons who participated in the 12 community workshops to determine the multiplier effect of this training program. Thirty-eight percent responded that they either have build, planned to build in 1977 or planned to build when they can. It is estimated that the construction of these greenhouses will lead to a further multiplier effect through friends and neighbors leading to the probable construction of at least 10% of the initial response rate annually. Data from this experience has been extrapolated for use in determining participation in the solar workshop program of the Energy Extension Service. Please see Appendix for EES implementation plan.

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR SUSTENANCE PROJECT

ESTIMATED COST OF IMPLEMENTATION:

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR SUSTENANCE PROJECT

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the research and resulting data of the Solar Sustenance Project, State of New Mexico.

TOTAL ENERGY SAVINGS FROM SOLAR SUSTENANCE PROJECT BY 1980 = 0.091 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. The 1,000 participants of the Solar Sustenance Workshops will respond in the same manner as the 100 participants surveyed.
2. Greenhouse construction in a specific geographic location will stimulate other people in that area to construct greenhouses on their own at a 10 percent rate of the initial response rate to the initial pilot each year - 1978, 1979, 1980.
3. The net gain of energy per day in a greenhouse replaces the use of traditional heating fuels - natural gas, electricity, propane, etc. - in the structure to which the greenhouse is attached.
4. The mean heating days for Albuquerque, New Mexico, is equal to the average number of heating days of the locations of all greenhouses within the state.
5. The traditional heating fuels of the structures with greenhouses would have been natural gas or propane.

Calculations: Solar Sustenance Project

Number of Workshops	X	Average Participation	=	Total Participation
12	X	90		1080
Total Participation	X	% Built or Intend To	=	Number of Greenhouses by
1080	X	.38	=	Workshop Participants - 1980
				410
Total by 1980	+	Sum of 10% Increase	=	Total Number of Solar Green-
		Per Year (1978, 79, 80)		houses by 1980
410	+	41+41+41	=	533

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: SOLAR SUSTENANCE PROJECT

Calculations: Energy Extension Service Solar Greenhouses

Number of Workshops x Average Participation = Total Participation

30 x 90 = 2700

Total Participation x % Built or Intend To = Number of Greenhouses by
Workshop Participants - 1980

2700 x .38 = 1026

Total by 1980 + Sum of 10% Increase
Per Year (1979, 1980) = Total Number of Solar Green-
houses by 1980

1026 102+102 = 1230

Net Gain of Energy/Day x Days in Average x # of Greenhouses = Energy Savings of
by Structures with Heating Season by 1980 Solar Sustenance
Greenhouses Project

100,000 BTU/day x 219 x 1763 = 0.039 x 10¹² BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

OVERVIEW:

In New Mexico, approximately 5,400,000 square feet¹ of space is contained in public, private and proprietary hospital buildings located throughout the state.

While all hospitals share similar building characteristics and have unique heating and lighting needs, the hospital buildings vary in terms of energy efficiency. The variance is accounted for by type and year of building construction, regional location, degree-day data, energy cost differentials, financing capabilities, opportunities for retrofit and other factors.

During 1975-76, the New Mexico Energy Resources Board, Conservation Division, developed a preliminary energy conservation program for state office buildings and public schools. It readily became apparent that certain energy-saving techniques under study or being implemented on a pilot basis through these programs could be applied effectively to buildings in other sectors, including hospitals.

However, the Energy Resources Board, Conservation Division, recognized that a much more precise and specific method was needed to assess energy efficiency and to make recommendations for improvements in all physical building structures and mechanical systems. Thus, the idea for a computerized approach to information gathering and assessment was conceived. This approach, known as an ENERGY SAVINGS PROGRAM (ESP) can eventually be applied to all hospitals in New Mexico.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting, as total energy efficiency is dependent upon both functions and their interrelationship.

To accomplish this task, a computer energy model currently is being developed. Upon receiving data input from a designated hospital official and/or

¹ Figure derived from the Rand Corporation report, "Energy Conservation in Non-Residential Buildings," October, 1976. (NOTE: The estimated square footage for hospitals owned or operated by State, County or Municipal Governments, has been deleted from the total square footages listed in the ESP's for those sectors to avoid double accounting.)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

OVERVIEW:

architect, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING hospital buildings, and
- 2) The energy efficiency and building code compliance of construction plans for NEW and RENOVATED hospital buildings.

In-Put

Public hospitals owned or operated by state, county or municipal governments will begin participation in the ESP for Hospitals in 1978, as the computer energy model is completed and ready for implementation.

If a private or proprietary hospital elects to participate in the ESP for Hospitals, a hospital representative may contact the Energy Resources Board, Conservation Division, to obtain the necessary materials and forms, and receive a cost-estimate for the service. The cost-estimate will be based on the size of the hospital building and general information regarding the mechanical systems utilized in the building. (The fee, however, will be minimal since the primary cost for developing the computer energy model will have been absorbed through the public buildings programs).

The data--mechanical, structural and energy-consumption building information--going into the computer model for analysis of EXISTING hospital buildings, will be supplied by the hospital administrator or other designated hospital official. A data input form will be developed to allow this official to supply the energy audit information to the computer in non-technical language.

Simultaneously, degree-day data acquired from weather bureau services will enable input of accurate temperature information for each hospital building, according to its location.

For analysis of construction plans for NEW and RENOVATED hospital buildings, the building code inspector, and/or builder will supply the necessary data to the computer model.

Output

Upon receiving the data-feed on EXISTING hospital buildings, the computer model will respond with a "print-out" or assessment, of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

For example, if the computer model's assessment indicates that a thermal inefficiency exists in a hospital building, the corresponding computer

² New Mexico Construction Industries Commission has already adopted Chapter 53, Uniform Building Codes. This affects all new construction and all renovations over \$500.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

OVERVIEW:

recommendation may call for weatherstripping, insulating, putting in storm windows or implementing other retrofit alternatives designed to increase the thermal efficiency of the building. These recommendations will consider the cost-effectiveness of each action on an individual building basis, and the computer model will have the capability of updating the recommendations as new conservation techniques become known.

The computer energy model also will be utilized to assess the energy efficiency of construction plans for NEW and RENOVATED hospital buildings, and offer construction options before new structures are built. In this way, the construction of sound, energy-efficient hospital buildings can be assured from 1978 forward.

Assessments and recommendations for increasing the energy efficiency of EXISTING buildings will be delivered to the hospital administrator, and the State Department of Hospitals and Institutions, city or county manager, or private/proprietary owner, as appropriate. Assessments and recommendations for NEW and RENOVATED hospital construction plans will be delivered to the architect or builder, and the building code inspector, as required. All ESP information on hospital buildings will be disseminated in quarterly reports to the Energy Resources Board, Conservation Division, to enable monitoring of the program.

Information gathered through the ESP will enable hospitals in New Mexico to more accurately determine their utility-cost needs. The information can be utilized as a management control for budgeting operating expenses and new construction costs, and will provide firm evidence to support both public and private hospitals' funding requests for retrofit capital if the ESP demonstrates such retrofits to be cost-effective. And most importantly, the application of the ESP recommendations can save energy and money for hospitals.

Training Program

When a hospital receives its computerized assessments and recommendations for building retrofits, a prepared set of self-instructional training materials will be included to: (1) assist the hospital owner or administrator with initiating certain retrofit actions; and (2) assist other staff and building users with understanding and implementing energy conservation practices in the building.

The self-instructional program will include work-books and training session materials, and possibly audiovisual materials, specifically designed for each audience.

When the ESP for Hospitals is fully developed, it will be implemented as a management tool in the Energy Management Programs for State Agencies and County and Municipal Governments (public hospitals).

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

OVERVIEW:

Private and proprietary hospitals may obtain additional quantities of the training materials from the Energy Resources Board, Conservation Division, at cost, to assist them in implementing the ESP recommendations through their own management programs.

Program Measure: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing hospital buildings.

PRIMARY FUEL ENERGY SAVINGS FROM:

Lighting in New, Renovated and Existing Buildings	=	0.104 TBTU
Thermal and Mechanical in new and Renovated Buildings	=	0.074 TBTU
Thermal and Mechanical in Existing Buildings	=	0.602 TBTU
TOTAL ENERGY SAVINGS OF ESP/HOSPITALS	=	0.778 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent Hospitals¹ "share" of the overall savings.
3. The Hospitals share can be established by determining the proportion of floor space used by the Hospital category of the total amount of floor space in the New Mexico estimate of Commercial and Public Buildings.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by hospitals.
5. Since energy conservation programs in hospitals will initially permeate those hospitals that are economically affected by rising utility costs, it is assumed that participation will be only 50%.

¹Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/Hospitals

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
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1106 (thousand)	÷	9150 (thousand)	=	12.09%
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% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ^{2 & 3}
12.09%	=	12.09%

Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	x	% of Floor Area for Hospitals	=	PRIMARY FUEL SAVINGS FROM HOSPITALS FOR LIGHTING EFFICIENCY
1.765×10^{12}	x	0.058	=	0.102×10^{12} BTU

¹U.S. Department of Commerce, Statistical Abstract of the United States.

²See Assumption 1.

³Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/Hospitals.

New and Renovated Structures

1974 Hospital Consumption ¹	÷	1974 Total Consumption for Commercial and Residential ¹	=	% of Consumption in Hospital Buildings
50.0 TBTU	÷	92.3 TBTU	=	54.2%
		% of Consumption in Commercial Buildings	=	% of Consumption in Commercial Buildings
		54.2%	=	54.2%

Table 1

ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970

(Millions of square feet)

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	197	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source: Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM
PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

Table 2
ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>West</u>								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/ HOSPITALS

Total Savings from Thermal Efficiency Standards (See Appendix B, FEA methodology)	X	% of Total Savings for Commercial Buildings	=	Savings from Commercial Buildings
2.35×10^{12} BTU	x	0.542	=	1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Hospitals	=	SAVINGS FROM HOSPITALS FOR THERMAL EFFICIENCY IN NEW AND RENOVATED BUILDINGS
1.27×10^{12} BTU	X	0.058	=	<u>0.074×10^{12} BTU</u>

¹ FEA Strawman Data, May, 1976.

² Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

Existing Structures

The annual Energy Consumption for conventional retail stores in the West is projected at 274,700 BTU/Sq.Ft.

Annual Energy Consumption/ Conventional Office Bldg.	X	Estimated Area of Hospitals ²	=	Annual Consumption of Hospitals
274,700 BTU/Sq.Ft.	x	5,400,000	=	1.483×10^{12} BTU

Assuming total consumption should be distributed proportionally by Energy Source as in State Agencies³:

<u>TYPE OF ENERGY</u>	<u>% DISTRIBUTION BY TYPE</u>	<u>ANNUAL BTU CONSUMPTION</u>
Electricity	3.5%	0.052×10^{12} BTU
Natural Gas	96.2%	1.427×10^{12} BTU
Propane	0.3%	0.004×10^{12} BTU

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, Subtract $12.6\%^4$ from 40.5% = 27.9% electrical savings, excluding lighting.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

Average Energy Consumption for Hospitals	X	% of Savings Possible/Energy Type	X	% of Compliance	=	SAVINGS PER ENERGY TYPE FOR EXISTING HOSPITAL
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Electricity

$$0.052 \times 10^{12} \text{ BTU} \times 0.279 \times 0.500 = 0.007 \times 10^{12} \text{ BTU}$$

Natural Gas

$$1.427 \times 10^{12} \text{ BTU} \times 0.486 \times 0.500 = 0.347 \times 10^{12} \text{ BTU}$$

Propane

$$0.004 \times 10^{12} \text{ BTU} \times 0.486 \times 0.500 = 0.001 \times 10^{12} \text{ BTU}$$

TOTAL SAVINGS FROM EXISTING HOSPITALS FOR

$$\text{THERMAL EFFICIENCY} = 0.355 \times 10^{12} \text{ BTU}$$

¹ Table III-7, An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B. (Hospitals undoubtedly have higher consumption than this figure but such datum was not available at the time of completing this document.

² See Table 2.

³ From historic consumption data 1973-1975 gathered by the Energy Resources Board, State of New Mexico, 1976.

⁴ Figure V-1, "1970 Energy Demand by End Use," An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

⁵ Assuming 50% compliance.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/Hospitals

Reduced Non-Electrical Demand

Total BTU Fossil Fuel
Saved by 1980 through
ESP/Hospitals

÷

Heating
Plant
Efficiency

=
BTU SAVED PER
PRIMARY ENERGY
SOURCE FOR
HEATING/COOLING

(See chart below.)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	0.007×10^{12}	0.6	0.578×10^{12}
Propane	0.001×10^{12}	0.5	0.002×10^{12}

TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 0.580×10^{12}

Reduced Electrical Demand

0.007×10^{12} BTU 3413 BTU/KWH = 2,050,982 KWH Saved of End Use Energy

Total KWH Electricity Saved by 1980 through ESP/Hospitals X % of Power Generated by Type of Generation¹ = KWH Saved by Type of Generation

<u>2,050,982</u>	KWH X 0.1% Gas-fired Gas Turbine =	<u>2,051</u>	KWH
<u>2,050,982</u>	KWH X 0.3% Oil-fired Gas Turbine =	<u>6,153</u>	KWH
<u>2,050,982</u>	KWH X 23.2% Gas-fired Steam Turbine =	<u>475,828</u>	KWH
<u>2,050,982</u>	KWH X 72.6% Oil-fired Steam Turbine =	<u>1,489,013</u>	KWH
<u>2,050,982</u>	KWH X 3.8% Coal-fired Steam Turbine =	<u>77,937</u>	KWH

KWH Saved by Type of Generation Conversion Factor X per Type of Fuel = Amount of Primary Fuel Saved

<u>477,879</u>	KWH in Natural Gas X 10.4 Cu.Ft./KWH =	<u>4,969,942</u>	Cu.Ft.
<u>1,495,166</u>	KWH in Oil X 0.076 Gallons/KWH =	<u>113,633</u>	Gallons
<u>77,937</u>	KWH in Coal X 0.88 Pounds/KWH =	<u>68,585</u>	Pounds

Unit of Primary Energy Source X Conversion Factor to BTU's = BTU Saved/Source of Fuel for Generation

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/HOSPITALS

<u>4,969.9</u>	MCF of Natural Gas X 1,000,000 BTU/MCF	= 0.005	x 10 ¹²	BTU
<u>113,633</u>	Gallons of Oil X 140,000 BTU/Gallon	= 0.016	x 10 ¹²	BTU
<u>34.3</u>	Tons of Coal x (26.2 x 10 ⁶) BTU/Ton	= 0.001	x 10 ¹²	BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 0.022 x 10¹² BTU

Primary Fuel Savings for Natural Gas and Propane = 0.580 x 10¹² BTU
Primary Fuel Savings for Electricity = 0.022 x 10¹² BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND
MECHANICAL IN EXISTING BUILDINGS= 0.602 x 10¹² BTU

Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR HOSPITALS

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR INDUSTRIAL OFFICE BUILDINGS

OVERVIEW:

In New Mexico, approximately 955,000 square feet¹ of office space is contained in industrial complexes. (This building space is distinct from the space utilized in actual plant operations.)

These industrial complexes are located throughout the State of New Mexico (121,666 square miles), and while their offices share similar building characteristics, they vary in terms of lighting and thermal efficiencies. The variance is accounted for by type and year of building construction, regional location, degree-day data, energy cost differentials, financial status, opportunities for retrofit, and other factors.

During 1975-76, the New Mexico Energy Resources Board, Conservation Division, developed a preliminary energy conservation program for public buildings in the state. It readily became apparent that energy-saving techniques under study or being implemented on a pilot basis in government buildings could be applied effectively to buildings in the private sector as well. However, the Energy Resources Board, Conservation Division, recognized that a much more precise and specific method was needed to assess energy efficiency and make recommendations for improvements in all physical building structures and mechanical systems. Thus the idea for a computerized approach to information gathering and assessment was conceived. This approach, known as an ENERGY SAVINGS PROGRAM (ESP) can be applied to all industrial office buildings in New Mexico for a minimum fee.

The ENERGY SAVINGS PROGRAM is a computerized approach to evaluating building structures in terms of energy efficiency and building code compliance so that specific opportunities for energy savings may be identified in new, renovated and existing buildings. Building envelopes and systems will be analyzed for collective efficiencies in both heating and lighting, as total energy efficiency is dependent upon both functions and their inter-relationship.

To accomplish this task, a computer energy model currently is being developed. Upon receiving data input from a designated industrial building official and/or architect, the computer energy model will provide assessments of:

- 1) The energy efficiency of lighting and heating in EXISTING buildings, and
- 2) The energy efficiency and building code compliance in construction plans for NEW and RENOVATED buildings.²

¹Figure derived from the Rand Corporation report, "Energy Conservation in Non-Residential Buildings," October, 1976, assuming Industrial office space is 5% of office and banks space.

²New Mexico Construction Industries Commission has already adopted Chapter 53, Uniform Building Codes. This affects all new construction and all renovations over \$500.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR INDUSTRIAL OFFICE BUILDINGS

OVERVIEW:

-IN-PUT

If an industrial concern chooses to participate in the ESP, a company representative may contact the Energy Resources Board, Conservation Division, or a local Energy Extension Service office to obtain the necessary materials and receive an estimate of the cost for the computer analysis of office buildings, or office space, in the industrial complex. The cost-estimate will be based on the number and size of office buildings in the complex, and general information regarding the mechanical systems utilized. (The fee, however, will be minimal since the primary cost of developing the computer energy model will have been absorbed through the public buildings programs.)

The data (mechanical, structural and energy consumption building information) going into the computer model for analysis of EXISTING buildings, will be supplied by the industrial office manager or a designated maintenance official. A data input form will be developed to allow this official to supply the energy audit information to the computer in non-technical language.

Simultaneously, degree-day data acquired from weather bureau services will enable input of accurate temperature information for each building, according to its location.

For analysis of construction plans for NEW and RENOVATED industrial office buildings, the building code inspector, architect and/or builder will supply the necessary data to the computer model.

OUTPUT

Upon receiving the data-feed on EXISTING industrial office buildings, the computer model will respond with a "print-out" or assessment, of the energy efficiency (thermal and lighting) of each building. The assessment will be accompanied by recommendations for measures which could be taken to improve the building's efficiency, including an estimate of the cost-effectiveness of each action.

For example, if the computer model's assessment indicates that a thermal inefficiency exists in an industrial office building, the corresponding computer recommendation may call for weatherstripping, insulating, putting in storm windows or implementing other retrofit alternatives designed to increase the thermal efficiency of the building. These recommendations will consider the cost-effectiveness of each action on an individual building basis, and the computer model will have the capability of updating the recommendations as new conservation techniques become known.

The computer energy model also will be utilized to assess the energy efficiency of construction plans for NEW and RENOVATED buildings, and offer construction options before new structures are built. In this way, the construction of sound, energy-efficient industrial office buildings can

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP) FOR INDUSTRIAL OFFICE BUILDINGS

OVERVIEW:

be assured from 1978 forward.

Assessments and recommendations for increasing the energy efficiency of EXISTING buildings will be delivered to the industrial concern which contracted for the ESP service and to the office manager, as requested. Assessments and recommendations for NEW and RENOVATED buildings' construction plans will be delivered to the architect or builder, and the building code inspector, as required. All ESP information on industrial office buildings will be disseminated in quarterly reports to the Energy Resources Board, Conservation Division, to enable monitoring of the program.

Information gathered through the ESP will enable industrial concerns in New Mexico to more accurately determine their utility-cost needs for offices. The information can be utilized as a management control for budgeting operating expenses and calculating new construction costs. And most importantly, the application of the ESP recommendations can save energy and money for industry.

Training Program

When an industrial office receives its computerized assessments and recommendations for office building retrofits, a prepared set of self-instructional training materials will be included to:

- (1) assist the office manager or maintenance official with initiating certain retrofit actions; and
- (2) assist administrative officials, staff and other building users with understanding and implementing energy conservation practices in the building.

The self-instructional program will include workbooks and training sessions materials, and possibly audiovisual materials, specifically designed for each audience. Additional quantities of the training materials will be provided by the Energy Resources Board, Conservation Division, at cost.

The ESP for Industrial Office Buildings will be carried out through the New Mexico Energy Extension Service which projects contacting 5000 small businesses by April, 1979. If the EES continues to operate after that date, the remainder of the audits for industrial office buildings will be initiated through that organization. Otherwise, at that point the program will continue to operate through the ERB, Conservation Division.

Calendar Milestones:

TASK	1976 Quarter	1977 Quarter	1978 Quarter	1979 Quarter	1980 Quarter
Computer Energy Model in Development					
Training Program Materials in Development					
Acquisition of Degree-Day Data					
Dissemination of Data-Input Forms					
Implementation of ESP in Industrial Office Buildings:					
--DATA INPUT					
--DATA OUTPUT					
--DELIVERY OF SELF-INSTRUCTIONAL MATERIALS					

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration for Lighting Efficiency Standards and Thermal Efficiency Standards plus additional methodology for energy savings for Thermal Efficiency for existing commercial buildings.

PRIMARY FUEL ENERGY SAVINGS FROM:

Lighting in New, Renovated and existing buildings	=	0.088 TBTU
Thermal and Mechanical in New and Renovated Buildings	=	0.064 TBTU
Thermal and Mechanical in Existing Buildings	=	<u>0.116 TBTU</u>
TOTAL ENERGY SAVINGS OF ESP/INDUSTRIAL	=	0.268 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Square feet of Commercial and Public Buildings¹ in the eight states identified in the Mountain West Census Region are directly proportional to the populations of these states.
2. Savings for new, renovated and existing buildings from the Lighting Efficiency Standards and for new and renovated buildings for Thermal Efficiency Standards (FEA methodology) may be derived from establishing a proportion of the total savings acquired from these methodologies that represent the office space of Industrial Complexes, "share" of the overall savings.
3. The Industrial Complexes share can be established by determining the proportion of floor space used by offices of Industrial Complexes of the total amount of floor space in the New Mexico estimate of Commercial and Public Buildings.
4. Savings for existing buildings for Thermal Efficiency Standards may be derived by applying nationally recognized energy conservation non-residential building studies to the historical consumption of electricity, natural gas and propane used by Industrial Complexes.
5. Since energy conservation programs in Industrial Complexes will initially permeate those businesses that are economically affected by rising utility costs, it is assumed that participation will be only 50%.
6. Assume Industrial office space to be 5% of Offices & Banks from Table 2.

¹ Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

Calculations:

Determining Energy Saved in Increased Lighting Efficiency by Implementing ESP/Industrial Complexes

New Mexico Population	÷	Total Population of Eight States in Mountain West Region ¹	=	% of Population in New Mexico of Area Called Mountain West
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1106 (thousand)	÷	9150 (thousand)	=	12.09%
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% of Population in New Mexico of Area Called Mountain West	=	Proportion of Estimated Floor Area of Commercial and Public Buildings, 1970, Mountain West Region in New Mexico ^{2 & 3}
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12.09%	=	12.09%
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Table 2 is derived from Table 1 to determine the amount of estimated floor area in various non-residential building categories.

Total Savings from Lighting Efficiency Standards (See Appendix A, FEA methodology)	x	% of Floor Area for Industrial Complexes ⁴	=	SAVINGS FROM INDUSTRIAL COMPLEXES FOR LIGHTING EFFICIENCY
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1.765×10^{12}	x	0.050	=	0.088×10^{12} BTU
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¹U. S. Department of Commerce, Statistical Abstract of the United States.

²See Assumption 1.

³Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976,

⁴See Assumption 6.

Determining Energy Saved in Increased Thermal Efficiency by Implementing ESP/ INDUSTRIAL COMPLEXES.

New and Renovated Structures

1974 Commercial Consumption	÷	1974 Total Consumption for Commercial and Residential	=	% of Consumption in Commercial Buildings
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50.0 TBTU	÷	92.2 TBTU	=	54.2%
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% of Consumption in Commercial Buildings	=	% of Savings in Commercial Buildings ²
--	---	---

54.2%	=	54.2%
-------	---	-------

Table 1

**ESTIMATED FLOOR AREA OF U.S. COMMERCIAL AND PUBLIC BUILDINGS
AT BEGINNING OF 1970**

(Millions of square feet)

REGION	Stores	Offices & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
<u>Northeast</u>								
New England	228	221	44	75	461	91	151	1,271
Middle Atlantic	660	605	150	204	1244	256	483	3,602
<u>North Central</u>								
East North Central	792	733	370	248	1186	351	1000	4,680
West North Central	249	236	117	80	377	112	315	1,486
<u>South</u>								
South Atlantic	668	626	187	210	732	215	594	3,232
East South Central	170	156	58	53	184	54	170	845
West South Central	396	366	105	125	430	127	339	1,888
<u>West</u>								
Mountain	172	158	77	54	189	51	189	890
Pacific	783	730	355	247	846	235	858	4,054
UNITED STATES TOTAL	4,118	3,831	1,463	1,296	5,649	1,492	4,099	21,948

Source: Rand Corporation, Energy Conservation in Non-Residential Buildings, October, 1976.

Table 2
ESTIMATED FLOOR AREA OF NEW MEXICO COMMERCIAL AND
PUBLIC BUILDINGS AT BEGINNING OF 1970
(Millions of square feet)

	Stores	Offices ³ & Banks	Hotels	Garages	Schools	Hospitals	Public & Other	TOTAL
West								
Mountain ¹	172	158	77	54	189	51	189	890
New Mexico ²	20.8	19.1	9.3	6.5	22.9	6.2	22.9	107.7
Percent of N.M. Building Floor Space/Category	19.3%	17.7%	8.6%	6.0%	21.3%	5.8%	21.3%	100.0%

¹From Table 1.

²12.09 Percent of the Mountain-West figures.

³12.7% or 13.7 million square feet allotted to Commercial ESP; 5.0% or 5.4 million square feet allotted to Industrial ESP.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE:: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

Total Savings from Thermal Efficiency Standards (See Appendix B, FEA methodology)	X	% of Total Savings for Commercial Buildings	=	Savings from Commercial Buildings
2.35×10^{12} BTU	X	0.542	=	1.27×10^{12} BTU
Savings from Commercial Buildings	X	% of Floor Area for Industrial Complexes ³	=	FOR THERMAL EFFICIENCY IN NEW AND RENOVATED BUILDINGS
1.27×10^{12} BTU	X	0.050	=	0.064×10^{12} BTU

¹FEA Strawman Data, May, 1976.

²Assuming that a vigorous Building Code application would affect new and renovated structures equally in both the Commercial and Residential Sectors.

³ See Assumption 6.

Existing Structures

The annual energy consumption for conventional office buildings in the West is projected at 248,600 BTU/Sq.Ft. :

Annual Energy Consumption/Conventional Office Bldg.	X	Estimated Area of Industrial Offices ²	=	Annual Consumption of Industrial Offices
248,600 BTU/Sq.Ft.	x	955,000 Sq.Ft.	=	0.237×10^{12} BTU

Assuming that this total consumption should be distributed proportionally by energy source as in State Agencies³ :

<u>TYPE OF ENERGY</u>	<u>% DISTRIBUTION BY TYPE</u>	<u>ANNUAL BTU CONSUMPTION</u>
Electricity	3.5%	0.008×10^{12} BTU
Natural Gas	96.2%	0.228×10^{12} BTU
Propane	0.3%	0.001×10^{12} BTU

Rand Corporation estimates that at least 90 percent of non-residential energy conservation tactics can be accomplished without specific building design constraints, and that the following savings can be achieved per building:

45% electrical savings
54% fossil fuel savings

Applying the 90% factor most achievable to existing structures, these percentages of estimated savings become:

40.5% electrical savings
48.6% fossil fuel savings

To eliminate overlap of Lighting Program, subtract 12.6%⁴ from 40.5% = 27.9% electrical savings, excluding lighting.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

Estimated Energy Consumption for Industrial Complexes	x	% of Savings Possible/Energy Type	x	% of Compliance ¹	=	SAVINGS PER TYPE FOR EXISTING INDUSTRIAL COMPLEXES
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Electricity

$$0.008 \times 10^{12} \text{ BTU} \quad \times \quad 0.279 \quad \times \quad 0.500 \quad = \quad 0.001 \times 10^{12} \text{ BTU}$$

Natural Gas

$$0.228 \times 10^{12} \text{ BTU} \quad \times \quad 0.486 \quad \times \quad 0.500 \quad = \quad 0.055 \times 10^{12} \text{ BTU}$$

Propane

$$0.001 \times 10^{12} \text{ BTU} \quad \times \quad 0.486 \quad \times \quad 0.500 \quad = \quad 0.0002 \times 10^{12} \text{ BTU}$$

TOTAL SAVINGS FROM EXISTING INDUSTRIAL COMPLEXES FOR
THERMAL EFFICIENCY = $0.056 \times 10^{12} \text{ BTU}$

¹Table III-5, An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

²See Table 2, assuming 5% of Offices & Banks.

³From historic consumption data 1973-1975 gathered by the Energy Resources Board, State of New Mexico, 1976.

⁴Figure V-1, "1970 Energy Demand by End Use," An Impact Assessment of ASHRAE 90-75 Standards, FEA Conservation Paper #43B.

⁵Assuming 50% compliance.

Determining Energy Saved with Primary Energy Resources through Reduction in Demand by ESP/INDUSTRIAL COMPLEXES

Reduced Non-Electrical Demand

Total BTU Fossil Fuel
Saved by 1980 through
ESP/Industrial Complexes

÷

Heating
Plant
Efficiency

= BTU SAVED PER
PRIMARY ENERGY
SOURCE FOR
HEATING/COOLING

(See chart below.)

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

Energy Source	End Use BTU's Saved	Heating Plant Efficiency	Total BTU's Primary and End Use
Natural Gas	0.055×10^{12}	0.6	0.092×10^{12}
Propane	0.0002×10^{12}	0.5	0.0004×10^{12}

TOTAL OF PRIMARY FUEL SAVINGS FOR NATURAL GAS AND
PROPANE IN EXISTING BUILDINGS = 0.092×10^{12}

Reduced Electrical Demand

$$0.001 \times 10^{12} \text{ BTU} \div 3413 \text{ BTU/KWH} = 292,997 \text{ KWH Saved of End Use Energy}$$

Total KWH Electricity
Saved by 1980 through
ESP/Industrial
Complexes

X % of Power
Generated by
Type of Generation¹

= KWH Saved by Type
of Generation

292,997	KWH X 0.1% Gas-fired Gas Turbine	=	293	KWH
292,997	KWH X 0.3% Oil-fired Gas Turbine	=	879	KWH
292,997	KWH X 23.2% Gas-fired Steam Turbine	=	67,975	KWH
292,997	KWH X 72.6% Oil-fired Steam Turbine	=	212,716	KWH
292,997	KWH X 3.8% Coal-fired Steam Turbine	=	11,134	KWH

KWH Saved by Type of Generation	Conversion Factor X per Type of Fuel	=	Amount of Primary Fuel Saved	
68,268	KWH in Natural Gas X 10.4 Cu.Ft./KWH	=	709,987	Cu.Ft.
213,598	KWH in Oil X 0.076 Gallons/KWH	=	16,233	Gallons
11,134	KWH in Coal X 0.88 Pounds/KWH	=	9,798	Pounds

Unit of Primary
Energy Source

X Conversion Factor
to BTU's

= BTU Saved/Source of
Fuel for Generation

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM/INDUSTRIAL COMPLEXES

<u>710.0</u>	MCF of Natural Gas X 1,000,000 BTU/MCF	=	<u>0.001</u>	x	10^{12}	BTU
<u>16,233</u>	Gallons of Oil X 140,000 BTU/Gallon	=	<u>0.023</u>	x	10^{12}	BTU
<u>4.9</u>	Tons of Coal x (26.2 x 10^6) BTU/Ton	=	<u>0.0001</u>	x	10^{12}	BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 0.024 x 10^{12} BTU

Primary Fuel Savings for Natural Gas and Propane, = 0.092 x 10^{12} BTU
Primary Fuel Savings for Electricity = 0.024 x 10^{12} BTU

PRIMARY FUEL ENERGY SAVINGS FROM THERMAL AND
MECHANICAL IN EXISTING BUILDINGS= 0.116 x 10^{12} BTU

¹ Derived by determining the total BTU's of any energy source used in the generators producing electricity for sale within the state from the 1975 Annual Reports of major electrical companies to the Public Service Commission, State of New Mexico.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ENERGY SAVINGS PROGRAM (ESP)/INDUSTRIAL

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: ESP - Industrial

YEAR: 1978

	FEA		NON-FEA	TOTAL	FEA				
	EPCA (Base)	ECPA (Supp.)			Other	NMERE	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$5,000	\$5,000		\$5,000 ⁽¹⁾			
OTHER	*	**							
Total Direct	-	-	\$5,000	\$5,000		\$5,000			
Indirect									
TOTAL BUDGET	-	-	\$5,000	\$5,000		\$5,000			

* - Refer to Administrative Package,
2.0% of EPCA Budget

(1) Fees-Audits

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

In New Mexico, the transportation sector accounts for 43 per cent of all energy consumed in the state, with the greatest consumption attributed to vehicular traffic.¹ Major contributing factors to this high consumption are sparse population, vast distances between population centers, and poor or non-existent mass transportation systems. The state's population of 1.2 million is spread out over 121,666 square miles, requiring that many residents commute relatively long distances for business and employment, and often these commuters travel as individuals or in small groups to reach their destinations.

Opportunities for creation or expansion of mass transit systems in New Mexico cities are limited outside of Albuquerque where roughly one-fourth of the state's population resides. The next largest urban centers in New Mexico are Santa Fe, Las Cruces, Roswell, Farmington, Carlsbad, Alamogordo, Hobbs, Clovis and Gallup--all with populations between 22,500 and 48,000.² City bus lines meet some public transportation needs within some of these cities, but low populations generally do not justify expansion of intra-city transportation systems.

The major vehicular energy consumption does not occur in the intra-city distances in New Mexico, but rather in the distances travelled between urban centers. Also, existing intra-urban transit systems can not adequately meet the needs of commuters needing to travel relatively long distances daily within an urban area. Thus, carpooling and vanpooling by persons needing to travel from home to work on a regular basis, offer the greatest opportunities for energy savings in the transportation sector in New Mexico.

The New Mexico Energy Resources Board, Conservation Division, has been instrumental in developing a number of programs designed to assist commuters in New Mexico. Under contract with the ERB, the Energy Institute at the University of New Mexico, has completed a study of all long-distance commuting situations in the state to determine the number and needs of persons who must travel 15 miles or more daily to reach their place of employment and the Energy Resources Board, Conservation Division, has begun an active program to assist citizens throughout the state in setting up vanpooling programs which can serve long-distance commuting situations.

In 1978, the Energy Resources Board, Conservation Division, will prepare legislation for consideration by the New Mexico State Legislature to facilitate vanpooling programs by providing protective regulations for

1. New Mexico Energy Resources Board, "A State Energy Plan for New Mexico," January, 1977.
2. New Mexico Department of Development, Community Profiles, June 30, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

"share expense carriers". Essentially such legislation would exempt non-profit vanpooling groups from the restrictive regulations applied to licensed common carriers, and would insure that "share expense carrier" vehicles are properly maintained and that adequate insurance coverage is provided for passengers.

Under the proposed legislation, a person who is not engaged in furnishing transportation as a business, could provide transportation for 10 or more passengers to and from work, at cost. The owner of the vehicle would apply to the State Corporation Commission for a "share expense carrier" permit for a \$15.00 fee, and would provide a surety bond or insurance policy at the required level.

Hopefully, the "share expense carrier" legislation will encourage more commuter groups to form non-profit corporations to buy or lease vans, or otherwise pool resources, to commute to and from places of employment. Such action would not only save money for individual commuters, but would sizeably reduce energy consumption in the transportation sector in New Mexico.

State Employees Commuter Association (SECA)

In 1975, after establishing a quasi-cabinet form of government for the State of New Mexico, Governor Jerry Apodaca asked his Secretary of Transportation to investigate the possibility of providing better commuter transportation for the large numbers of residents who travel considerable distances to and from work. The first program was to be aimed at state employees who commute daily to Santa Fe, the State Capitol.

Under the direction of Mr. Jerry Manzagol, Secretary of Transportation, an ad-hoc committee was formed to study the feasibility of establishing a commuter service for state employees. Representatives of the State Highway Department, State Motor Transportation Pool, State Department of Finance and Administration, State Planning Office, State Motor Vehicle Department, and the New Mexico Energy Resources Board, Conservation Division, served on the committee.

With assistance from the State Personnel Office, the committee obtained a list of all state employees whose work addresses differed substantially from their home addresses. It was determined that 286 state employees lived in Albuquerque and worked in Santa Fe, a daily commuting distance of approximately 120 miles round-trip. In addition, there were more than 350 other state employees who worked in Santa Fe, but lived elsewhere, mainly in the Espanola Valley, a daily round-trip of approximately 60 miles, and Las Vegas, a daily round-trip of approximately 130 miles.

A series of meetings of these commuters resulted in the formation of the New Mexico State Employees Commuter Association, Inc. (SECA), a non-profit

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

organization exempted from the state's common carrier law. SECA's primary goal was to promote more efficient methods of transportation for state employee commuters.

During 1975, SECA obtained loans from the State Employees Credit Union to lease four 15-passenger vans. Three of the vans were used between Albuquerque and Santa Fe, and one van travelled from Espanola to Santa Fe where it unloaded its 15 passengers and picked up another group of riders to take them to the State Penitentiary, about 15 miles from Santa Fe.

Fares were established at \$2.00 per day between Albuquerque and Santa Fe, \$1.50 per day between Espanola and Santa Fe, and \$.75 per day between Santa Fe and the State Penitentiary. The fares are collected through a payroll deduction plan, and new SECA members are required to pay an initial \$10.00 membership fee for joining the Association.

During SECA's first year of operation, the passenger vans travelling from Albuquerque to Santa Fe were filled to capacity almost every day. By March 1, 1977, enough commuter names were placed on a waiting list to justify the lease or purchase of at least one additional van.

It is important to note that publicity and promotion of the SECA vanpooling program has been minimal due to the volunteer nature of SECA's structure. It is believed that aggressive publicity and promotion of the SECA vanpooling program through the State Personnel and Payroll offices, could greatly increase this number, as the total of state employees who now commute daily to Santa Fe is in excess of 600.

During 1977, a federal grant from the U.S. Department of Transportation enabled the purchase of six 15-passenger vans through a no-interest loan made to SECA. The six new vans replaced the vans leased by SECA. The federal DOT funds will be channeled through the New Mexico State Highway Department for a four year period (1977-1980). The State Highway Department will subcontract with the Energy Resources Board, Conservation Division, for administration of the program, with the Energy Resources Board handling promotion and publicity, loan repayment, and monitoring of energy savings. Because of the interest generated through this federal financing, the State Highway Department has set aside \$100,000 per year for the purpose of providing 90 percent no interest loans for the purchase of vans.

If needed, additional passenger vans can be made available to SECA for purchase each year for the next three years. It was previously estimated that a total of 12 state employee commuter vans would be in operation by 1980. However, the State Employees Commuter Association has informed the ERB Conservation Division that they have a need for an additional 10-15 vans in 1978 alone. At this point we cannot calculate energy savings as the

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

precise number and routes are unknown. These additional vans will, however, be acknowledged in our quarterly reports to the Department of Energy.

Promotion of State Employee Car and Vanpooling

In the capital city of Santa Fe, which has a resident population of 48,000, State government is easily the largest employer, with approximately 8,000 state employees travelling to state offices in the city daily. Some portion of out-of-town commuters travel in carpools or vanpools, but the vast majority of local employees drive their own vehicles to and from work. Because of the unique street patterns in the quaint, historic city of Santa Fe--more famed as an artist colony than as the seat of State government--the daily rush to state employee traffic creates monumental problems of congestion along the city's narrow, curving streets. Coupled with the fact that parking space is severely limited at, or near, many state agency office buildings, the City of Santa Fe could benefit greatly from the implementation of state employee car and vanpooling by local residents as well as long-distance commuters.

During 1977, the New Mexico State Highway Department conducted an in-depth study of state employee travel to and from places of employment in Santa Fe. Information regarding the location of residence and place of employment for each state employee working in Santa Fe was extracted from State Personnel records. (This information will be used in a transit feasibility study.) The Energy Resources Board, Conservation Division, will follow up with a survey of these employees to determine the potential for car and vanpooling among them.

Simultaneously, the Energy Resources Board, Conservation Division, State Highway Department, and City of Santa Fe traffic planners will conduct a study of Santa Fe's street/load factors traffic patterns, and parking facilities near state agency office buildings in order to make recommendations for improvements in the present system.

From 1978-1980, the Energy Resources Board, Conservation Division, working in cooperation with the Governor's office, will exert an effort to promote car and vanpooling among all state employees who work in Santa Fe. Among incentives under consideration for implementation are preferential parking, adjusted work hours to alleviate the heavy traffic flow at 8 a.m. and 5 p.m. and a four-day work week where feasible. Staggered work hours are already in effect at one major state agency.

The Energy Resources Board, Conservation Division, also will assist with the development of a soft-match system, such as a "locator board" displayed in the State Capitol complex to help state employees with determining carpooling and vanpooling possibilities by linking them up with other state employees

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

who live near their homes.

The State Employees Car and Vanpooling program will be promoted during 1978-1980 through a publicity campaign, including such items as the insertion of informational flyers into bi-weekly paychecks to remind state employees of the locator board and SECA vanpools and the printing of an informative brochure on the car and vanpooling systems. Dissemination of this information will become a part of each new state employee's orientation program.

State Motor Pool Program

Shuttle Van System:

State government in New Mexico, the largest single non-federal employer, can make a significant contribution to energy conservation by increasing the efficiency of transporting state employees to locations to conduct state business. In a survey conducted in August, 1975, by a special state ad-hoc transportation committee, it was learned that 484 passengers travelled in 332 vehicles from Santa Fe to Albuquerque and back to Santa Fe each week, a distance of approximately 120 miles.³

On the average, more than two-thirds of those state employees departing from Santa Fe for Albuquerque (337 persons), left between the hours of 6 and 10 a.m. More than half of those state employees returning to Santa Fe from Albuquerque (217 persons) travelled between the hours of 2 and 6 p.m.

To reduce the number of individual trips made along this heavily travelled route, the Energy Resources Board, Conservation Division, proposed development of a passenger van shuttle system to transport state employees on official business from Santa Fe to Albuquerque and back to Santa Fe, or vice-versa. During 1975, the ad-hoc transportation committee prepared a report on the feasibility of such a service and made recommendations for the implementation of a State Motor Pool shuttle system.

Implementation of the initial shuttle system between Santa Fe and Albuquerque on November 1, 1977, required the purchase of four 15-passenger vans by the State Motor Transportation Pool. Departing from Santa Fe, the shuttle vans deliver state employee passengers to a "mini-motor-pool" located at the State Highway Department's District III headquarters in Albuquerque. From there, state employee passengers may check out a state passenger vehicle to conduct their business in the City of Albuquerque. When finished, they will drive back to the mini-motor pool to board a return shuttle van to Santa Fe.

³"Shuttle Van/Mini Pool Proposal," prepared by the Ad-Hoc Committee Investigating the Feasibility of Commuter and Shuttle Service for State Employees," Jerry Manzagol, Secretary for Transportation, Chairman, 1975.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

Conversely, state employees originating in Albuquerque and riding the shuttle van to Santa Fe to conduct business, will check out a state car from the State Motor Pool in Santa Fe if necessary. They will return the car before boarding the shuttle van back to Albuquerque.

Initially the system requires the addition of 24 state passenger vehicles to the District III motor pool in order to accommodate the shuttle van passengers needing local transportation upon arrival in Albuquerque.

In order to best serve the majority of state employees travelling between Santa Fe and Albuquerque, the following schedule has been implemented initially by the four 15-passenger vans travelling between the two locations.

Monday through Friday:

<u>VAN</u>	<u>DEPART SANTA FE</u>	<u>ARRIVE ALBUQ.</u>	<u>DEPART ALBUQ.</u>	<u>ARRIVE SANTA FE</u>
#1	6:45 a.m.	8:00 a.m.	1:00 p.m.	2:30 p.m.
#2	8:00 a.m.	9:30 a.m.	3:00 p.m.	4:30 p.m.
#3	9:00 a.m.	10:30 a.m.	4:00 p.m.	5:30 p.m.
#4	10:00 a.m.	11:30 a.m.	5:30 p.m.	6:30 p.m.

The establishment of this initial schedule for departure and return of the four shuttle vans was based on the assumption that 50 percent of the state employees normally travelling between Albuquerque and Santa Fe at, or near, these times would ride the shuttles. That is, according to the ad-hoc transportation committee's study, an average of 67 persons depart from Santa Fe for Albuquerque between 6 a.m. and 10 a.m. daily.

Similarly, the return schedule for the four shuttle vans would accommodate the large number of people who return to Santa Fe from Albuquerque during the afternoon hours.

According to the ad-hoc transportation committee's study, an average of 70 state employees travel to Santa Fe from Albuquerque daily between noon and 9 p.m. Between 1-5:30 p.m.--the hours when the shuttle vans will return to Santa Fe--an average of 50 state employees travel from Albuquerque to Santa Fe daily. Space provided on the four shuttle vans will easily accommodate half or more of these persons.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

Implementation of the Shuttle Van/Mini Pool system will require cooperation from all state agencies involved, to schedule their business meetings, conferences and other assignments to coincide with the shuttle van departure schedule whenever possible, including the allowance of time to check out a state passenger vehicle from the motor pool in order to reach their ultimate destination within the city.

As the program gains acceptance, more shuttle vans will be added, and/or at least two of the initial four vans will make an additional round-trip between the two cities each day.

The shuttle system will produce additional side benefits in addition to reducing energy consumption by state agencies: it will provide significant cost-savings in vehicle maintenance and fuel; it will provide a reliable inter-city, inter-agency mail delivery system with same-day service; it will alleviate traffic congestion in the City of Albuquerque; and it will reduce air pollution.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

Expanded Car and Vanpooling Pilots

The Energy Resources Board, Conservation Division, foresees an important future for car and vanpools in the State of New Mexico, as there are many long distance commuting situations in the state. These situations will be identified and quantified during 1977 through a statewide study being conducted by the Energy Institute at the University of New Mexico, plus information gathered by the State Highway Department's transit studies of municipalities, and the City of Albuquerque's analyses of commuters moving within the Standard Metropolitan Statistical Area (SMSA) of Albuquerque. When this information becomes available, the ERB's transportation planner will meet with various employers and employee groups to set priorities for the initiation of car and vanpooling operations.

Car/Vanpools to a Particular Location:

Some of the private industry, public agency, and institutes of higher learning locations having car and vanpooling potential in the state include:

<u>Company/Agency</u>	<u>Location</u>
Amax Chemical Corporation	Near Carlsbad
Anaconda Company, Inc.	Near Grants
Dynallectron Corporation	Holloman Air Force Base, near Alamogordo
Hanes Corporation	Mesilla Park, south of Las Cruces
Ideal Basic Industries, Inc.	Minesite near Carlsbad
International Mineral & Chemical	Minesite near Carlsbad
Kaiser Steel Corporation	York Canyon, near Raton
Kennecott Copper Corporation	Hurley, near Silver City
Kerr-McGee Chemical Corporation	Carlsbad Highway, near Hobbs
Kerr-McGee Corporation	Ambrosia Lake, near Grants
Molycorp, Inc.	Lower Red River Canyon, near Questa
Phelps Dodge Corporation	Tyrone, near Silver City
United Nuclear Corporation	Ambrosia Lake, near Grants
United Nuclear-Homestake Partners	Near Grants
Utah International, Inc.	Fruitland, near Farmington
UV Industries, Inc.	Hanover, near Silver City
General Electric Company	Southeast Albuquerque
GTE Lenkurt, Inc. (General Telephone and Electronics) -two plants	Northeast Albuquerque and Rio Rio Rancho Estates
Digital Company	Northeast Albuquerque
Spartan Southwest, Inc.	Northwest Albuquerque
Levi Strauss & Company	Northeast Albuquerque
City of Albuquerque	Downtown Albuquerque
Kirtland Air Force Base	Southeast Albuquerque
Sandia Laboratory	Southeast Albuquerque
Holloman Air Force Base	West of Alamogordo
Los Alamos Scientific Laboratory	Los Alamos
White Sands Missile Range	Between Alamogordo & Las Cruces

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

Another sector presenting opportunities for car and vanpooling are institutions of higher learning in New Mexico. Their unique populations (teaching staff, administrative staff, and students) who must travel some distance daily to reach a common destination, coupled with limited parking facilities available on most campuses, offer good arguments in favor of ride-sharing programs. Some of these institutions include:

Eastern New Mexico University	Portales
New Mexico Highlands University	Las Vegas
New Mexico Institute of Mining and Technology	Socorro
New Mexico State University	Las Cruces
Western New Mexico University	Silver City
University of New Mexico	Albuquerque

Employer-Organized:

The Energy Resources Board, Conservation Division encourages and offers technical assistance to private industry and governmental agencies to initiate car and vanpooling operations for their employees. Such programs might be modeled after the 3-M Company's vanpooling operation in St. Paul, Minnesota. 3-M Company furnishes the vans; pays for gas, oil, maintenance and insurance; and agrees to help each Pool Coordinator (a driver/employee) form and maintain a minimum of eight passengers in his pool. Fares paid to the company from the eight passengers are based on van purchase price and operating costs.

Possibilities for similar vanpooling operations among private businesses with large numbers of employees in New Mexico were explored during a national vanpooling workshop cosponsored by the Energy Resources Board, Conservation Division, and the Federal Energy Administration in Albuquerque on June 10, 1977. The conference will be followed up by technical assistance from the Energy Resources Board, Conservation Division, through 1980. The ERB Conservation Division sponsored several workshops in 1976, utilizing Robert Owens of 3-M Company as the workshop leader.

The Energy Resources Board, Conservation Division has set a goal of 30 employer-organized vanpooling operations by 1980.

Employee-Organized:

The Energy Resources Board, Conservation Division, will offer technical assistance for the formation of non-profit commuter groups for commuters who originate in proximate locations and commute to a particular location where their employer/agency is not providing car and vanpooling services and mass transit services are inadequate to meet the needs of these commuters.

Such technical assistance may take the form of developing "matching"

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

OVERVIEW:

techniques, operational guidance, funding assistance, or help in obtaining suitable insurance or non-profit group status. Such groups may be initiated, if feasible, under the 1977-78 Department of Transportation and State Highway Department pilot vanpooling project to be administered by the Energy Resources Board, Conservation Division, or through an expanded version of this pilot program.

The ERB Conservation Division has set a goal of 50 employee-organized vanpooling operations by 1980.

Commuter-Organized Vanpools to Locations in Proximity:

The Energy Resources Board, Conservation Division, will offer assistance to individual commuters whose daily travel originates in the same town to different places of employment in proximity to each other. For example, many residents of the Village of Corrales (15 miles from downtown Albuquerque) and nearby Rio Rancho Estates, commute daily to downtown Albuquerque for employment with a variety of business concerns. There are numerous other similar situations of this type throughout the state.

Assistance from the ERB Conservation Division may take the form of developing "matching" techniques through town meetings, operational guidance, funding assistance, or help in obtaining insurance or non-profit group status. Such groups may be initiated, if feasible, under the 1977-78 Department of Transportation and State Highway Department pilot vanpooling project to be administered by the ERB Conservation Division, or under an expanded version of this pilot operation and other emerging financial strategies.

The ERB Conservation Division has set a goal of 20 commuter-organized vanpool operations to locations in proximity by 1980.

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

TOTAL ENERGY SAVINGS FROM PROGRAM

<u>State Employee Commuter Association</u>	-----	0.024 x 10 ¹² BTU
Albuquerque to Santa Fe	-----	0.020 x 10 ¹² BTU
El Rancho to Santa Fe	-----	0.001 x 10 ¹² BTU
Las Vegas to Santa Fe	-----	0.003 x 10 ¹² BTU
<u>Promotion of State Employee Car and Vanpooling</u>	-----	0.021 x 10 ¹² BTU
Carpools	-----	0.015 x 10 ¹² BTU
Vanpools	-----	0.006 x 10 ¹² BTU
<u>State Motor Pool</u>	-----	0.014 x 10 ¹² BTU
<u>Expanded Vanpooling Pilots</u>	-----	0.043 x 10 ¹² BTU
Employer-Organized Vanpools to a Particular Location	0.013 x 10 ¹² BTU	
Commuter-Organized Vanpools to a Particular Location	0.021 x 10 ¹² BTU	
Commuter-Organized Vanpools to Locations in Proximity	0.009 x 10 ¹² BTU	

TOTAL ENERGY SAVINGS FROM PROGRAMS TO PROMOTE CAR AND
VANPOOLING AND PUBLIC TRANSPORTATION = 0.102 x 10¹² BTU

Although energy savings from various transportation strategies have been grouped together under this methodology and budget to show the strength of the transportation initiatives, certain components more properly belong in the Energy Management Programs for State Agencies, Public Schools and County and Municipal Governments. Consequently, in order to avoid duplication in total energy savings and environmental impact assessments in the overall program, the total savings of this program has been distributed as follows:

Energy Management Program-State Agencies	= 0.0514 TBTU
Energy Management Program-Public Schools	= 0.0140 TBTU
Energy Management Program-County & Municipal Governments	= 0.0110 TBTU

The remaining savings, 0.018 TBTU, may be attributed to employees and/or employers in private business. Therefore, the environmental impact assessment included in this program is based only on this savings (the other components being addressed in their appropriate EMP's).

TOTAL ENERGY SAVINGS DIRECTLY ATTRIBUTED TO THIS PROGRAM = 0.026 x 10¹² BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR SECA - Albuquerque to Santa Fe and Embudo to Santa Fe

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length	÷	Average Commuter Auto MPG ¹	=	Gallons/Day Consumed by Average Commuter Auto
130 miles/day	÷	12.0 MPG	=	10.83 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate ²	=	Number of Autos Replaced by a Vanpool
15 Persons/Van	÷	2.2 Persons/Auto	=	7 Autos (rounded up to the nearest whole person)/Van
Gallons/Day Consumed by Average Commuter Auto	X	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
10.83 gal/day	X	7 Autos	=	75.81 gal/day

Calculating Gallons/Day Consumed with a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG ³	=	Gallons/Day Consumed by Average Commuter Van with Program
130 miles/day	÷	9.5 MPG	=	13.68 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	—	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
75.81 gal/day	—	13.68 gal/day	=	62.13 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	X	Number of Vanpools	X	Conversion Factor Gal/Day to BTU/Yr.	=	Yearly Savings for Vanpool Program
62.13 gal/day	X	10 vans	X	3.1×10^{-5}	=	$.020 \times 10^{12}$ BTU

¹Table II B, FEA Methodology, Source Book, p. 113

²New Mexico State Highway Department Survey, 1976.

³Table A, FEA Methodology, Source Book, p. 108

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR SECA - El Rancho to Santa Fe

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length	÷	Average Commuter Auto MPG ¹	=	Gallons/Day Consumed by Average Commuter Auto
70 miles/day	÷	12.0 MPG	=	5.83 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate ²	=	Number of Autos Replaced by a Vanpool
15 Persons/Van	÷	2.2 Persons/Auto	=	7 Autos (rounded up to the nearest whole person)/Van
Gallons/Day Consumed by Average Commuter Auto	X	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
5.83 gal/day	X	7 Autos	=	40.81 gal/day

Calculating Gallons/Day Consumed with a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG ³	=	Gallons/Day Consumed by Average Commuter Van with Program
70 miles/day	÷	9.5 MPG	=	7.37 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
40.81 gal/day	-	7.37 gal/day	=	33.44 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	X	Number of Vanpools	X	Conversion Factor Gal/Day to TBTU/Yr.	=	Yearly Savings for Vanpool Program
33.44 gal/day	X	1 van	X	3.1×10^{-5}	=	$.001 \times 10^{12}$ BTU

¹Table II B, FEA Methodology, Source Book, p. 113

²New Mexico State Highway Department Survey, 1976.

³Table A, FEA Methodology, Source Book, p. 108

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR SECA - Las Vegas to Santa Fe

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length	÷	Average Commuter Auto MPG ¹	=	Gallons/Day Consumed by Average Commuter Auto
130 miles/day	÷	12.0 MPG	=	10.83 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate ²	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	2.2 Persons/Auto	=	6 Autos (rounded up to the Nearest Whole Person)/Van
Gallons/Day Consumed by Average Commuter Auto	x	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
10.83 gal/day	x	6 Autos	=	64.98 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG ³	=	Gallons/Day Consumed by Aver- age Commuter Van with Program
130 miles/day	÷	9.5 MPG	=	13.68 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
64.98 gal/day	-	13.68 gal/day	=	51.30 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	x	Number of Vanpools	x	Conversion Factor Gal/Day to TBTU/Yr.	=	Yearly Savings for Vanpool Program
51.30 gal/day	x	2 vans	x	3.1×10^5	=	0.003×10^{12} BTU

¹Table II B, FEA Methodology, Source Book, p. 113.

²New Mexico State Highway Department Survey, 1976.

³Table A, FEA Methodology, Source Book, p. 108.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR Promotion of State Employee Car & Vanpooling/Carpools

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

$$\begin{array}{llll} \text{Average Commuter} & \div & \text{Average Commuter} & = & \text{Gallons/Day Consumed by} \\ \text{Trip Length}^1 & & \text{Auto MPG}^2 & & \text{Average Commuter Auto} \\ 14.8 \text{ miles/day} & \div & 12.0 \text{ MPG} & = & 1.23 \text{ gal/day} \\ \\ \text{Average Number of} & \div & \text{Average Commuter} & = & \text{Number of Autos Replaced} \\ \text{Commuters/Carpool} & & \text{Auto Occupancy Rate}^3 & & \text{by a Carpool} \\ 4 \text{ Persons/Carpool} & \div & 1.5 \text{ Persons/Auto} & = & 3 \text{ Autos (rounded up to the} \\ & & & & \text{Nearest Whole Person)/Carpool} \\ \\ \text{Gallons/Day Consumed by} & \times & \text{Number of Commuter} & = & \text{Gallons/Day Consumed for} \\ \text{Average Commuter Auto} & & \text{Autos Without Program} & & \text{Commuting Without Program} \\ 1.23 \text{ gal/day} & \times & 3 \text{ Autos} & = & 3.69 \text{ gal/day} \end{array}$$

Calculating Gallons/Day Consumed With a Transportation Program

$$\begin{array}{llll} \text{Average Carpool} & \div & \text{Average Carpool} & = & \text{Gallons/Day Consumed by Aver-} \\ \text{Trip Length}^4 & & \text{MPG} & & \text{age Commuter Carpool with Program} \\ 15.0 \text{ miles/day} & \div & 12.0 \text{ MPG} & = & 1.25 \text{ gal/day} \end{array}$$

Calculating Savings Through Transportation Program

$$\begin{array}{llll} \text{Gallons/Day Consumed for} & - & \text{Gallons/Day Consumed for} & = & \text{Gallons/Day of Gasoline} \\ \text{Commuting Without Program} & & \text{Commuting With Program} & & \text{Saved by One Carpool} \\ 3.64 \text{ gal/day} & - & 1.25 \text{ gal/day} & = & 2.44 \text{ gal/day} \\ \\ \text{Gallons/Day of Gasoline} & \times & \text{Number of} & \times & \text{Conversion Factor} & = & \text{Yearly Savings for} \\ \text{Saved by One Carpool} & & \text{Carpools} & & \text{Gal/Day to TBTU/Yr.} & & \text{Carpool Program} \\ 2.44 \text{ gal/day} & \times & 200 \text{ Carpools} & \times & 3.1 \times 10^5 & = & 0.015 \times 10^{12} \text{ BTU} \end{array}$$

¹Table II A, FEA Methodology, Source Book, p. 113.

²Table II B, FEA Methodology, Source Book, p. 113.

³New Mexico State Highway Department Survey, 1976.

⁴Allowing for passenger pickup/discharge in a neighborhood.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR Promotion of State Employee Car and Vanpooling/Vanpools

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length ¹	÷	Average Commuter Auto MPG ²	=	Gallons/Day Consumed by Average Commuter Auto
14.8 miles/day	÷	12.0 MPG	=	1.23 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate ³	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	2.0 Persons/Auto	=	6 Autos (rounded up to the Nearest Whole Person)/Van
Gallons/Day Consumed by Average Commuter Auto	x	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
1.23 gal/day	x	6 Autos	=	7.40 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length ⁴	÷	Average Vanpool MPG ⁵	=	Gallons/Day Consumed by Aver- age Commuter Van with Program
16.0 miles/day	÷	9.5 MPG	=	1.68 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
7.40 gal/day	-	1.68 gal/day	=	5.72 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	x	Number of Vanpools ⁶	x	Conversion Factor Gal/Day to BTU/Yr.	=	Yearly Savings for Vanpool Program
5.72 gal/day	x	33 vans	x	3.1×10^5	=	0.006×10^{12} BTU

¹Table II A, FEA Methodology, Source Book, p. 113.

²Table II B, FEA Methodology, Source Book, p. 113.

³New Mexico State Highway Department Survey, 1976.

Allowing for passenger pickup/discharge in a neighborhood.

⁵Table A, FEA Methodology, Source Book, p. 108.

⁶Assuming 5% participation of State employees in Santa Fe.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR Expanded Vanpooling Pilots - Employer-Organized to Particular Location

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length ¹	÷	Average Commuter Auto MPG	=	Gallons/Day Consumed by Average Commuter Auto
34.4 miles/day	÷	12.0 MPG	=	2.87 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	2.2 Persons/Auto	=	6 Autos (rounded up to the Nearest Whole Person)/Van
Gallons/Day Consumed by Average Commuter Auto	X	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
2.87 gal/day	x	6 Autos	=	17.22 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG	=	Gallons/Day Consumed by Average Commuter Van with Program
34.4 miles/day	÷	9.5 MPG	=	3.62 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
17.22 gal/day	-	3.62 gal/day	=	13.60 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	X	Number of Vanpools	X	Conversion Factor Gal/Day to TBTU/Yr.	=	Yearly Savings for Vanpool Program
13.60 gal/day	x	30 vans	x	3.1 x 10 ⁵	=	0.013 x 10 ¹² BTU

¹ Average roundtrip distance for pilot commuter situations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR Expanded Vanpooling Pilots - Commuter-Organized to Particular Location

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length	÷	Average Commuter Auto MPG	=	Gallons/Day Consumed by Average Commuter Auto
34.4 miles/day	÷	12.0 MPG	=	2.87 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	2.2 Persons/Auto	=	6 Autos (rounded up to the Nearest Whole Person)/Van
Gallons/Day Consumed by Average Commuter Auto	x	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
2.87 gal/day	x	6 Autos	=	17.22 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG	=	Gallons/Day Consumed by Aver- age Commuter Van with Program
34.4 miles/day	÷	9.5 MPG	=	3.62 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
17.22 gal/day	-	3.62 gal/day	=	13.60 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	X	Number of Vanpools	X	Conversion Factor Gal/Day to BTU/Yr.	=	Yearly Savings for Vanpool Program
13.60 gal/day	x	50 vans	x	3.1×10^5	=	0.021×10^{12} BTU

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR Expanded Vanpooling Pilots - Commuter-Organized to Proximate Locations

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length ¹	÷	Average Commuter Auto MPG	=	Gallons/Day Consumed by Average Commuter Auto
37.0 miles/day	÷	12.0MPG	=	3.08 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	2.2 Persons/Auto	=	6 Autos (rounded up to the Nearest Whole Person)/Van
Gallons/Day Consumed by Average Commuter Auto	x	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
3.08 gal/day	x	6 Autos	=	18.50 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG	=	Gallons/Day Consumed by Average Commuter Van with Program
37.0 miles/day	÷	9.5 MPG	=	3.89 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
18.50 gal/day	-	3.89 gal/day	=	14.61 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	x	Number of Vanpools	x	Conversion Factor Gal/Day to TBTU/Yr.	=	Yearly Savings for Vanpool Program
14.61 gal/day	x	20 vans	x	3.1×10^5	=	0.009×10^{12} BTU

¹Allowing for extra pickup/discharge in neighborhood.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROMOTION OF CAR AND VANPOOLING AND PUBLIC TRANSPORTATION

ENERGY SAVINGS WORKSHEET FOR State Motor Pool Mini-Shuttle

Calculating Gallons/Day Consumed for Commuting Without a Transportation Program

Average Commuter Trip Length	÷	Average Commuter Auto MPG ¹	=	Gallons/Day Consumed by Average Commuter Auto
130 miles/day	÷	12.0 MPG	=	10.83 gal/day
Average Number of Commuters per Van	÷	Average Commuter Auto Occupancy Rate ²	=	Number of Autos Replaced by a Vanpool
12 Persons/Van	÷	1.5 Persons/Auto	=	8 Autos (rounded to Nearest Whole Number)/Van
Gallons/Day Consumed by Average Commuter Auto	x	Number of Commuter Autos Without Program	=	Gallons/Day Consumed for Commuting Without Program
10.83 gal/day	x	8 Autos	=	84.64 gal/day

Calculating Gallons/Day Consumed With a Transportation Program

Average Vanpool Trip Length	÷	Average Vanpool MPG ³	=	Gallons/Day Consumed by Aver- age Commuter Van with Program
130 miles/day	÷	9.5 MPG	=	13.68 gal/day

Calculating Savings Through Transportation Program

Gallons/Day Consumed for Commuting Without Program	-	Gallons/Day Consumed for Commuting With Program	=	Gallons/Day of Gasoline Saved by One Vanpool		
86.64 gal/day	-	13.68 gal/day	=	72.96 gal/day		
Gallons/Day of Gasoline Saved by One Vanpool	x	Number of Vanpools Trips	x	Conversion Factor Gal/Day to TBTU/Yr.	=	Yearly Savings for Vanpool Program
72.96 gal/day	x	6 vans	x	3.1×10^{-5}	=	0.014×10^{12} BTU

¹Table II B, FEA Methodology, Source Book, p. 113.

²New Mexico State Highway Department Survey, 1976.

³Table A, FEA Methodology, Source Book, p. 108.

PROGRAM MEASURE: Van/car Pools

YEAR: 1978

	EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	x	xx							
FRINGE BENEFITS	x	xx							
TRAVEL	x	xx							
EQUIPMENT			\$115,000	\$115,000		(1)		\$100,000	
SUPPLIES	x	xx							
CONTRACTUAL	\$ 7860 - carryover 20000	-	-	\$27,860					
OTHER	x	xx							
Total Direct	\$27,860		115,000	\$142,860		15,000		100,000	
Indirect									
TOTAL BUDGET	\$27,860		115,000	\$142,860		15,000		100,000	

x - Refer to Administrative Package, 6.5% of EPCA Budget

xx - Refer to Administrative Package, 3.7% of ECPA Budget

(1) State Motor Pool

PROGRAM MEASURE: ESP - Hospitals

YEAR: 1978

	FEA		NON-FEA	TOTAL	FEA				
	EPCA (Base)	ECPA (Supp.)			Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL			\$111,000	\$111,000		\$11,000 (1)			
OTHER	*	**				\$100,000			
Total Direct	-	-	\$111,000	\$111,000		\$111,000			
Indirect									
TOTAL BUDGET	-	-	\$111,000	\$111,000		\$111,000			

* - Refer to Administrative Package,
9.0% of EPCA Budget

** - Refer to Administrative Package,
11.1% of ECPA Budget

(1) Fees-Audits

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROJECT 55

OVERVIEW:

In the winter of 1974, in face of the oil embargo by certain Middle Eastern and North African nations, the U.S. Congress enacted a number of measures related to the conservation and efficient use of fuel supplies. One of the highest-impact measures was the Federal-Aid Highway Amenaments Act of 1974, which denied federal highway funds to those states which did not lower speed limits to 55 mph on highways within federal jurisdiction.

By lowering the national speed limit, Congress felt that significant gas savings would result, thereby easing the strain on available fuel supplies. Estimates of the amount of savings vary, but a conservative estimate of the average energy savings would be one percent per MPH between 65 mph and 55 mph. Initially the lower speed limit achieved a high degree of compliance, both nationally and in New Mexico. More recently however, the 55 mph limit has been adhered to by significantly fewer drivers.

Project 55

"Project 55," implemented in 1976 and continuing through 1980, is New Mexico's program to encourage compliance with the national 55 mph speed limit.

Enforcement of the 55 mph limit is complicated in New Mexico by the fact that a relatively sparse population (1.2 million) is spread out over a vast geographical area (121,666 square miles). The combination of this low population, great distances between towns, and the lack of public transportation, contributes to a high privately-owned vehicle/population ratio. The state has approximately 67,500 miles of improved roads, travelled by about 1,000,000 New Mexico vehicles.¹

In late 1975 and early 1976, the New Mexico Energy Resources Board, Conservation Division, and the New Mexico Traffic Safety Commission, had a survey conducted to determine public attitudes and opinions on the 55 mph speed limit law. The telephone survey of approximately 1,000 New Mexico drivers was performed by the Bureau of Economic Research, Division of Government Research, at the University of New Mexico. Some of the major findings included:²

1. State Department of Motor Vehicles, 1977.
2. "The 55 MPH Speed Limit Law -- Public Attitudes and Opinions", Bureau of Business and Economic Research, Division of Government Research, Institute for Applied Research Services, University of New Mexico, Final Report, February 16, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROJECT 55

OVERVIEW:

- New Mexicans felt that resultant gas savings were not significant enough to compensate for the inconvenience of driving at 55 mph.
- Many of those who were driving gas-conserving, smaller cars felt the lower limit was inapplicable to them since they had already "done their share" for fuel conservation.
- Many drivers who travel great distances regularly (commuters) felt that unreasonable time restrictions were caused by the 55 mph limit.
- "Stricter enforcement" was the most frequently mentioned (43 percent of those interviewed) form of inducement for achieving compliance with the 55 mph speed limit.

On the basis of these and other responses, the ERB Conservation Division and the Traffic Safety Commission concluded that (1) a strict enforcement program must be set up for enforcement of the 55 mph law in New Mexico; and (2) that such an enforcement program must be prefaced by a public information program designed to increase the public's knowledge concerning the benefits of driving at 55 mph. The public information program should make New Mexicans aware of the continuing problem of the availability of fuel supplies and of the need for fuel conservation.

In early 1976, Phase I of "Project 55" began by incorporating public information programs and stricter enforcement of the law into one comprehensive policy. Under the coordination of the New Mexico Secretary for Transportation Project 55 represented the combined efforts of the ERB Conservation Division, Traffic Safety Commission, New Mexico Department of Motor Vehicles, New Mexico State Highway Department, New Mexico State Police, and the Governor's Council on Criminal Justice Planning.

During the first quarter of 1976 the State Police purchased \$81,000 worth of additional radar equipment utilizing Federal Highway Administration funds. An ongoing public information program, utilizing all news media outlets in the state, kept the public aware of the need for compliance with the 55 mph. speed limit law.

As a result of this concerted enforcement/information effort, the average speed on New Mexico's highways dropped to 57 mph during the second quarter of 1976. This reduction nearly matched the volunteer compliance triggered by the oil embargo in April, 1974.

Since mid-year, 1976, however, the average speed on New Mexico's

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PROJECT 55

OVERVIEW:

interstate rural highways and on roads statewide indicates a steady upward trend. During 1977, the average speed statewide was 57.6 mph.

In an attempt to reverse this upward trend and to achieve closer compliance with the 55 mph law statewide, the ERB Conservation Division, Traffic Safety Commission and other participating agencies have begun Phase II of "Project 55." A major feature of Phase II will be a statewide publicity and information campaign being made possible by a \$34,000 grant from the Traffic Safety Commission.

In June, 1978, the results of Phase II of Project 55 will be assessed. If compliance with the 55 mph speed limit law is still found to be unsatisfactory at that time, the participating planning and enforcement agencies will enter Phase III of Project 55.. Phase III will involve the State judicial system as part of the enforcement authority, and will consider changing the penalty system in New Mexico by instituting a point system. Under such a system, "points" may be issued against all drivers found to be exceeding the 55 mph speed limit. The penalty points may affect a driver's insurance coverage and driver's license renewal.

The overall objective of this program is to reduce the average statewide highway speed from the current speed of 57.6 mph to 55 mph.

PROGRAM ELEMENT: PROJECT 55

CALENDAR MILESTONES:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROJECT 55

ESTIMATED COST OF IMPLEMENTATION-

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

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STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PROJECT 55

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on New Mexico State Highway Department data and national estimates of the possible energy savings to be achieved by lowering the speed limit on highways to 55 MPH.

TOTAL ENERGY SAVINGS FROM PROJECT 55 BY 1980 = 4.192 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. FEA Strawman Data Series has accurately forecasted the energy consumption of motor gasoline for the Transportation Sector and future economic patterns in the pricing of gasoline will not significantly change this prediction.
2. Although various savings have been predicted for reducing driving speeds to 55 MPH, the statement that the consumption of gasoline by vehicles reducing speed from 65 MPH to 55 MPH will be reduced by 10 percent made by the American Automobile Association represents a conservative estimate of such savings.
3. The percent of savings per MPH that can be saved between 55 MPH and 65 MPH is approximately one percent per MPH less than 65 MPH.

Calculations:

Average Highway Speed (First Quarter, 1977) on New Mexico Highways	-	Legal Speed Limit on New Mexico Highways	=	Net Reduction in Highway Speed with Project 55
59.7 MPH	-	55.0 MPH	=	4.7 MPH Decrease

MPH Decrease with Project 55	X	1% savings/MPH Reduction Between, ¹ 65 MPH and 55 MPH	X	1980 Projected Motor Gasoline = Consumption	TOTAL ENERGY SAVINGS FROM PROJECT 55 BY 1980
4.7 MPH Decrease	X	0.01	X	89.2×10^{12} BTU	= 4.192×10^{12} BTU

¹American Automobile Association, Be A Gas Watcher Program, 1975.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WASTE OIL RECYCLING

OVERVIEW:

Waste or used oil is a valuable energy resource. It can be recycled and put right back to work again as a lubricant or fuel for many industrial, automotive and home needs.

The United States is generating waste oil from automotive and industrial sources at the rate of 1,100,000,000 gallons annually, equal to 70,000 plus, barrels per day. Only half of this oil is currently being recovered and reused. The remainder is lost, and frequently disposed of in ways harmful to the environment.

State energy conservation program measures directed toward waste oil recycling from both automotive and industrial sources, can result in the nationwide annual conservation of approximately 500 million gallons (35,000 barrels per day), of used but recyclable oil.

Although dirty and contaminated, waste oil has high energy value and is composed almost entirely of "lube oil fractions," a small but valuable portion of a barrel of crude oil. It can be re-refined into good lubricating oil or used as a feedstock in the manufacture of other petroleum products. In industrial applications it can be reclaimed to nearly original quality by off-the-shelf equipment. It can be reprocessed to clean fuel oil and, under special conditions, burned safely without treatment.

Yet, right now, as much as 50% of all waste oil generated in this country is lost from a resource recovery point of view through dumping, land spreading, road oiling, incineration and direct discharge into waterways and municipal sewers. These practices result in the irretrievable loss of a valuable energy resource and an increasing contribution to community environmental pollution problems.

Current estimates of waste oil generation in the State of New Mexico are running at 4,880,000 gallons per year in the automotive sector and 1,587,500 gallons per year in the industrial sector.¹ New Mexico's Energy Conservation Plan will incorporate a waste oil recycling pilot aimed, initially, at the state-owned motor transportation fleet of approximately 3,300 vehicles. The major motor vehicle pools within the state fleet include: the State Highway Department, the State Police, the State Department of Game and Fish and the State Transportation Pool.

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1. GCA Corporation, Waste Automotive Lubricating Oil Reuse as a Fuel, published report EPA-600/5-74-032, Environmental Protection Agency, September 1974.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: WASTE OIL RECYCLING

OVERVIEW:

Support for New Mexico's Waste Oil Recycling Pilot for State-Owned Vehicles will be effected by an Executive Memorandum or Resolution from the Governor directing these motor pools to collect and deliver all waste oil to an appropriate commercial oil company for re-refining. Thereafter, state motor pools will be directed to purchase this recycled waste oil with funds from their normal operating budgets.

If proven cost-effective, this Waste Oil Recycling Pilot will be extended to include motor vehicle transportation fleets owned by county and municipal governments and public schools and universities, after 1980.

Program Measure: WASTE OIL RECYCLING

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: WASTE OIL RECYCLING

ESTIMATED ENERGY SAVINGS:

The following energy savings methodology is based on the methodology developed by the Federal Energy Administration.

TOTAL ENERGY SAVINGS DIRECTLY FROM WASTE OIL RECYCLING BY 1980 = 0.002 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. The total used oil generation in the automotive sector by the State was derived from Table D, FEA Source Book, Waste Oil Program.
2. The fraction of oil available for recycling was determined by calculating the proportion of all automobiles in the state are owned by the state.
3. The degree of compliance is an estimate of the percent of state vehicles that are maintained by common motor pools of various agencies.

Calculations:

See attached worksheet taken from the FEA Source Book.

STATE NAME NEW MEXICO

TARGET YEAR 1980

State Energy Conservation Program

Worksheet for Estimating Energy Savings from Used Oil Recycling

Step 1: Enter data necessary to calculate energy savings

- a. Enter total used oil generation in the automotive sector by the State, in trillion 0.69 x 10¹² BTU's (Table D).
- b. Enter fraction of oil available for recycling (State estimate or use .5) 0.0033
- c. Enter degree of compliance (State estimate) 0.75

Step 2: Compute total Energy Savings

(Multiply line 1a X 1b X 1c) 0.002 x 10¹² BTU

USED OIL GENERATION BY STATE
IN THE AUTOMOTIVE SECTOR (1971 DATA)
(Trillions of Btu/year)

AL	1.76	IN	2.56	NB	1.28	SC	.93
AK	.20	IA	1.60	NV	.34	SD	.63
AZ	.92	KS	2.08	NH	.24	TN	1.83
AR	1.16	KY	2.03	NJ	2.61	TX	6.82
CA	10.40	LA	2.19	NM	.69	UT	.67
CO	1.18	ME	.48	NY	4.62	VT	.19
CT	.97	MD	1.05	NC	2.00	VA	1.56
DE	.23	MA	1.93	ND	.58	WA	1.59
FL	2.08	MI	5.41	OH	5.29	WV	.94
GA	2.09	MN	2.10	OK	1.77	WI	2.49
HI	.27	MS	1.33	OR	1.73	WY	.37
ID	.50	MO	2.84	PA	5.16	DC	.24
IL	5.38	MT	.60	RI	.28		

* FEA, "Waste Oil Fact Sheet," June, 1976

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: WASTE OIL RECYCLING

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

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PROGRAM MEASURE: WASTE OIL

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*								
FRINGE BENEFITS	*								
TRAVEL	*								
EQUIPMENT									
SUPPLIES	*								
CONTRACTUAL	-	-	-	-					
OTHER	*								
Total Direct	-	-	-	-					
Indirect									
TOTAL BUDGET	-	-	-	-					

* - Refer to Administrative Budget,
1.0% of EPCA Budget.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS.

OVERVIEW:

Energy conservation programs in the utilities sector must be directed toward two types of energy "savings:" (1) savings in the actual number of BTU's of energy consumed; and (2) savings of critical fuel resources by shifting to less critical resources to produce energy as dictated by national energy policies.

Energy conservation programs for utility companies can achieve energy savings: (1) at the energy source, e.i., at the point of electrical generation or natural gas production; (2) while the company is transporting and handling energy; and (3) at the point of consumption after delivery by the utility company.

Between 1977-1980, a significant amount of natural gas and heating oil, both critical resources, will be saved by conversion to coal, a less-critical resource, for the generation of electricity. Currently a substantial amount of the electricity consumed in New Mexico is generated from oil and a large percentage of all electricity produced in the state is generated from natural gas.

The Federal Power Commission has mandated that all new electrical generation plants must utilize coal rather than natural gas for the generation of electricity. Because of the rising price of natural gas from interstate and intrastate pipelines, the generation of electricity from coal is proving economically advantageous for New Mexico producers of electricity as well. It is anticipated that a sizeable shift-over to coal for the generation of electricity in New Mexico will occur by 1980.

The greatest energy savings in the utility sector result from increasing end-use efficiency, and most utility companies in New Mexico have planned or initiated conservation programs aimed at assisting the consumer toward this goal. Projected savings resulting from increasing the end-use efficiency have been calculated in the Energy Savings Programs (ESP's) for residential, commercial, industrial, hospital, public school, state agency and county and municipal government consumers.

Gas Utilities

1. Cathodic Protection on Distribution Lines

In 1980, it is estimated that 884.7 billion cubic feet of natural gas will be produced in New Mexico. Of this volume 269 billion cubic feet will be delivered in New Mexico via interstate and intrastate pipelines. Under provisions of the state Pipeline Safety Act cathodic protection is being installed on all distribution lines.

The installation of cathodic protection on steel pipelines carrying natural gas prevents deterioration of the pipelines (rusting with resulting leakage) by controlling the electric field on the exterior of the pipeline. Cathodic

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS

OVERVIEW:

protection may be accomplished by the placement of sacrificial anodes, or by the use of rectifiers.

It is estimated that installation of cathodic protection on all gas utilities' steel distribution pipelines in New Mexico would result in an average savings of approximately 1.3 per cent of the natural gas consumed in-state by 1980.

2. End-Use Efficiency

Gas utilities in New Mexico have initiated a number of consumer strategies to improve end-use efficiency of natural gas, with a significant fuel savings projected from the implementation of these strategies by 1980. Among energy conservation programs planned or being implemented by gas utilities in New Mexico during 1977-1980 are the following:

- The New Mexico Home: An energy-conservative design concept presented by the Gas Company of New Mexico to assist homeowners in keeping annual heating costs under \$100. Gas-fueled homes built to Gas Company of New Mexico specifications utilize thicker and more continuous insulation, and apply a number of cost-saving innovations designed to enable maximum control over heating and cooling efficiencies. Plans for the New Mexico Home are available on request from the Gas Company of New Mexico, which estimates that homes built to these specifications consume about half the heating and cooling energy required for a conventional home.
- Utility-Financed Retrofits: Beginning in 1977, the Gas Company of New Mexico has offered customer-financing, through utility bills, for the installation of insulation and other weatherizing materials for residential consumers.
- Water Heater Retrofit: An energy-saving insulation device being marketed through the Gas Company of New Mexico. The fiberglass insulation material is wrapped around residential gas water heaters to prevent heat loss.
- Ornamental Gas Lights: The ornamental gas light market has been eliminated in New Mexico through the efforts of the Energy Resources Board, Conservation Division, and cooperating gas utilities.
- Consumer Information & Education: Many gas utility companies in New Mexico have initiated ongoing information and education programs (including paid advertisements, bill stuffers, consultation services and community service activities) to assist their customers with achieving the most energy-efficient operation of their gas-fueled appliances and heating and cooling systems, and reducing utility bills.

Energy savings through these and other consumer strategies are calculated in the Energy Savings Programs (ESP's) for residential, commercial, industrial, hospital, state agencies, public schools and county and municipal governments.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS

OVERVIEW:

Electric Utility

1. Non-Traditional Energy Sources

A number of pilot projects currently are under way in New Mexico to explore the potential savings of critical fuels by switching to alternate, non-traditional energy sources for electrical generation. The Southwest Project, a solar demonstration project currently under way, will assist in determining whether the barriers to large-scale solar generation of electricity can be resolved in the near future. Additional research has been initiated to assess the potential for the generation of electricity from dry-rock geothermal energy. Research into waste heat utilization projects by the state's largest investor-owned electric utility should begin in the near future.

2. End-Use Efficiency

Electric utilities in New Mexico are exploring and initiating a number of strategies designed to improve the end-use efficiency of electricity for the consumer. Among these strategies are:

- Electric Utility Load Management: Techniques currently under assessment include end-use controls, heat and cold storage devices, interruptible services for adjustment of peak loads. Some electric utilities in New Mexico are studying the possibility of enacting interruptible service on air conditioners at peak summer temperatures.
- Rate Reform: The restructuring of rates to better reflect the cost of electrical service by category of consumer and to improve the load factor, is under consideration by electric utilities in New Mexico. The Public Service Company of New Mexico reports that a time-of-day rate for their wholesale customers has resulted in a 4.7 load factor improvement, and that it minimizes the use of petroleum and natural gas energy for generation by shifting part of the load to coal generation.
- SMART Home: An energy-conservative design concept prepared by the Public Service Company of New Mexico to enable construction of all-electric homes at reasonable costs. A SMART ("Saves Money and Resources Too") Home utilizes increased insulation levels in walls, ceilings and floors; insulated glass and doors; and appropriate ventilation. During the 1976 construction season 70 SMART Homes were built in New Mexico, and current consumption data indicates that their heating and cooling costs are about 44 per cent of conventional electric homes. Other electric utilities in the state have also developed plans for energy-conserving, all electric homes.
- Consumer Information & Education: Many electric utilities in New Mexico have initiated ongoing information and education programs (paid advertisements, bill stuffers, consultation services and community service activities) to assist their customers with achieving the most energy-efficient operation of their electric appliances and home heating and cooling systems, and to assist saving money on their utility bills.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS

OVERVIEW:

This effort will be supported and reinforced by ERB Conservation Division as a joint effort.

--Utility-Financed Retrofits: Electric utilities in New Mexico currently are studying the possibility of financing the retrofits of customer homes to achieve increased energy-efficiency in their heating and cooling systems.

Energy savings through these and other consumer strategies are calculated in the Energy Savings Programs (ESP's) for residential, commercial, industrial, hospital, state agencies, public schools and county and municipal governments.

Energy Conservation Division Participation in Conservation Hearings Before New Mexico Public Service Commission

A major effort of the Division during 1978 will be preparation for participation in upcoming fact-finding and conservation rule-making hearings before the Public Service Commission which is the utility regulatory body in New Mexico. Conservation policy for gas and electric (investor-owned and rural electric cooperatives) utilities under the Commission's jurisdiction will result from the testimony. The fact-finding and analysis by the Commission will require the participation of electric and gas utilities, consumers, and agencies of local, state, and federal government.

The Conservation Division will provide ongoing consultation to the Commission staff, consumers, and the utilities on matters pertaining to Conservation to help insure that Conservation issues are adequately presented.

Topics to be addressed are:

1. Rate structure and pricing as they affect level of consumption.
2. Cooperation on Waste Heat Utilization opportunities.
3. Load management techniques as they affect the consumption of critical fuels (Natural gas and petroleum) at the electricity generation end and efficiency of total consumption at the consumer end.
4. The issue of weatherization service to consumers by utilities in or out of the regulated environment.
5. Master meter as it affects individual consumption.

Total BTU savings can be calculated only after resultant policies are known. This should occur at the end of 1978.

Water and Waste-Water Utilities

1. Energy-Accounting

During 1978, the Energy Resources Board, Conservation Division, will participate in a pilot study of small municipal and rural water and waste-water utility operations in New Mexico to determine strategies for energy conservation programs.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS

OVERVIEW:

At the present time municipal and rural water and sewage utilities throughout the state are facing rising utility costs for the electricity or gas utilized to operate their treatment, distribution or collection systems. The Energy Resources Board, Conservation Division, projects that these utility costs may be reduced and energy savings may be realized by the implementation of energy management or control techniques.

After completion of the pilot demonstration project, the Energy Resources Board, Conservation Division, will solicit support from the Department of Energy, Environmental Improvement Agency (which presently regulates the State of New Mexico's operator certification program for water and waste-water operators), the Farmers Home Administration, and/or other related agencies, to develop an energy management program for water utilities. The management program will assist: (1) maintenance staff and operators with identifying the needs and improving the energy-efficiency of their operations; and (2) city managers or fiscal officers with implementing energy-accounting systems in their water and waste-water budgeting programs.

2. End-Use Efficiency

During 1977-1980, water and waste-water utilities throughout New Mexico will provide energy-conservation information to their customers to educate them on various techniques which can save them money on their utility bills. Such information programs will be directed towards the savings which can be achieved through the voluntary cutback of consumption, utilization of mechanical devices to control water flow, and water management techniques to achieve maximum benefit (ie., in the watering of lawns, maintaining the water level in swimming pools etc.).

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: STATE/UTILITIES INITIATED CONSERVATION PROGRAMS

ENERGY SAVINGS ESTIMATE:

The following methodology energy savings was developed by T. G. Gebhard, Jr., Consultant, Energy Institute at the University of New Mexico.

TOTAL PRIMARY FUEL ENERGY SAVINGS FOR STATE/UTILITIES INITIATED
PROGRAM = 1.495 TBTU

ACTUAL CALCULATIONS:

Assumptions:

1. Cathodic protection of natural gas pipelines has already been installed on transportation lines, thus savings from this source have not been included in this methodology.
2. The percentages of natural gas savings to be derived from the installation of cathodic protection programs on distribution lines within New Mexico have been estimated by Robert McGee, Southern Union Gas Company, Dallas, Texas for Gas Company of New Mexico and by T. G. Gebhard, Consultant to the Energy Institute at the University of New Mexico, and by Albino Zuniga, New Mexico Corporation Commission, Pipeline Division.
3. Blending of data on the percentage of achievable savings in natural gas is based on the miles of distribution lines under the Cathodic Protection Program.

Savings From Completion Of Cathodic Protection Program On Natural Gas Instate Lines

Total Miles of Distribution Lines in New Mexico	-	Miles of Distribution Lines by Gas Co. of New Mexico	=	Miles of Distribution Lines by Other Gas Companies in New Mexico
7,800 miles	-	5,550 miles	=	2,250 miles

Savings by Gas Company of New Mexico = 1%; savings by other gas companies = 2%.¹

¹See Assumption 2.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: STATE/UTILITIES INITIATED CONSERVATION PROGRAMS

ENERGY SAVINGS ESTIMATE:

Percent of Savings/Gas Co. of NM	X	Miles of Lines/Gas Co. of N.M.	+	Percent of Savings/Other Gas Companies	X	Miles of Lines/Other Companies	=	Percent Savings for N.M.
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Total Miles of Distribution Lines

$$\frac{(.01 \times 5,550) + (.02 \times 2,250)}{7,800} = 1.3\% \text{ Savings}$$

Total Gas in N.M.	X	% of Sales to New Mexico Intra-State Market ³	X	BTU Conversion Factor	=	BTU's of Gas in New Mexico Distribution Systems from Intrastate Lines
-------------------	---	--	---	-----------------------	---	---

$$884.7 \times 10^9 \text{ CF} \times 0.13 \times 1000 \text{ BTU/CF} = 115.0 \times 10^{12} \text{ BTU of Gas}$$

Total BTU of Gas in N.M. Distribution Lines	X	% Savings Through CP Program by 1980	=	BTU of Gas Saved By 1980 Through CP Program
---	---	--------------------------------------	---	---

$$115.0 \times 10^{12} \text{ BTU} \times 0.013 = 1.495 \times 10^{12} \text{ BTU}$$

$$\text{Primary Fuel Savings for Natural Gas and Propane} = 1.495 \times 10^{12} \text{ BTU}$$

$$\text{NATURAL GAS SAVED BY 1980 THROUGH CATHODIC PROTECTION PROGRAM} = 1.495 \times 10^{12} \text{ BTU}$$

²State Geologist, State of New Mexico.

³Gedi Cibas, Energy Consultant, Energy Resources Board, projected sale of natural gas to intrastate market in 1980.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: STATE/UTILITIES-INITIATED CONSERVATION PROGRAMS

ESTIMATED COST OF IMPLEMENTATION

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PROGRAM MEASURE: CONSERVATION IN UTILITIES

YEAR: 1978

	FEA EPCA (Base)	FEA EPCA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	\$26,900	\$3,100	-	\$30,000					
OTHER	*	**							
Total Direct	\$26,900	\$3,100	-	\$30,000					
Indirect									
TOTAL BUDGET	\$26,900	\$3,100	-	\$30,000					

* - Refer to Administrative Package,
9.0% of EPCA Budget

** - Refer to Administrative Package,
12.3% of EPCA Budget

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: CONSERVING ENERGY IN AGRICULTURE

OVERVIEW:

The impressive yields of agriculture in the United States today are the direct result of the substitution of manual labor and natural processes, with the application of modern technology and the use of energy-intensive machinery. Farming in the U.S. is highly mechanized, with extensive use of irrigation, artificial crop-drying and manufactured fertilizer, and is therefore more energy-intensive than many other countries.

It is widely believed that the implementation of relatively simple conservation measures could achieve as much as 20 percent improvement in fuel-use efficiency in agricultural operations. These savings will be achieved through increased efficiencies in the form of modified cropping and feeding techniques; improved machinery and new technologies; continued genetic improvements in plants and animals; and better management and utilization of electricity, fossil fuels and/or other sources.

Although farmers have been promised preferential treatment in the event of fuel shortages or fuel-allocation programs, the implementation of energy conservation techniques now will better assure that such resources are available for continued use in the future. The conservation of available energy also will allow time needed for the development of adequate energy alternatives before large-scale shortages of traditional resources occur.

SOLAR IRRIGATION PROJECT

The economics of New Mexico and several other western states are heavily dependent on agricultural irrigation. In these states, a wholly irrigated farm produces nearly seven times more crop value per acre than a non-irrigated one. The 17 western states which contain more than 80 per cent of the irrigated farm land in the United States, produced 20 per cent of the total United States farm products in 1969. On the average, about one-half of the value of agricultural products sold in these states were from irrigated land. In 1973, for example, more than \$50 million of agricultural products were produced from ground-water irrigated land in New Mexico.

There is a growing need for more food for world consumption. However, the energy crisis is having a detrimental effect upon our ability to meet this need. The use of natural gas for powering irrigation pumps is widespread in the western United States. Arizona, California, Texas and New Mexico have a combined total of 160,000 natural gas powered systems in use. There exists a real threat that natural gas will become unavailable, therefore other energy sources must be used. This project evaluates the use of solar energy as a replacement energy source.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: CONSERVING ENERGY IN AGRICULTURE

OVERVIEW:

The Solar Powered Irrigation System project, located southeast of Albuquerque, is a joint effort between ERDA (now Department of Energy) and the State of New Mexico to find a solution to the above problems. The system engineering is under the direction of Sandia Laboratories, Albuquerque, while all agricultural experiments will be conducted by New Mexico State University, Las Cruces.

How the System Operates:

Generally, the system consists of a solar collector field, energy storage (fluid tank), solar engine, irrigation pump, controls and a water storage pond. The solar engine, an organic Rankine cycle turbine, delivers 25 shaft horsepower to the irrigation pump, which in turn will deliver 380 gpm from a 110 foot well, (enough water to irrigate 80 acres) during the 100-day irrigation season. The sun-tracking solar collectors raise the temperature of the heating fluid to 420° F. When the system is not operating the irrigation pump, it can generate 10,000,000 BTU's/day of heat or 20 KW (200 KWH/day) electrical power for other uses.

Since the accumulation of data is an important function of the solar irrigation project, a number of temperature sensors and flow indicators will be placed at the site to monitor environmental conditions. A multi-channel data recording unit will record data from temperature sensors, flow indicators and the weather station in order to analyze system performance.

Use of the solar powered irrigation system does not end with the summer growing season. A number of alternate off-season uses currently are being investigated. These uses include providing the heating needs for a greenhouse, a fish farm, farrowing and poultry houses, crop drying and farm house space heating. Methods are also being explored to produce energy from waste wood, crop residue and other organic waste to power the system.

Project Schedule:

Site selection, overall project design, component specifications and system assembly begun in February, 1976, was completed in May, 1977. The project has continued operating with constant monitoring by the Department of Energy and Sandia Labs. If proven cost-effective, the system would be theoretically ready for larger-scale production sometime after 1980. It is estimated that the Solar Irrigation Project could save 1,000,000 MCF's of natural gas per year per pump.

Because the Solar Irrigation Project is a single demonstration project, no BTU savings will be calculated for New Mexico prior to 1980. However, as an incentive the 1977 legislature passed a bill whereby a tax credit of 25 percent of the cost of solar irrigation equipment not to exceed \$25,000 will be given to those requesting it.

¹Federal Energy Administration, Son-of-Strawman Data Series, May, 1976.

Program Measure: CONSERVING ENERGY IN AGRICULTURE

Calendar Milestones:

[illegible]

State Energy Conservation PlanWorksheet for Estimating Energy Savings from
Conserving Energy in Food ProductionCalculate Annual Energy Savings by Operation and Fuel Type.

	MOTOR GASOLINE	DIESEL	LPG	NATURAL GAS	ELECTRICITY	INVESTED
Operation: <u>Irrigation</u>						
a. Enter Energy Expended: (Table IX-A)	<u>7,824</u> (1000 gal.)	<u>9,381</u> (1000 gal.)	<u>17,115</u> (1000 gal.)	<u>15,163</u> (10 ⁶ ft ³)	<u>404</u> (10 ⁶ kWh)	<u>-</u> (10 ⁹ Btu)
b. Enter fractional savings of fuel: (State estimate in decimal fractions).	<u>0.15</u>	<u>0.15</u>	<u>0.15</u>	<u>0.15</u>	<u>0.15</u>	<u>-</u>
c. Compute savings (line a X b.)	<u>1173.6</u> (1000 gal.)	<u>1407.2</u> (1000 gal.)	<u>2567.3</u> (1000 gal.)	<u>2274.5</u> (10 ⁶ ft ³)	<u>60.6</u> (10 ⁶ kWh)	<u>-</u> (10 ⁹ Btu)

Operation: <u>Crop Drving</u>						
a. Enter Energy Expended: (Table IX-A)	<u>-</u> (1000 gal.)	<u>-</u> (1000 gal.)	<u>42</u> (1000 gal.)	<u>133</u> (10 ⁶ ft ³)	<u>2</u> (10 ⁶ kWh)	<u>-</u> (10 ⁹ Btu)
b. Enter fractional savings of fuel: (State estimate in decimal fractions).	<u>-</u>	<u>-</u>	<u>0.20</u>	<u>0.20</u>	<u>0.20</u>	<u>-</u>
c. Compute savings (line a X b.)	<u>-</u> (1000 gal.)	<u>-</u> (1000 gal.)	<u>8.4</u> (1000 gal.)	<u>26.6</u> (10 ⁶ ft ³)	<u>0.4</u> (10 ⁶ kWh)	<u>-</u> (10 ⁹ Btu)

Operation: _____						
a. Enter Energy Expended: (Table IX-A)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)
b. Enter fractional savings of fuel: (State estimate in decimal fractions).	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
c. Compute savings (line a X b.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)

Operation: _____						
a. Enter Energy Expended: (Table IX-A)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)
b. Enter fractional savings of fuel: (State estimate in decimal fractions.)	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
c. Compute savings (line a X b.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)

Operation: _____						
a. Enter Energy Expended: (Table IX-A)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)
b. Enter fractional savings of fuel: (State estimate in decimal fractions.)	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
c. Compute savings (line a X b.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (1000 gal.)	<u> </u> (10 ⁶ ft ³)	<u> </u> (10 ⁶ kWh)	<u> </u> (10 ⁹ Btu)

(Use additional sheets as needed) ENTER SAVINGS FROM EACH LINE c ONTO SUMMARY SHEET

Target Year 1980

State Energy Conservation Program
Summary Sheet for Accumulating Energy Savings
from Conserving Energy in Food Production

A. Enter energy savings for each operation by fuel type from each line c on worksheet (a)

Operation	Motor Gasoline (1000 gal)	Diesel (1000 gal)	LPG (1000 gal)	Natural Gas (10 ⁶ ft ³)	Electricity (10 ⁶ kWh)	Invested (10 ⁶ Btu)
Irrigation	1173.6	1407.2	2567.3	2274.5	60.6	-
Crop Drying	-	-	8.4	26.6	0.4	-

B. Add energy savings by each fuel type for all operations	$\frac{1173.6}{(1000 \text{ gal.})}$	$\frac{1407.2}{(1000 \text{ gal.})}$	$\frac{2575.7}{(1000 \text{ gal.})}$	$\frac{2301.1}{(10^6 \text{ ft}^3)}$	$\frac{61.0}{(10^6 \text{ Kwh})}$	$\frac{-}{(10^9 \text{ Btu})}$
C. Conversion factors:	1.25×10^{-4}	1.40×10^{-4}	$.96 \times 10^{-4}$	1.04×10^{-3}	1.14×10^{-2}	1×10^{-3}
D. Compute savings by fuel type in Btu's (Multiply line B x C)	$\frac{0.147}{(10^{12} \text{ Btu})}$	$\frac{0.197}{(10^{12} \text{ Btu})}$	$\frac{0.247}{(10^{12} \text{ Btu})}$	$\frac{2.393}{(10^{12} \text{ Btu})}$	$\frac{0.695}{(10^{12} \text{ Btu})}$	$\frac{-}{(10^{12} \text{ Btu})}$

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: CONSERVING ENERGY IN AGRICULTURE

Reduced Electrical Demand

$$0.695 \times 10^{12} \text{ BTU} \div 3413 \text{ BTU/KWH} = 203,633,167 \text{ KWH Saved of End Use Energy}$$

Total KWH Electricity Saved by 1980 through Agricultural Program	X	% of Power Generated by Type of Generation ¹	=	KWH Saved by Type of Generation
---	---	---	---	------------------------------------

203,633,167	KWH X 0.1% Gas-fired Gas Turbine	=	203,633	KWH
203,633,167	KWH X 0.3% Oil-fired Gas Turbine	=	610,900	KWH
203,633,167	KWH X 23.2% Gas-fired Steam Turbine	=	47,242,895	KWH
203,633,167	KWH X 72.6% Oil-fired Steam Turbine	=	147,837,679	KWH
203,633,167	KWH X 3.8% Coal-fired Steam Turbine	=	7,738,060	KWH

KWH Saved by Type of Generation	X	Conversion Factor per Type of Fuel	=	Amount of Primary Fuel Saved
493,443.9	KWH in Natural Gas X 10.4 Cu.Ft./KWH	=	493,443,891	Cu.Ft.
11,282,092	KWH in Oil X 0.076 Gallons/KWH	=	11,282,092	Gallons
3404.7	KWH in Coal X 0.88 Pounds/KWH	=	6,809,493	Pounds

Unit of Primary Energy Source	X	Conversion Factor to BTU's	=	BTU Saved/Source of Fuel for Generation
493,443.9	MCF of Natural Gas X 1,000,000 BTU/MCF	=	0.493	$\times 10^{12}$ BTU
11,282,092	Gallons of Oil X 140,000 BTU/Gallon	=	1.579	$\times 10^{12}$ BTU
3,404.7	Tons of Coal x (26.2 $\times 10^6$) BTU/Ton	=	0.089	$\times 10^{12}$ BTU

TOTAL ENERGY SAVINGS OF PRIMARY RESOURCES THROUGH
REDUCTION OF ELECTRICAL DEMAND = 2.161 $\times 10^{12}$ BTU

Summary of Energy Savings:

Motor Gasoline	0.147
Diesel	0.197
LPG	0.247
Natural Gas	2.393
Electricity (Primary Source)	<u>2.161</u>
TOTAL SAVINGS FOR PROGRAM	5.145

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: Conserving Energy in Agriculture

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding, originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

PROGRAM MEASURE: CONSERVATION IN AGRICULTURE

YEAR: 1978

	FEA		NON-FEA	TOTAL	FEA				
	EPCA (Base)	ECPA (Supp.)			Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$60,000	\$60,000		\$60,000 ¹			
OTHER	*	**							
Total Direct	-	-	\$60,000	\$60,000		\$60,000			
Indirect									
TOTAL BUDGET	-	-	\$60,000	\$60,000		\$60,000			

* - Refer to Administrative Package,
2.0% of EPCA Budget.

** - Refer to Administrative Package,
1.2% of ECPA Budget.

¹ EES

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES OF STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

OVERVIEW:

It has been the general practice for State and local Government purchasing agents to purchase the least expensive item meeting minimum specifications in order to save public money. However, the cheapest product may not be the most efficient in terms of energy consumption. As energy costs continue to rise at an alarming rate, the initial cost saved by purchasing the cheapest product may be quickly offset by high consumption costs of the energy needed to operate that product.

The Energy Resources Board, Conservation Division, believes that the most effective way to save both money and energy, is through an analysis of the "life-cycle cost" of the item to be purchased. "Life-cycle costing" may be defined as the cost of a product over its entire useful period, including the initial purchase price, projected maintenance expense, and energy consumption costs.

During 1977-1980, the Energy Resources Board, Conservation Division, will stress the need for life-cycle costing principles to be applied to purchases of equipment, appliances and other items by New Mexico State Government and its political subdivisions throughout the state. A primary benefit to these public agencies is the cost-savings which will result from purchasing energy-efficient items with lower operating and maintenance costs.

Implementing the principle of life-cycle costing in the public sector also will serve to: (1) influence private industry and individuals to utilize life-cycle costing in their purchasing practices; (2) stimulate development of more energy-efficient products by creating a demand market; and (3) save energy for the State of New Mexico.

The State of New Mexico currently has a public purchases law which defines rules and regulations which the state purchasing agent must follow in purchasing items for State government. The two major provisions of the Public Purchases Act concern specifications and bids:

- (1) Before an item is purchased, specifications must be drawn up to define what functions the item must be capable of performing in order to be considered for purchase. The State Purchasing Standards and Specifications Committee holds responsibility for drawing up these specifications.
- (2) The State Purchasing Agent is required to advertise and accept bids from all potential contractors whose products meet the specifications. He is then required to award the contract to the lowest bidder.

It is also the general practice for public subdivisions (county and municipal governments) and public schools to utilize state specifications in purchasing items at the local level.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES OF STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

OVERVIEW:

To ensure the energy-efficiency of all energy-consuming products purchased by the state and its political subdivision, the Energy Resources Board, Conservation Division, will, during 1978-1980, work cooperatively with the State Purchasing Standards and Specifications Committee to determine specifications for specific products on the basis of life-cycle cost analyses (within the constraints of available energy efficiency standards) prior to issuing these specifications for bid. During 1978 two workshops will be sponsored on life-cycle costing for the staff of the State Purchasing Agent's office and for the purchasing agents of county and municipal offices. The Energy Resources Board, Conservation Division, will likewise sponsor two workshops for these same groups on the development of procurement guidelines. The ERB Conservation Division has concluded that because purchases in New Mexico are comparatively small, extensive life-cycle costing analysis, in many cases, is more expensive than what would be saved by undertaking our own life-cycle costing analysis on each item purchased. Therefore, we will be relying on what other professionals have gathered which is applicable to New Mexico.

It is the opinion of the State of New Mexico Attorney General's office that the present Public Purchases Act neither mandates nor prohibits life-cycle costing but such provision could be instituted by the State Purchasing Agent through the Purchasing Standards and Specifications Committee. The S.P.A. has assured this office that the Committee is considering life-cycle costing, but should the ERB Conservation Division find that the Committee is not doing so, the Conservation Division will draft legislation requiring consideration of life-cycle cost analysis in all public purchases. This would be taken up by either the 1979 or 1980 legislative session.

During 1977 the ERB Conservation Division presented to the Governor a proposal whereby Environmental Protection Agency mileage figures would be used as a method for rating the energy-efficiency of new automobiles to be purchased by the state. The Governor's office would direct all state agencies owning automobiles to require that new automobiles purchased are smaller than the automobiles they are replacing, wherever feasible. The Governor, however, did not approve the plan and asked that it be studied further. New Mexico's State Purchasing Agent has the authority to specify the most energy-efficient car and is, at the present time, exercising that authority. However, New Mexico law does not prohibit a state agency from purchasing a full-size car when all that is needed is a compact. The Department of Finance and Administration has the authority to determine the state's needs but a mechanism should be set up to enforce the proper sizing of an auto to the job to be done. The ERB Conservation Division is presently studying the ramifications of such a proposal.

During 1975-76, the State Transportation Pool was successful in phasing out all of the full-size and intermediate cars used by state agencies. Since July, 1977, the Transportation Pool consists of 189 compacts.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES OF
STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

OVERVIEW:

In addition, the staff of the State Transportation Pool is maintaining a fuel consumption and repair cost analysis by model to determine actual dollar savings now that the complete fleet is in service. Best estimates indicate that savings to the State will be in excess of 40 per cent in monthly savings.¹ It is assumed that similar savings would be achieved in Public Schools and County and Municipal Governments as well.

¹State Transportation Pool Report, December, 1976.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES OF
STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

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The "NON-DOE" funds appear on the budget sheets as DOE-Other , New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES
OF STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

ENERGY SAVINGS ESTIMATE:

The following energy savings methodology is based on data and strategies derived from the actual experience of the State Transportation Pool in a two-year program to convert Motor Pool vehicles from full and intermediate size automobiles to compacts.

TOTAL ENERGY SAVINGS DIRECTLY FROM PROCUREMENT PROGRAM = 0.410 TBTU

Assumptions:

1. Automobiles in motor pools and governmental operations are replaced after three years of operation.¹ Thus, automobiles of 1973-1974 vintage in such operations will be replaced in 1977, those of 1975 vintage in 1978 and those of 1976 vintage in 1979. Therefore, if all replacement automobiles were compacts and intermediate size instead of full and intermediate size, all such operations would own only compacts by 1980.
2. Automobiles in 1976 motor pools and governmental operations are predominantly full and intermediate size vehicles.²
3. On the average, full and intermediate size automobiles consume approximately 250,000,000 BTU's of energy per year, assuming they fall in the weight category of 3800 to 4799 pounds and travel on the average of 20,000 miles per year³ (The average mileage of a State Transportation Pool vehicle is 27,322 miles per year.).

¹State of New Mexico, State Transportation Pool maintenance records, 1976.

²Ibid.

³Table III.C, Federal Energy Administration, FEA Source Book.

Calculations:

Estimated Number of Full and Intermediate Size Automobiles in 1976 ¹	X	BTU's Consumed/ Year by Full or Intermediate ² Automobile	X	25% Energy ³ Savings	=	Total Savings from Procurement Program for Automobiles
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¹Tallied from State of New Mexico Motor Vehicle Department records.

²For vehicles weighing 3800-4799 pounds travelling 20,000 miles per year.

³From actual experience of State Transportation Pool, 1976..

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: IMPROVEMENT OF ENERGY EFFICIENCY IN PROCUREMENT PRACTICES
OF STATE GOVERNMENT AND ITS POLITICAL SUBDIVISIONS

Procurement of State-Owned Automobiles:

2239 automobiles X 250,000,000 BTU/auto X 0.25 = 0.140×10^{12} BTU

Procurement of Automobiles Owned by Schools and Universities:

521 automobiles X 250,000,000 BTU/auto X 0.25 = 0.033×10^{12} BTU

Procurement of Automobiles Owned by County and Municipal Governments:

3795 automobiles X 250,000,000 BTU/auto X 0.25 = 0.237×10^{12} BTU

Total Savings

For State Agencies	=	0.140×10^{12} BTU
For Schools and Universities	=	0.033×10^{12} BTU
For County and Municipal Governments	=	0.237×10^{12} BTU
TOTAL SAVINGS FOR PROCUREMENT PROGRAM	=	(0.410×10^{12}) BTU

These savings are distributed to the proper Energy Management Programs to avoid duplication in the total savings and environmental impact of the State Energy Conservation Program.

PROGRAM MEASURE: Procurement

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	x	xx							
FRINGE BENEFITS	x	xx							
TRAVEL	x	xx							
EQUIPMENT									
SUPPLIES	x	xx							
CONTRACTUAL	\$20,000	\$10,000		30,000					
OTHER	x	xx							
Total Direct	20,000	10,000		30,000					
Indirect									
TOTAL BUDGET	20,000	10,000		30,000					

x - Refer to Administrative Package 2.8% of EPCA Budget

xx - Refer to Administrative Package, 3.1% of ECPA Budget.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

OVERVIEW:

The Energy Conservation plan for New Mexico has been programmed in such a way that it can be modified or expanded to respond to technological advances or new legislation at any point in time. Conservation measures funded or otherwise supported through the New Mexico Energy Resources Board, Conservation Division, will come under the continual review of both the public and professional-technical experts to insure that they are producing the most desirable effects--economically and in terms of energy savings--for the people of the state and the nation.

The review of programs, with public and professional input, will be accomplished through four specific processes:

ONGOING

Legislative Review--New Mexico State legislative review of conservation programs utilizing state funds, requiring state legislation, and/or affecting the public good, will be ongoing. Additions and/or deletions of particular programs will be directly related to the appropriation or non-appropriation of state funds, and to the passage or non-passage of enabling legislation. Legislative scrutiny reflects public sentiment and the opinions of private industry.

PERIODIC

Public Hearings--As the need arises, the New Mexico Energy Resources Board, Conservation Division, will hold public hearings on conservation proposals to enable input from private citizens and representatives of private industry in the development or continuation of statewide conservation programs. Appropriate notice, utilizing statewide news media and other channels, will be posted to insure maximum participation in such hearings. Every effort will be made to insure input from the greatest number of citizens affected (or potentially affected) by the conservation measures by scheduling the hearings in major population centers.

Public input from the hearings will be duly recorded, printed and considered by the New Mexico Energy Resources Board, Conservation Division, in its evaluations of proposed or continuing conservation programs. Public hearings on the state conservation plan, or portions of it, will be held a minimum of once annually through 1980. The exact number of hearings and specific location of hearings will be determined by the population affected, or potentially affected, by the measures under discussion.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

COORDINATION AMONG LOCAL, STATE AND FEDERAL ENERGY CONSERVATION PROGRAMS:

Provisions have been made to insure coordination among various local, state and federal energy conservation programs. A close relationship exists between those working on the State Energy Conservation Plan and those working on the Energy Extension Service. The chief reason for this relationship is that both programs are being implemented within the Conservation Division. The Director of Conservation and Management has direct supervisory control over employees in both divisions. Further, the EES will be used as a vehicle for carrying out many of our SECP goals.

The Energy Resources Board, Conservation Division, expects to use the EES Advisory Committee to obtain information and share views in all conservation efforts in New Mexico. This committee is composed of the Director of Conservation and Management at the ERB, the three directors of the New Mexico Energy Institutes, representatives of the federal labs, representatives of the state utilities, the Director of the Technical Applications Center, representatives of energy consumer groups and the Cooperative Extension Service director. Further, the five EES field agents are expected to have a local advisory committee which will include business leaders, local government leaders and civic leaders. The ERB, Conservation Division, fully intends to use these field agents to gather pertinent and useful information on various governmental conservation efforts statewide.

Program Measure: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

ESTIMATED ENERGY SAVINGS:

The Modification of State Energy Conservation Plan has been included in the basic State of New Mexico Energy Conservation Program to comply with the provisions of the Supplemental Energy Conservation Program specified in the Energy Conservation and Production Act of 1976 (Public Law 94-385). As a program measure, it does not produce measurable energy savings. Thus, no estimated energy savings have been calculated.

ENVIRONMENTAL IMPACT:

Not calculated.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN-

ESTIMATED COST OF IMPLEMENTATION

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PROGRAM MEASURE: Modification

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	-	-					
OTHER	*	**							
Total Direct	-	-	-	-					
Indirect									
TOTAL BUDGET	-	-	-	-					

* Refer to administrative package, 9.0% of EPCA budget

** Refer to administrative package, 7.7% of ECPA budget

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

OVERVIEW:

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ONGOING

Legislative Review--New Mexico State legislative review of conservation programs utilizing state funds, requiring state legislation, and/or affecting the public good, will be ongoing. Additions and/or deletions of particular programs will be directly related to the appropriation or non-appropriation of state funds, and to the passage or non-passage of enabling legislation. Legislative scrutiny reflects public sentiment and the opinions of private industry.

PERIODIC

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STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

COORDINATION AMONG LOCAL, STATE AND FEDERAL ENERGY CONSERVATION PROGRAMS:

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Program Measure: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

Calendar Milestones:

[illegible]

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN

ESTIMATED ENERGY SAVINGS:

The Modification of State Energy Conservation Plan has been included in the basic State of New Mexico Energy Conservation Program to comply with the provisions of the Supplemental Energy Conservation Program specified in the Energy Conservation and Production Act of 1976 (Public Law 94-385). As a program measure, it does not produce measurable energy savings. Thus, no estimated energy savings have been calculated.

ENVIRONMENTAL IMPACT:

Not calculated.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: MODIFICATION OF STATE ENERGY CONSERVATION PLAN-

ESTIMATED COST OF IMPLEMENTATION

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PROGRAM MEASURE: Modification

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	-	-					
OTHER	*	**							
Total Direct	-	-	-	-					
Indirect									
TOTAL BUDGET	-	-	-	-					

* Refer to administrative package, 9.0% of EPCA budget

** Refer to administrative package, 7.7% of ECPA budget

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: PUBLIC INFORMATION PROGRAMS

ESTIMATED COST OF IMPLEMENTATION

In general, funding sources which can be identified with some accuracy have been included in the following budgets. Monies to be spent by end-users of most program measures are impossible to project with any accuracy at this time, and thus are not included in the budgets.

By Department of Energy definition, "DOE" funding includes only funding from either the Energy Policy and Conservation Act of 1975 (Public Law 94-163, Part C) or the Energy Conservation and Production Act of 1976 (Public Law 94-385, Part B).

Further, "NON-DOE" funding includes DOE funding originating from legislation not specifically quoted above, as well as funding from other federal, state and private sources.

The "NON-DOE" funds appear on the budget sheets as DOE-Other, New Mexico Energy Resources Board, New Mexico Research and Development, Department of Transportation, Housing and Urban Development, Individual School Districts, New Mexico Department of Finance and Administration, Private Sources, New Mexico Motor Pool, and State of New Mexico Appropriations.

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN

PROGRAM MEASURE: PUBLIC INFORMATION PROGRAMS

ESTIMATED ENERGY SAVINGS:

Not calculated.

ENVIRONMENTAL IMPACT:

Not calculated.

PROGRAM MEASURE: Public Information

YEAR: 1978

	EPC ^a (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	FUD
PERSONNEL	*	**							
FRINGE BENEFITS	*	**							
TRAVEL	*	**							
EQUIPMENT									
SUPPLIES	*	**							
CONTRACTUAL	-	-	\$285,000	\$285,000		(1) \$285,000			
OTHER	*	**							
Total Direct	-	-	\$285,000	\$285,000		\$285,000			
Indirect									
TOTAL BUDGET	-	-	\$285,000	\$285,000		\$285,000			

* - Refer to Administrative Package,
4.5% of EPCA Budget

** - Refer to Administrative Package,
3.7% of EPCA Budget

(1) EES

PROGRAM MEASURE: Project 55

YEAR: 1978

	EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERE	NMR&D	DOT	HUD
PERSONNEL	*								
FRINGE BENEFITS	*								
TRAVEL	*								
EQUIPMENT									
SUPPLIES	*								
CONTRACTUAL	-	-	-	-					
OTHER	*								
Total Direct	-	-	-	-					
Indirect									
TOTAL BUDGET	-	-	-	-					

* - Refer to Administrative Package,
1.0% of EPCA Budget

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ADMINISTRATIVE PACKET

OVERVIEW:

In order to facilitate internal accounting procedures during the implementation of program measures under both EPCA and ECPA funding, basic Energy Resources Board, Conservation Division, administration has been included in this packet. Given the assumption that all program measures will be adequately funded at the levels indicated in their budgets, a percentage of the total administrative packets for EPCA and ECPA funding necessary to provide minimum "maintenance" to the programs from the Energy Resources Board, Conservation Division staff are indicated on each of the other program measure budget sheets.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ADMINISTRATIVE PACKET

CALENDAR MILESTONES:

Because the Administrative Packet was created specifically to facilitate the implementation of other program measures and the accounting processes involved in this implementation, no calendar milestones can be defined.

ESTIMATED ENERGY SAVINGS:

Not calculated.

ENVIRONMENTAL IMPACT:

Not calculated.

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ADMINISTRATIVE PACKET

OVERVIEW

In order to facilitate internal accounting procedures during the implementation of program measures under both EPCA and ECPA funding, basic Energy Resources Board, Conservation Division, administration has been included in this packet. Given the assumption that all program measures will be adequately funded at the levels indicated in their budgets, a percentage of the total administrative packets for EPCA and ECPA funding necessary to provide minimum "maintenance" to the programs from the Energy Resources Board, Conservation Division staff are indicated on each of the other program measure budget sheets.

PROGRAM MEASURE: Administrative Program

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	\$121,800	\$74,000	\$152,500	348,300					
FRINGE BENEFITS	11,700	7,100	14,500	33,300					
TRAVEL	12,000		10,000	23,860					
	1,860 - carryover								
EQUIPMENT	-								
SUPPLIES	3,000	400	3,000	6,400					
CONTRACTUAL									
OTHER	20,000	-	30,000	50,000					
Total Direct	170,360	81,500	210,000	461,860					
Indirect									
TOTAL BUDGET	170,360	81,500	210,000 (1)	461,860					

(1) EES

PROGRAM MEASURE: Administrative Program

YEAR: 1978

	FEA EPCA (Base)	FEA ECPA (Supp.)	NON-FEA	TOTAL	FEA Other	NMERB	NMR&D	DOT	HUD
PERSONNEL	\$121,800	\$74,000	\$152,500	348,300					
FRINGE BENEFITS	11,700	7,100	14,500	33,300					
TRAVEL	12,000		10,000	23,860					
	1,860 - carryover								
EQUIPMENT	-								
SUPPLIES	3,000	400	3,000	6,400					
CONTRACTUAL									
OTHER	20,000	-	30,000	50,000					
Total Direct	170,360	81,500	210,000	461,860					
Indirect									
TOTAL BUDGET	170,360	81,500	210,000 (1)	461,860					

(1) EES

STATE OF NEW MEXICO ENERGY CONSERVATION PROGRAM

PROGRAM MEASURE: ADMINISTRATIVE PACKET

CALENDAR MILESTONES:

Because the Administrative Packet was created specifically to facilitate the implementation of other program measures and the accounting processes involved in this implementation, no calendar milestones can be defined.

ESTIMATED ENERGY SAVINGS:

Not calculated.

ENVIRONMENTAL IMPACT:

Not calculated.

State Energy Conservation Program
 Lighting Efficiency Standards

Worksheet for Total Electricity Savings in Terms of Source Fuel (in trillion Btu's)
 for the following building type (check one):

☒ Office ☐ Retail Stores ☐ Schools ☐ Hospitals ☐ Other

Note: Step 1 may be skipped if a State has specific State data on projected lighting energy for this building type. The five territories must skip Step 1 and provide their own data for Steps 2a and 3a.

Step 1: Calculate projected 1980 electrical energy consumption for lighting in buildings in region built prior to and following effective date of program, in trillion Btu's.

a. Enter 1980 energy consumption for lighting in buildings built pre-1971 in region (Table I.C.) Base	11.5	(x10 ¹²)
b. Enter energy for lighting in additional buildings built in region each year since 1971. (Table I.C.) Additional	1.05	(x10 ¹²)
c. Enter number of years program in effect (Table I.D.)	3.440	
d. Compute no. years between beginning of 1971 and time program goes into effect (10 - line 1c)	6.560	
e. Compute 1980 energy consumption for lighting in buildings in region built in 1971 through the time program goes into effect (line 1b x 1d)	6.888	(x10 ¹²)
f. Compute 1980 energy consumption for lighting in all buildings in region built prior to time program goes into effect. (line 1a + 1e)	18.388	(x10 ¹²)
g. Compute 1980 energy consumption for lighting in buildings in region built during the years program is in effect (line 1c minus .5) x (line 1b)	3.612	(x10 ¹²)
h. Enter State/Region ratio (Table I.A., see instruction noted on table)	0.0222	

Step 2: Calculate electrical energy savings in State by buildings built prior to program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built prior to effective date of standards (State data or line 1f x 1h)	0.41	(x10 ¹²)	L _e
b. Enter % (decimal fraction) reduction in lighting in existing buildings (State estimate; see Table I.B. for data on potential reductions)	0.2		F _e
c. Enter fraction of floor space affected (State estimate)	0.7		C _e
d. Compute electricity savings in "existing" buildings (line 2a x 2b x 2c)	0.06	(x10 ¹²)	

Step 3: Calculate electrical energy savings in State by buildings built since time of program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built since time of program effective date (State data or line 1g x 1h)	0.08	(x10 ¹²)	L _n
b. Enter % (decimal fraction) reduction in lighting in new buildings (State estimate; see Table I.B. for data on potential reduction)	0.5		F _n
c. Enter fraction of floor space affected (State estimate)	1.0		C _n
d. Compute electricity savings in "new" buildings (line 3a x 3b x 3c)	0.04	(x10 ¹²)	

Step 4: Calculate total electrical energy savings by new and existing buildings in the State, in trillion Btu's.

a. Aggregate savings (line 2d + 3d)	0.10	(x10 ¹²)	L _s

Step 5: Enter savings (line 4a) for each building type on Summary Sheet.

$$\text{Formula: } L_s = L_e F_e C_e + L_n F_n C_n$$

State Energy Conservation Program
 Lighting Efficiency Standards

Worksheet for Total Electricity Savings in Terms of Source Fuel (in trillion Btu's)
 for the following building type (check one):

Office ☒ Retail Stores Schools Hospitals Other

Notes: Step 1 may be skipped if a State has specific State data on projected lighting energy for this building type. The five territories must skip Step 1 and provide their own data for Steps 2a and 3a.

Step 1: Calculate projected 1980 electrical energy consumption for lighting in buildings in region built prior to and following effective date of program, in trillion Btu's.

a. Enter 1980 energy consumption for lighting in buildings built pre-1971 in region (Table I.C.) Base	13.8	(x10 ¹²)
b. Enter energy for lighting in additional buildings built in region each year since 1971. (Table I.C.) Additional	1.53	(x10 ¹²)
c. Enter number of years program in effect (Table I.D.)	3.220	
d. Compute no. years between beginning of 1971 and time program goes into effect (10 - line 1c)	6.780	
e. Compute 1980 energy consumption for lighting in buildings in region built in 1971 through the time program goes into effect (line 1b x 1d)	10.37	(x10 ¹²)
f. Compute 1980 energy consumption for lighting in all buildings in region built prior to time program goes into effect. (line 1a + 1e)	24.17	(x10 ¹²)
g. Compute 1980 energy consumption for lighting in buildings in region built during the years program is in effect (line 1c minus .5) x (line 1b)	4.93	(x10 ¹²)
h. Enter State/Region ratio (Table I.A., see instruction noted on table) <u>Personal Income</u>	0.022	

Step 2: Calculate electrical energy savings in State by buildings built prior to program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built prior to effective date of standards (State data or line 1f x 1h)	0.53	(x10 ¹²)	L _e
b. Enter % (decimal fraction) reduction in lighting in existing buildings (State estimate; see Table I.B. for data on potential reductions)	0.3		F _e
c. Enter fraction of floor space affected (State estimate)	0.4		C _e
d. Compute electricity savings in "existing" buildings (line 2a x 2b x 2c)	0.06	(x10 ¹²)	

Step 3: Calculate electrical energy savings in State by buildings built since time of program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built since time of program effective date (State data or line 1g x 1h)	0.11	(x10 ¹²)	L _n
b. Enter % (decimal fraction) reduction in lighting in new buildings (State estimate; see Table I.B. for data on potential reduction)	0.5		F _n
c. Enter fraction of floor space affected (State estimate)	1.0		C _n
d. Compute electricity savings in "new" buildings (line 3a x 3b x 3c)	0.05	(x10 ¹²)	

Step 4: Calculate total electrical energy savings by new and existing buildings in the State, in trillion Btu's.

a. Aggregate savings (line 2d + 3d)	0.11	(x10 ¹²)	L _s

Step 5: Enter savings (line 4a) for each building type on Summary Sheet.

$$\text{Formula: } L_s = L_e F_e C_e + L_n F_n C_n$$

State Energy Conservation Program
Lighting Efficiency Standards

Worksheet for Total Electricity Savings in Terms of Source Fuel (in trillion Btu's)
for the following building type (check one):

☐ Office ☐ Retail Stores ☒ Schools ☐ Hospitals ☐ Other

Note: Step 1 may be skipped if a State has specific State data on projected lighting energy for this building type. The five territories must skip Step 1 and provide their own data for Steps 2a and 3a.

Step 1: Calculate projected 1980 electrical energy consumption for lighting in buildings in region built prior to and following effective date of program, in trillion Btu's.

a. Enter 1980 energy consumption for lighting in buildings built pre-1971 in region (Table I.C.) Base	<u>12.7</u>	(x10 ¹²)
b. Enter energy for lighting in additional buildings built in region each year since 1971. (Table I.C.) Additional	<u>0.72</u>	(x10 ¹²)
c. Enter number of years program in effect (Table I.D.)	<u>2.3</u>	
d. Compute no. years between beginning of 1971 and time program goes into effect (10 - line 1c)	<u>5.970</u>	
e. Compute 1980 energy consumption for lighting in buildings in region built in 1971 through the time program goes into effect (line 1b x d)	<u>4.30</u>	(x10 ¹²)
f. Compute 1980 energy consumption for lighting in all buildings in region built prior to time program goes into effect. (line 1a + 1e)	<u>17.00</u>	(x10 ¹²)
g. Compute 1980 energy consumption for lighting in buildings in region built during the years program is in effect (line 1c minus 1 x (line 1b) 1.7	<u>1.7</u>	(x10 ¹²)
h. Enter State/Region ratio (Table I.A., see instruction noted on table)	<u>0.0302</u>	

Step 2: Calculate electrical energy savings in State by buildings built prior to program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built prior to effective date of standards (State data or line 1f x 1h)	<u>0.51</u>	(x10 ¹²)	L _e
b. Enter % (decimal fraction) reduction in lighting in existing buildings (State estimate: see Table I.B. for data on potential reductions)	<u>0.2</u>		F _e
c. Enter fraction of floor space affected (State estimate)	<u>1.0</u>		C _e
d. Compute electricity savings in "existing" buildings (line 2a x 2b x 2c)	<u>0.10</u>	(x10 ¹²)	

Step 3: Calculate electrical energy savings in State by buildings built since time of program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built since time of program effective date (State data or line 1g x 1h)	<u>0.05</u>	(x10 ¹²)	L _n
b. Enter % (decimal fraction) reduction in lighting in new buildings (State estimate: see Table I.B. for data on potential reduction)	<u>0.5</u>		F _n
c. Enter fraction of floor space affected (State estimate)	<u>1.0</u>		C _n
d. Compute electricity savings in "new" buildings (line 3a x 3b x 3c)	<u>0.025</u>	(x10 ¹²)	

Step 4: Calculate total electrical energy savings by new and existing buildings in the State, in trillion Btu's.

a. Aggregate savings (line 2d + 3d)	<u>0.125</u>	(x10 ¹²)	L _s

Step 5: Enter savings (line 4a) for each building type on Summary Sheet.

$$\text{Formula: } L_s = L_e F_e C_e + L_n F_n C_n$$

State Name New Mexico
 Target Year 1980

State Energy Conservation Program
 Lighting Efficiency Standards

Worksheet for Total Electricity Savings in Terms of Source Fuel (in trillion Btu's)
 for the following building type (check one):

Office Retail Stores Schools X Hospitals Other

Note: Step 1 may be skipped if a State has specific State data on projected lighting energy for this building type. The five territories must skip Step 1 and provide their own data for Steps 2a and 3a.

Step 1: Calculate projected 1980 electrical energy consumption for lighting in buildings in region built prior to and following effective date of program, in trillion Btu's.

a. Enter 1980 energy consumption for lighting in buildings built pre-1971 in region (Table I.C.) Base	7.2	(x10 ¹²)
b. Enter energy for lighting in additional buildings built in region each year since 1971. (Table I.C.) Additional	0.47	(x10 ¹²)
c. Enter number of years program in effect (Table I.D.)	3.031	
d. Compute no. years between beginning of 1971 and time program goes into effect (10 - line 1c)	6.969	
e. Compute 1980 energy consumption for lighting in buildings in region built in 1971 through the time program goes into effect (line 1b x d)	3.28	(x10 ¹²)
f. Compute 1980 energy consumption for lighting in all buildings in region built prior to time program goes into effect. (line 1a + 1e)	10.48	(x10 ¹²)
g. Compute 1980 energy consumption for lighting in buildings in region built during the years program is in effect (line 1c minus .5) x (line 1b)	1.42	(x10 ¹²)
h. Enter State/Region ratio (Table I.A., see instruction noted on table)	0.0302	

Personal Income

Step 2: Calculate electrical energy savings in State by buildings built prior to program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built prior to effective date of standards (State data or line 1f x 1h)	0.32	(x10 ¹²)	L _e
b. Enter % (decimal fraction) reduction in lighting in existing buildings (State estimate; see Table I.B. for data on potential reductions)	0.2		F _e
c. Enter fraction of floor space affected (State estimate)	0.8		C _e
d. Compute electricity savings in "existing" buildings (line 2a x 2b x 2c)	0.05	(x10 ¹²)	

Step 3: Calculate electrical energy savings in State by buildings built since time of program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built since time of program effective date (State data or line 1g x 1h)	0.04	(x10 ¹²)	L _n
b. Enter % (decimal fraction) reduction in lighting in new buildings (State estimate; see Table I.B. for data on potential reduction)	0.4		F _n
c. Enter fraction of floor space affected (State estimate)	1.0		C _n
d. Compute electricity savings in "new" buildings (line 3a x 3b x 3c)	0.02	(x10 ¹²)	

Step 4: Calculate total electrical energy savings by new and existing buildings in the State, in trillion Btu's.

a. Aggregate savings (line 2d + 3d)	0.07	(x10 ¹²)	L _s

Step 5: Enter savings (line 4a) for each building type on Summary Sheet.

$$\text{Formula: } L_s = L_e F_e C_e + L_n F_n C_n$$

State Energy Conservation Program
 Lighting Efficiency Standards

Worksheet for Total Electricity Savings in Terms of Source Fuel (in trillion Btu's)
 for the following building type (check one):

☐ Office ☐ Retail Stores ☐ Schools ☐ Hospitals ☒ Other

Note: Step 1 may be skipped if a State has specific State data on projected lighting energy for this building type. The five territories must skip Step 1 and provide their own data for Steps 2a and 3a.

Step 1: Calculate projected 1980 electrical energy consumption for lighting in buildings in region built prior to and following effective date of program, in trillion Btu's.

a. Enter 1980 energy consumption for lighting in buildings built pre-1971 in region (Table I.C.) Base	25.8	(x10 ¹²)
b. Enter energy for lighting in additional buildings built in region each year since 1971. (Table I.C.) Additional	1.61	(x10 ¹²)
c. Enter number of years program in effect (Table I.D.)	3.173	
d. Compute no. years between beginning of 1971 and time program goes into effect (10 - line 1c)	6.827	
e. Compute 1980 energy consumption for lighting in buildings in region built in 1971 through the time program goes into effect (line 1b x d)	10.99	(x10 ¹²)
f. Compute 1980 energy consumption for lighting in all buildings in region built prior to time program goes into effect. (line 1a + 1e)	36.79	(x10 ¹²)
g. Compute 1980 energy consumption for lighting in buildings in region built during the years program is in effect (line 1c minus .5) x (line 1b)	5.11	(x10 ¹²)
h. Enter State/Region ratio (Table I.A., see instruction noted on table)	0.0222	

Step 2: Calculate electrical energy savings in State by buildings built prior to program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built prior to effective date of standards (State data or line 1f x 1h)	0.82	(x10 ¹²)	L _e
b. Enter % (decimal fraction) reduction in lighting in existing buildings (State estimate: see Table I.B. for data on potential reductions)	0.2		F _e
c. Enter fraction of floor space affected (State estimate)	0.3		C _e
d. Compute electricity savings in "existing" buildings (line 2a x 2b x 2c)	0.05	(x10 ¹²)	

Step 3: Calculate electrical energy savings in State by buildings built since time of program effective date, in trillion Btu's.

a. Enter total projected 1980 lighting energy for buildings in State built since time of program effective date (State data or line 1g x 1h)	0.11	(x10 ¹²)	L _n
b. Enter % (decimal fraction) reduction in lighting in new buildings (State estimate: see Table I.B. for data on potential reduction)	0.5		F _n
c. Enter fraction of floor space affected (State estimate)	1.0		C _n
d. Compute electricity savings in "new" buildings (line 3a x 3b x 3c)	0.06	(x10 ¹²)	

Step 4: Calculate total electrical energy savings by new and existing buildings in the State, in trillion Btu's.

a. Aggregate savings (line 2d + 3d)	0.11	(x10 ¹²)	L _s

Step 5: Enter savings (line 4a) for each building type on Summary Sheet.

$$\text{Formula: } L_s = L_e F_e C_e + L_n F_n C_n$$

State Name New Mexico
Target Year 1980

Summary Sheet for Accumulating Total Energy Savings
for Mandatory Lighting Efficiency Standards for Public
Buildings

Electricity Savings in trillion Btu's
(from Worksheets, line 4a)

Office Buildings:	<u>0.10</u>	<u>(x10¹²)</u>	
Retail Stores:	<u>0.11</u>	<u>(x10¹²)</u>	
Schools:	<u>0.03</u>	<u>(x10¹²)</u>	
Hospitals:	<u>0.07</u>	<u>(x10¹²)</u>	
Other:	<u>0.11</u>	<u>(x10¹²)</u>	
SubTotal	<u>0.42</u>	<u>(x10¹²)</u>	ΣL_s

Calculate total energy savings
in terms of source fuel, by
multiplying the subtotal by 3.33,
(the factor to correct for gen-
erating efficiency).

X 3.33

Total = 1.39 (x10¹²) E_s
Btu's

Summary Formula: $E_s = 3.33 \Sigma L_s$

State Name New Mexico
Target Year 1980

State Energy Conservation Program
Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☒ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

- Step 1:** Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.
- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 378.6 ($\times 10^6$)
 - b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302
 - c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 11.43 ($\times 10^6$) A_n
 - d. Enter number of years standards are in effect for new construction in State (Table IV.F) 0.875 T_n
 - e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)x(line 1c) 44.29 ($\times 10^6$) $A_n T_n$
- Step 2:** Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.
- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 138.0 ($\times 10^6$)
 - b. Enter State/Region ratio (Same as line 1b) 0.0302
 - c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 4.17 ($\times 10^6$) A_r
 - d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 3.875 T_r
 - e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.25 F_r
 - f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e;x(line 2d minus .5)) 4.04 ($\times 10^6$) $A_r T_r F_r$
- Step 3:** Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.
- a. Add area of new and renovated construction in State (line 1e + 2f) 48.33 ($\times 10^6$) $A_n T_n + A_r T_r F_r$
- Step 4:** Calculate State energy savings, in billions of Btu's, typical of this building type in the region.
	<u>Space Heating</u>	<u>Air Conditioning</u>
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	<u>73.26</u> ($\times 10^3$) C_h	<u>19.91</u> ($\times 10^3$) C_c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	<u>65.93</u> ($\times 10^3$) C'_h	<u>14.73</u> ($\times 10^3$) C'_c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	<u>7.33</u> ($\times 10^3$) $C_h - C'_h$	<u>5.18</u> ($\times 10^3$) $C_c - C'_c$
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	<u>354.26</u> ($\times 10^9$) E_h	<u>250.35</u> ($\times 10^9$) E_c
- Step 5:** Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New MexicoTarget Year 1980

State Energy Conservation Program

Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☐ Single Family 2. ☒ Low Density 3. ☐ Low Rise 4. ☐ High Rise
 5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
 8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

- Step 1:** Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.
- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 136.3 ($\times 10^6$)
- b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302
- c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 4.12 ($\times 10^6$) A_n
- d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.875 T_n
- e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)x(line 1c) 15.97 ($\times 10^6$) $A_n T_n$
- Step 2:** Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.
- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 22.3 ($\times 10^6$)
- b. Enter State/Region ratio (Same as line 1b) 0.0302
- c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.67 ($\times 10^6$) A_r
- d. Enter number of years standards are in effect for renovation in State (Table IV.F; may be same as line 1d) 3.875 T_r
- e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.25 F_r
- f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)x(line 2d minus .5) 0.649 ($\times 10^6$) $A_r T_r F_r$
- Step 3:** Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.
- a. Add area of new and renovated construction in State (line 1e + f) 16.61 ($\times 10^6$) $A_n T_n + A_r T_r F_r$
- Step 4:** Calculate State energy savings, in billions of Btu's, typical of this building type in the region.
	<u>Space Heating</u>	<u>Air Conditioning</u>
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	<u>64.22</u> ($\times 10^3$) C_h	<u>18.25</u> ($\times 10^3$) C_c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	<u>57.80</u> ($\times 10^3$) C'_h	<u>13.50</u> ($\times 10^3$) C'_c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	<u>6.42</u> ($\times 10^3$) $C_h - C'_h$	<u>4.75</u> ($\times 10^3$) $C_c - C'_c$
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	<u>106.67</u> ($\times 10^9$) E_h	<u>78.92</u> ($\times 10^9$) E_c
- Step 5:** Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☒ Low Rise 4. ☐ High Rise
5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

Step 1:	<p><u>Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.</u></p> <p>a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 72.6 (x10⁶)</p> <p>b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302</p> <p>c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 2.19 (x10⁶) A_n</p> <p>d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.875 T_n</p> <p>e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)(line 1c) 8.49 (x10⁶) A_nT_n</p>				
Step 2:	<p><u>Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.</u></p> <p>a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 28.1 (x10⁶)</p> <p>b. Enter State/Region ratio (Same as line 1b) 0.0302</p> <p>c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.85 (x10⁶) A_r</p> <p>d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 3.875 T_r</p> <p>e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.25 F_r</p> <p>f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)(line 2d minus .5) 0.82 (x10⁶) A_rT_rF_r</p>				
Step 3:	<p><u>Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.</u></p> <p>a. Add area of new and renovated construction in State (line 1e + 2f) 9.31 (x10⁶) A_nT_n + A_rT_rF_r</p>				
Step 4:	<p><u>Calculate State energy savings, in billions of Btu's, typical of this building type in the region.</u></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"><u>Space Heating</u></td> <td style="width: 50%; text-align: center;"><u>Air Conditioning</u></td> </tr> <tr> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 45.88 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 23.86 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 22.02 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 205.08 (x10⁹) E_h</p> </td> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 18.73 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 10.30 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.43 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 78.51 (x10⁹) E_c</p> </td> </tr> </table>	<u>Space Heating</u>	<u>Air Conditioning</u>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 45.88 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 23.86 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 22.02 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 205.08 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 18.73 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 10.30 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.43 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 78.51 (x10⁹) E_c</p>
<u>Space Heating</u>	<u>Air Conditioning</u>				
<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 45.88 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 23.86 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 22.02 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 205.08 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 18.73 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 10.30 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.43 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 78.51 (x10⁹) E_c</p>				
Step 5:	<p><u>Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).</u></p>				

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New Mexico
 Target Year 1980
 State Energy Conservation Program
 Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning.
 for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☒ High Rise
 5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
 8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

- Step 1:** Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.
- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 28.2 ($\times 10^6$)
- b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302
- c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 0.85 ($\times 10^6$) A_n
- d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.625 T_n
- e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)(line 1c) 3.08 ($\times 10^6$) $A_n T_n$
- Step 2:** Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.
- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 4.5 ($\times 10^6$)
- b. Enter State/Region ratio (Same as line 1b) 0.0302
- c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.14 ($\times 10^6$) A_r
- d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 3.625 T_r
- e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.25 F_r
- f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)(line 2d minus .5) 0.13 ($\times 10^6$) $A_r T_r F_r$
- Step 3:** Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.
- a. Add area of new and renovated construction in State (line 1e + 2f) 3.21 ($\times 10^6$) $A_n T_n + A_r T_r F_r$
- Step 4:** Calculate State energy savings, in billions of Btu's, typical of this building type in the region.
	Space Heating	Air Conditioning
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	<u>39.59</u> ($\times 10^3$) C_h	<u>14.34</u> ($\times 10^3$) C_c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	<u>20.59</u> ($\times 10^3$) C'_h	<u>7.89</u> ($\times 10^3$) C'_c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	<u>19.00</u> ($\times 10^3$) $C_h - C'_h$	<u>6.45</u> ($\times 10^3$) $C_c - C'_c$
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	<u>60.99</u> ($\times 10^9$) E_h	<u>20.71</u> ($\times 10^9$) E_c
- Step 5:** Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New Mexico
Target Year 1980

State Energy Conservation Program
Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
5. ☒ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

Step 1:	<p>Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.</p> <p>a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 51.2 (x10⁶)</p> <p>b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0222</p> <p>c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 1.14 (x10⁶) A_n</p> <p>d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.375 T_n</p> <p>e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)x(line 1c) 3.85 (x10⁶) A_nT_n</p>					
Step 2:	<p>Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.</p> <p>a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 4.7 (x10⁶)</p> <p>b. Enter State/Region ratio (Same as line 1b) 0.0222</p> <p>c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.10 (x10⁶) A_r</p> <p>d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 3.375 T_r</p> <p>e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.50 F_r</p> <p>f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)x(line 2d minus .5) 0.17 (x10⁶) A_rT_rF_r</p>					
Step 3:	<p>Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.</p> <p>a. Add area of new and renovated construction in State (line 1e + 2f) 4.02 (x10⁶) A_nT_n + A_rT_rF_r</p>					
Step 4:	<p>Calculate State energy savings, in billions of Btu's, typical of this building type in the region.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"><u>Space Heating</u></td> <td style="width: 50%; text-align: center;"><u>Air Conditioning</u></td> </tr> <tr> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 105.01 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 31.50 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 73.51 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 295.42 (x10⁹) E_h</p> </td> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 32.98 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 24.40 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.58 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 34.48 (x10⁹) E_c</p> </td> </tr> </table>	<u>Space Heating</u>	<u>Air Conditioning</u>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 105.01 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 31.50 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 73.51 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 295.42 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 32.98 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 24.40 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.58 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 34.48 (x10⁹) E_c</p>	
<u>Space Heating</u>	<u>Air Conditioning</u>					
<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 105.01 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 31.50 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 73.51 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 295.42 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 32.98 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 24.40 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 8.58 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 34.48 (x10⁹) E_c</p>					
Step 5:	<p>Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).</p>					

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Energy Conservation Program
Thermal StandardsWorksheet for Estimating Energy Savings for Space Heating and Air Conditioning
for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
 5. ☐ Office Building 6. ☒ Retail & Mercantile Buildings 7. ☐ Educational Buildings
 8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

Step 1: Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.

- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 69.6 (x10⁶)
 b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0222
 c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 1.55 (x10⁶) A_n
 d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.625 T_n
 e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)(line 1c) 5.62 (x10⁶) $A_n T_n$

Step 2: Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.

- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 5.3 (x10⁶)
 b. Enter State/Region ratio (Same as line 1b) 0.0222
 c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b). 0.12 (x10⁶) A_r
 d. Enter number of years standards are in effect for renovation in State (Table IV.F: may be same as line 1d) 3.625 T_r
 e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.50 F_r
 f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)(line 2d minus .5) 0.22 (x10⁶) $A_r T_r F_r$

Step 3: Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.

- a. Add area of new and renovated construction in State (line 1e + 2f) 5.84 (x10⁶) $A_n T_n + A_r T_r F_r$

Step 4: Calculate State energy savings, in billions of Btu's, typical of this building type in the region.

	Space Heating	Air Conditioning
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	<u>51.53 (x10³)</u> C_h	<u>38.31 (x10³)</u> C_c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	<u>11.34 (x10³)</u> C'_h	<u>32.95 (x10³)</u> C'_c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	<u>40.19 (x10³)</u> $C_h - C'_h$	<u>5.36 (x10³)</u> $C_c - C'_c$
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	<u>234.61 (x10⁹)</u> E_h	<u>31.29 (x10⁹)</u> E_c

Step 5: Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New Mexico
Target Year 1980

State Energy Conservation Program
Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☒ Educational Buildings
8. ☐ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

- Step 1:** Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.
- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 40.4 (x10⁶)
 - b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302
 - c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 1.22 (x10⁶) A_n
 - d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.625 T_n
 - e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)x(line 1c) 4.42 (x10⁶) A_nT_n
- Step 2:** Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.
- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 6.0 (x10⁶)
 - b. Enter State/Region ratio (Same as line 1b) 0.0302
 - c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.18 (x10⁶) A_r
 - d. Enter number of years standards are in effect for renovation in State (Table IV.F; may be same as line 1d) 3.625 T_r
 - e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.50 F_r
 - f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)x(line 2d minus .5) 0.33 (x10⁶) A_rT_rF_r
- Step 3:** Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.
- a. Add area of new and renovated construction in State (line 1e + 2f) 4.75 (x10⁶) A_nT_n + A_rT_rF_r
- Step 4:** Calculate State energy savings, in billions of Btu's, typical of this building type in the region.
	Space Heating	Air Conditioning
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	89.01 (x10 ³) C _h	20.56 (x10 ³) C _c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	29.40 (x10 ³) C' _h	13.16 (x10 ³) C' _c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	59.61 (x10 ³) C _h -C' _h	7.4 (x10 ³) C _c -C' _c
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	282.92 (x10 ⁹) E _h	35.12 (x10 ⁹) E _c
- Step 5:** Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New Mexico
Target Year 1980

State Energy Conservation Program
Thermal Standards

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the Following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
8. ☒ Hospital and Other Institutional Buildings 9. ☐ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

- Step 1:** Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.
- a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 11.3 (x10⁶)
- b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0302
- c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 0.34 (x10⁶) A_n
- d. Enter number of years standards are in effect for new construction in State (Table IV.F) 2.625 T_n
- e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)(line 1c) 0.89 (x10⁶) $A_n T_n$
- Step 2:** Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.
- a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 1.4 (x10⁶)
- b. Enter State/Region ratio (Same as line 1b) 0.0302
- c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.04 (x10⁶) A_r
- d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 2.625 T_r
- e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.50 F_r
- f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)(line 2d minus .5) 0.05 (x10⁶) $A_r T_r F_r$
- Step 3:** Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.
- a. Add area of new and renovated construction in State (line 1e + 2f) 0.94 (x10⁶) $A_n T_n + A_r T_r F_r$
- Step 4:** Calculate State energy savings, in billions of Btu's, typical of this building type in the region.
	<u>Space Heating</u>	<u>Air Conditioning</u>
a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E)	<u>101.71 (x10³)</u> C_h	<u>46.00 (x10³)</u> C_c
b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75)	<u>41.70 (x10³)</u> C'_h	<u>36.80 (x10³)</u> C'_c
c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b)	<u>60.01 (x10³)</u> $C_h - C'_h$	<u>9.2 (x10³)</u> $C_c - C'_c$
d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c)	<u>56.56 (x10⁹)</u> E_h	<u>8.67 (x10⁹)</u> E_c
- Step 5:** Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).

Formulas: $E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$
 $E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$

Worksheet for Estimating Energy Savings for Space Heating and Air Conditioning for the following Building Type (check one):

1. ☐ Single Family 2. ☐ Low Density 3. ☐ Low Rise 4. ☐ High Rise
5. ☐ Office Building 6. ☐ Retail & Mercantile Buildings 7. ☐ Educational Buildings
8. ☐ Hospital and Other Institutional Buildings 9. ☒ Other

Note: States with their own data on projected annual new construction and renovation, and territories, should skip steps 1a and b and 2a and b, below

Step 1:	<p><u>Calculate total new construction, in millions sq. ft., of each building type from time standards take effect through 1980, in the State.</u></p> <p>a. Enter total area of annual new construction of buildings of this type, in the Region (Table IV.A) 73.2 (x10⁶)</p> <p>b. Enter State/Region ratio (Table IV.C, see instructions noted at bottom of table) 0.0222</p> <p>c. Enter total area of annual new construction of buildings of this type, in the State (State estimate or line 1a x 1b). 1.63 (x10⁶) A_n</p> <p>d. Enter number of years standards are in effect for new construction in State (Table IV.F) 3.375 T_n</p> <p>e. Calculate total area of "new" buildings of this type as of the end of 1980 (line 1d minus .5)x(line 1c) 5.50 (x10⁶) A_nT_n</p>					
Step 2:	<p><u>Calculate renovation of each building type in millions sq. ft., from time standards take effect until 1980, in the State.</u></p> <p>a. Enter total area of annual renovation of buildings of this type in the Region (Table IV.B) 9.8 (x10⁶)</p> <p>b. Enter State/Region ratio (Same as line 1b) 0.0222</p> <p>c. Enter total area of annual renovation of buildings of this type in the State (State estimate or line 2a x 2b) 0.22 (x10⁶) A_r</p> <p>d. Enter number of years standards are in effect for renovation in State (Table IV. F: may be same as line 1d) 3.375 T_r</p> <p>e. Enter decimal factor relating to the degree to which the standards can be applied to renovated buildings (State estimate, or may use .25 for residential, .50 for non-residential) 0.50 F_r</p> <p>f. Calculate total area of renovated buildings of this type as of the end of 1980 (line 2c x 2e)x(line 2d minus .5) 0.37 (x10⁶) A_rT_rF_r</p>					
Step 3:	<p><u>Calculate total affected area, in millions sq. ft., of new construction and renovation of this building type in State.</u></p> <p>a. Add area of new and renovated construction in State (line 1e + 2f) 5.87 (x10⁶) A_nT_n + A_rT_rF_r</p>					
Step 4:	<p><u>Calculate State energy savings, in billions of Btu's, typical of this building type in the region.</u></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center;"><u>Space Heating</u></td> <td style="width: 50%; text-align: center;"><u>Air Conditioning</u></td> </tr> <tr> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 51.50 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 19.57 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 31.93 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 187.47 (x10⁹) E_h</p> </td> <td style="vertical-align: top;"> <p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 38.31 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 32.95 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 5.36 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 31.47 (x10⁹) E_c</p> </td> </tr> </table>	<u>Space Heating</u>	<u>Air Conditioning</u>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 51.50 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 19.57 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 31.93 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 187.47 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 38.31 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 32.95 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 5.36 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 31.47 (x10⁹) E_c</p>	
<u>Space Heating</u>	<u>Air Conditioning</u>					
<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 51.50 (x10³) C_h</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 19.57 (x10³) C'_h</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 31.93 (x10³) C_h-C'_h</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 187.47 (x10⁹) E_h</p>	<p>a. Enter typical annual unit energy consumption under conventional standards, in thousand Btu's/sq.ft. (Table IV.D and IV.E) 38.31 (x10³) C_c</p> <p>b. Enter typical annual unit energy consumption under revised standards (Table IV.D and IV.E, or State estimate if new standards differ from ASHRAE 90-75) 32.95 (x10³) C'_c</p> <p>c. Calculate typical annual reduction of unit energy consumption (line 4a minus 4b) 5.36 (x10³) C_c-C'_c</p> <p>d. Calculate total region-typical reduction of energy consumption for this building type (line 3a x 4c) 31.47 (x10⁹) E_c</p>					
Step 5:	<p><u>Enter region-typical reduction of energy consumption (line 4d) for each building type, for space heating and for air conditioning, on Summary Sheet. (Data will then be corrected for State differences within the region and adjusted to trillion Btu's).</u></p>					

Formulas:

$$E_h = C_h - C'_h (A_n T_n + A_r T_r F_r)$$

$$E_c = C_c - C'_c (A_n T_n + A_r T_r F_r)$$

State Name New MexicoTarget Year 1980

Summary Sheet for Accumulating Energy Savings for Mandatory
Thermal Efficiency Standards and Insulation Requirements
for New and Renovated Buildings

Building Types	Energy Savings in Billion Btu's	
	Space Heating (E_h) (from worksheet, line 4d)	Air Conditioning (E_c)
<u>Residential Buildings:</u>		
1. Single family - one unit detached	<u>354.26 ($\times 10^9$)</u>	<u>250.35 ($\times 10^9$)</u>
2. Low density - one unit attached and 2-4 unit structures	<u>106.67 ($\times 10^9$)</u>	<u>78.92 ($\times 10^9$)</u>
3. Low rise - structures with 5 or more units and 3 stories or less	<u>205.08 ($\times 10^9$)</u>	<u>78.51 ($\times 10^9$)</u>
4. High rise - structures with 5 or more units and 4 or more stories	<u>60.99 ($\times 10^9$)</u>	<u>20.71 ($\times 10^9$)</u>
<u>Non-residential Buildings</u>		
5. Office buildings	<u>295.42 ($\times 10^9$)</u>	<u>34.48 ($\times 10^9$)</u>
6. Retail stores and other mercantile buildings	<u>234.61 ($\times 10^9$)</u>	<u>31.29 ($\times 10^9$)</u>
7. Educational buildings	<u>282.92 ($\times 10^9$)</u>	<u>35.12 ($\times 10^9$)</u>
8. Hospitals and other institutional buildings	<u>56.56 ($\times 10^9$)</u>	<u>8.67 ($\times 10^9$)</u>
10. Other	<u>187.47 ($\times 10^9$)</u>	<u>31.47 ($\times 10^9$)</u>
Subtotals:	<u>1783.98 ($\times 10^9$)</u>	<u>569.52 ($\times 10^9$)</u>
	$\times$	$\times$
	State Heating factor: <u>1.08</u> (Table IV.G)	State Cooling factor: <u>0.74</u> (Table IV.G)
	$=$	$=$
	<u>1926.70 ($\times 10^9$)</u>	<u>421.44 ($\times 10^9$)</u>
	$+$	$=$
		<u>2348.14 ($\times 10^9$)</u>
		$\times 10^{-12}$
	Total Energy Savings =	<u>2.35 ($\times 10^{12}$)</u>
		Btu's

Summary Formula: $E_s = F_h (\Sigma E_h) + F_c (\Sigma E_c)$

ENERGY RESOURCES BOARD

POST OFFICE BOX 2770

SANTA FE 87501

TELEPHONE: (505) 827-2146

JERRY APODACA
GOVERNOR

December 20, 1977

Ms. Estella Romo
Program Officer, EES
DOE-ERDA
Government Relations-EES
20 Massachusetts, N.W.
Washington, D.C. 20545

Dear Ms. Romo:

We wish to thank you for the assistance and guidance provided to us in reference to our original implementation plan. This final implementation plan has incorporated your suggested changes.

The only major change from our original proposal is in the area of the budget. We have attempted to simplify the budget allocation by placing all contractual obligations and the EES technical staff support within each of the three (3) program areas. Furthermore, we have incorporated within the category of administration, all managerial field and clerical personnel including operating costs, i.e., travel, supplies and equipment. The unallocated category is to be used within the small business program when a specific need has been established. The funds allocated to program areas have been revised for the following reasons:

1. The agricultural component has been increased from the original proposal to facilitate incorporation of an irrigation pump audit program. We feel this new program will be most beneficial to the farm and ranch operators of New Mexico and, furthermore, this program was highly endorsed by the Cooperative Extension Service for whom we rely on to establish the primary needs of the agricultural component within the pilot program.
2. The small business component appears to have decreased, but in reality, a large percentage of the funds within the administration category could be allocated to the small business component. This can be justified by the fact that the majority of the small business program will be expedited by EES field and staff personnel and volunteers.

Ms. Estella Romo
December 20, 1977
Page two

The residential component is consistent with the original proposal but we wish to request approval for the changes previously mentioned within the other two program areas.

We appreciate and look forward to your continuous support in assisting us during this pilot program.

FELIZ NAVIDAD,

FRANK J. MARQUEZ
EES Director

FJM/RR/vm

STATE EES PROGRAM AND TECHNICAL SUPPORT
MANAGEMENT
ADMINISTRATION AND FIELD OFFICE SUPPORT

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Staffing ¹	Budget			
		To provide Management for the Delivery of services program within Energy Conservation to the residential, small business and agricultural sector of the State.	EES Staff with a Central office in Santa Fe and five (5) field offices in Las Cruces, Albuquerque, Santa Fe, Roswell and Farmington. By appropriate contracting with agencies such as: 1. The three(3) Energy Institutes of UNM 2. The Cooperative Extension Service 3. The New Mexico Solar Energy Assoc. 4. State Agencies 5. Other groups	1. EES Director 100% one person full-time to administer overall EES Program. 1. EES Field Operations Manager 100%. One person full-time to direct central staff and field Liaison officers across the state. 5. EES Liaison officers 100%. Five full-time persons to administer EES Field offices for the delivery of services in five district offices. 1. Account-Auditor one person to manage EES Fiscal matters. 5 Clerical support personnel	<u>Personnel</u> ² Professional/Technical 121 8 167,043 Secretarial/Clerical 67 5 52,776 Volunteers --- --- --- Subtotal - Personnel 188 13 219,819 <u>Other Costs</u> ³ Total 188 13 332,164			

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. EXHIBIT 1
ADMINISTRATION
omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits

RESIDENTIAL COMPONENT # 1----HOMEMAKERS

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
						Person- Month	Number of Persons	EES Grant Funds	Other Funds
5,000 homemakers distributed state- wide; possibly increase to 15,000	Techniques in gen- eral weatherization and conservation in the home; minor building and me- chanical retrofit; no-cost behavioral adaptation for energy saving; fun- damental solar process facts	Workshops provided by 250 home- maker lead- ers who have been trained by 50 home economists; an average of 30 work- shops per month for 16 months to an av- erage au- dience of 10.	250 homemaker leaders who have been trained by 50 home econ- omists.	Target au- dience will become energy conscious and will take spe- cific steps to conserve energy.	1 residential specialist 30% time for 16 months to implement and coordinate the program, and to provide technical as- sistance				
						<u>Personnel</u> ²			
						Professional/Technical	49.8	54	18,781
						Secretarial/Clerical			
					250 homemaker leaders, vol- unteers, 2% time for 16 months.	Volunteers	12.0	250	
						Subtotal - Personnel	52.8	304	18,781
						<u>Other Costs</u> ³			
								9,900	
						Total		28,681	
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>				
		Training in weatheriz- ation, con- servation, for 50 home econ- omists.	UNMEI and NMSU-EI to train 50 home econo- mists.		3 specialists working full- time for 3 months to design and present the program to 50 home economists.				
		Training in weatheriz- ation, etc., for 250 homemaker leaders.	50 home eco- nomists to train 250 homemaker leaders		50 home econ- omists 5% time to train 250 homemaker leaders				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. Omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

STATE EES PROGRAM SERVICES AND TECHNICAL SUPPORT

RESIDENTIAL PROGRAM # 2, LOW INCOME

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
Approximately 15% of 73,000 low income home- owners (10,800) distributed statewide.	General weather- ization procedures and techniques of minor mechanical and building retro- fit operations; no-cost adoptions of energy conserva- tion, and behav- ioral adaptation	Forty workshops, counseling, and training provided by neighbor- hood and community workers, over a 14-month period	40 Community Action Agency workers under contract with Human Resource Division	Target audi- ence will take one or more steps to re- duce energy consumption.	1 residential specialist 25% time to plan, imple- ment, and coordinate the program, 14 months. 40 CAA work- ers 20% time to deliver program, 14 months. <u>Related Technical Support</u>	<u>Personnel</u> ² Professional/Technical Secretarial/Clerical Volunteers Subtotal - Personnel <u>Other Costs</u> ³ Total	Person- Month	Number of Persons	EES Grant Funds	Other Funds
		<u>Related Technical Support</u>	<u>Related Technical Support</u>							
		Training for 40 Com- munity Ac- tion Agency workers in techniques of weather- ization and no-cost conservation	University of New Mexico Energy Insti- tute							
					Two special- ists one day to in- struct Com- munity Action workers					

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
Omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

RESIDENTIAL PROGRAM # 3---RESIDENTIAL ENERGY AUDITS

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
Approximately 20% of 150,000 owner- occupied dwellings statewide (about 30,000) including some low-income homeowners. (Does not include mobile homes.)	Measurement of structural energy efficiency, pri- marily of the build- ing envelope.	2-zone energy audit of the Class "B" type, with recommendations to homeowner, at a rate of 2,500 per month for 12 months.	EES	Specific energy conservation action will be taken by target audience from recommendations made in energy audits	1 residential specialist 5% time for 12 months to monitor. 1 public information specialist 10% time for 12 months to publicize program.					
						<u>Personnel²</u>	Person- Month	Number of Persons	EES Grant Funds	Other Funds
						Professional/Technical	30.6	5	51,000	
						Secretarial/Clerical	84.0	7	39,000	
						Volunteers				
					Subtotal - Personnel			90,000		
					<u>Other Costs³</u>			80,000		
					Total			170,000		
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>					
		Computer capability to process audits	UNM-EI to provide data processing and computer capability		1 full-time systems analyst for computer work for 12 months 2 full-time auditors to maintain quality control, 12 months sec-cler full-time, 12 months to process data					

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. EXHIBIT 1
Omit secretarial/clerical staff. Page 3

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

STATE EES PROGRAM SERVICES AND TECHNICAL SUPPORT

RESIDENTIAL COMPONENT # 4 MOBILE HOME WEATHERIZATION

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
Approximately 5% of 50,000 mobile home owners (2,500) located in northwest quad- rant of state. (From Albuq- north and from Albuquerque west.)	Specific weather- ization techniques and energy conser- vation measures for mobile home dwellers; minor and major building retrofit applications and no-cost adoptions.	About 50 3-hour workshops, & group training provided focusing on special problems of weatherizing mobile homes, to an av- erage au- dience of 50.	UNM Energy Institute	Target au- dience will take specific energy con- servation action	1 program specialist 10% time to help plan and implement the program 1 researcher 1/4 time to collect and analyze data 1 specialist 1/4 time to present workshops	<u>Personnel</u> ²			
						Professional/Technical	9.0	3	14,115
						Secretarial/Clerical			
						Volunteers			
						Subtotal - Personnel	9.0	3	14,115
						<u>Other Costs</u> ³			
						Total	9.0	3	14,115
		<u>Related Technical Support</u>	<u>Related Technical Support</u>						
		None requir- ed.	None required						

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities
omit secretarial/clerical staff.

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

RESIDENTIAL, AGRICULTURAL, AND SMALL BUSINESS PROGRAM # 5---HOTLINE

EXHIBIT 1
Page 5

STATE EES PROGRAM SERVICES AND TECHNICAL SUPPORT

RESIDENTIAL, AGRICULTURAL, AND SMALL BUSINESS PROGRAM # 6---SPEAKERS BUREAU

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
						Personnel ²	Person- Month	Number of Persons	EES Grant Funds
Business, civic, professional, or agricultural groups and organizations (approximately 8,000 individuals)	General information on the energy situation. Technical information on energy conservation technologies and alternative energy technologies.	Speakers Bureau 16 presentations per month for 13 months to an average audience of 40.	EES staff, ECS staff, ERB staff, professionals from Speakers Bureau, including local experts from universities, industry and energy action groups	Create energy awareness in audience members, stimulate individuals to be energy conscious and to seek alternative sources.	2 specialists 10% time for three months to design program and establish the Bureau 1 public information specialist 5% time to promote the program, 13 mos. Speakers Bureau composed of 99 experts in some aspect of conservation, volunteer.	Professional/Technical	2.9	3	28,800
						Secretarial/Clerical	3.5	99	
						Volunteers			
						Subtotal - Personnel	6.4	102	
						Other Costs ³			5,000
						Total	6.4	102	19,000
		RELATED TECHNICAL SUPPORT	RELATED TECHNICAL SUPPORT		RELATED TECHNICAL SUPPORT				
		None needed	None needed		None needed				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. Omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

RESIDENTIAL, AGRICULTURAL, AND SMALL BUSINESS PROGRAM # 7----MEDIA

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
						Person-Month	Number of Persons	EES Grant Funds	Other Funds
Approximately 75% of state population of 1.1 million (750,000)	General and specific information on con- servation techniques Support of other programs where pub- licity is vital for the success of the program, e.g., publicizing the audit program, the hotline, Speak- ers Bureau, etc.	TV and radio spots, ads and coupons, in newspa- pers, blurbs in period- icals, special brochures, etc., as appropriate to publi- cize the program; displays at fairs and special events	EES staff	Audience will become aware of importance of energy con- servation; audience will be apprised of local and statewide energy-related programs in which they may be interested	1 information specialist 80% time to plan and co- ordinate pro- gram, for 15 mo 3 specialists in residential, agricultural, and small business to help prepare information programs and publicity, for 15 months				
						<u>Personnel</u> ²			
						Professional/Technical	14.2	4	20,000
						Secretarial/Clerical			
						Volunteers			
						Subtotal - Personnel	14.2	4	20,000
						<u>Other Costs</u> ³			50,000
						Total	14.2	4	70,000
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>				
		Institutes to provide minor tech- nical sup- port as needed	UNMEI NMSUEI		Incidental minor support				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
Omit secretarial/clerical staff.

EXHIBIT 1
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Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

RESIDENTIAL PROGRAM # 8 ----- ATTACHED SOLAR GREENHOUSES

Other costs include travel, supplies, and equipment (if not included in indirect costs).

STATE EES PROGRAM SERVICES AND TECHNICAL SUPPORT

RESIDENTIAL PROGRAM # 9 -----CONVECTION HEAT LOOP WINDOW BOXES, SOLAR

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
						Person- Month	Number of Persons	EES Grant Funds	Other Funds
1,000 interested citizens, state- wide, in selec- ted locales	Construction of con- vection loop window box solar heat col- lector for supple- mental heat.	25 1-day workshops to an av- erage au- dience of 40 in how to con- struct a window box heat loop.	NMSEA through NMSU-EI	Members of target au- dience will be able to construct their own window heat box.	NMSEA through NMSU-EI 2 instructors to conduct work- shops, 20% time for 6 months				
						<u>Personnel</u> ²			
						Professional/Technical	2.4	2	5,300
						Secretarial/Clerical			
						Volunteers			
						Subtotal - Personnel	2.4	2	5,300
						<u>Other Costs</u> ³			1,000
						Total	2.4	2	6,300
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>				
		None needed	None needed		None needed				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities EXHIBIT 1
omit secretarial/clerical staff. Page 9

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

STATE EES PROGRAM SERVICES AND TECHNICAL SUPPORT
RESIDENTIAL PROGRAM # 11 ----- CLASS "C" ENERGY AUDITS

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
Approximately 20% of 150,000 owner-occupants (30,000), state- wide.	Analysis of building envelope thermal efficiency.	Class "C" energy audit at an average rate of 2,500 per month for 12 months	EES staff	Target au- dience will become aware of the ther- mal ineffi- ciencies in their resi- dences and will take action to correct them.	1 residen- tial special- ist 10% time to plan and coordinate the program, 12 months					
						<u>Personnel</u> ²	Person- Month	Number of Persons	EES Grant Funds	Other Funds
						Professional/Technical	1.2	1	1,400	
						Secretarial/Clerical				
						Volunteers				
					Subtotal - Personnel	1.2	1	1,400		
					<u>Other Costs</u> ³ (Postage)			4,000		
					Total	1.2	1	5,400		
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>					
		Develop a self- instruction- al manual or workbook for home owners to enable them to conduct their own audit	UNM-EI to develop manual		1 staff mem- ber full-time for 1 month to develop the manual					

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities, **EXHIBIT 1**
omit secretarial/clerical staff. **Page 11**

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits.

Agricultural Program #1

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
1,000 elderly & handicapped throughout the state.	Assessment of energy conservation needs within the rural environment and application of weatherization techniques.	30 4-H clubs will participate in 30 "Community Pride" type of projects in which they par- ticipate & provide assistance to elderly or handi- capped in- dividual within their community in the techniques of weath- erization & energy conserva- tion.	30 4-H youth clubs	Provide 400 elderly or handicapped persons with assistance in weath- erizing their homes.	1 EES Pro- gram Spec, total person/ month - .33					
						<u>Personnel</u> ²				
						Professional/Technical	7.8	1	3131	
						Secretarial/Clerical				
						Volunteers	20	650		
						Subtotal - Personnel	27.8	651	3131	
						<u>Other Costs</u> ³				
						Total	27.8	651	4515	

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits Page 12
(if not included in indirect costs).

EXHIBIT 1

Agricultural Program #3

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
8,000 4-H youth statewide	Energy conservation around the farm or ranch.	40 work/ study pro- grams conducted by the Coop Ext. staff, est., attendees per work- shop 20. 4-H youth not able to attend the workshop will be given training by the 50 Coop Ext. agents or the 600 4-H youth leaders. RTS Development of publica- tion and material needs in the work- shops by NMEI.	Coop Ext. Staff Coop Ext. Agents 600 4-H leaders RTS Development of publica- tion and material needs in the workshops by NMEI.	Adoption of energy con- servation method by 50% of target audience	3 Coop Ext. Staff - 3 person/month 50 Coop Ext. Agents - 3 person/month (volunteers). 600 4-H leaders - 4 person/month (volunteers). 1 EES Prog. Spec. .50 person/ month RTS Unallocated				
						Personnel ²			
						Professional/Technical	3.5	4	4131
						Secretarial/Clerical			---
						Volunteers	35.0	650	---
						Subtotal - Personnel	38.5	654	
						Other Costs ³			461
						Total	38.5	654	4592

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

EXHIBIT 1
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Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Agricultural Program #4

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
30,000 4-H youth through- out the state.	General home weath- erization techniques for the rural home- owner directed toward the youth.	Information and 50 training sessions provided to the 600 4-H youth leaders.	4-H youth leaders.	Awareness of weatheriza- tion tech- niques by 100% of target	1 Program Spec. EES staff - 1 per month 600 4-H youth leaders - 74 per month as volunteers.				
		RTS Preparation of brochures and pamph- lets to be directed toward youth. Training for 600 youth leaders.				Personnel ² Professional/Technical Secretarial/Clerical Volunteers Subtotal - Personnel	2 -- 80 82	4 -- 650 654	6355 -- -- 6355
			RTS 50 Co-op Ex- tension Agents to train 600 4-H youth leaders.		RTS 50 Coop Ext. Agents - 16 per month as volunteers NMEI 3 Staff (1 per month)	Other Costs ³ Total			461 6816

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
Basic secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Agricultural Program #5

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
Approximately 3,904 farm and ranch operators throughout the state.	Agricultural pro- ducer awareness of increased opera- tional efficiencies of field machines and power units.	50 Educa- tional meetings, mass media, publica- tions.	50 Coop Ext. Agents, EES Staff & Field agents, and speakers bureau.	Awareness of energy efficient operation of field machinery by 50% of target audience.	50 Coop Ext. Agents - 1 person month	<div>Personnel²</div> <div>Professional/Technical</div> <div>Secretarial/Clerical</div> <div>Volunteers</div> <div>Subtotal - Personnel</div> <div>Other Costs³</div> <div>Total</div>	Person- Month	Number of Persons	EES Grant Funds	Other Funds
		County Extension Agents with a substan- tial number of field machines & power units in their counties will hold educational meeting on operational efficiencies of field machines & power units.			1 member of Speakers Bureau - 1 person month		1.5	51	7251	
					1 EES Pro- gram Spec. - .50 person month		1	1	661	
							1	1		
							3.5	53	7912	
									540	
						3.5	53	8542		
		No RTS	No RTS		No RTS					

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
Omit secretarial/clerical staff.

EXHIBIT 1
Page 16

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Agricultural Program #6

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
3,904 irrigated farms. Major emphasis will be directed toward counties with larger irrigated acreage. Target audience will be 50% of 3,904 farm and ranch unit operations. Mass mailing will be sent to 10,000 farm and ranch operators statewide.	Agricultural producer awareness of improved design and management of irrigation systems for energy conservation.	Extension Agents in counties with substantial irrigated areas will conduct awareness program on subjects identified with local planning groups.	50 Educational meetings, mass media, bulletins and personal contacts. 50 Coop Ext. Agents, EES Staff and Field agent and Speakers Bureau.	Adoption of energy efficient irrigation systems on 2% of 3,904 farms. A multiplier effect is expected.	50 Coop Ext. Agents - 1 person month. 1 member of speakers bureau - 1 person month 1 EES Program Spec. - .50 person month				
						<u>Personnel</u> ²			
						Professional/Technical	1.5	51	7251
						Secretarial/Clerical	1	1	661
						Volunteers	1	1	
						Subtotal - Personnel	3.5	53	7912
						<u>Other Costs</u> ³			540
						Total	3.5	53	8452
		No RTS	No RTS		No RTS				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. Limit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

Agricultural Program #7

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
Approximately 50% of 10,700 farm and ranch operators throughout the state.	Agricultural pro- ducer awareness of possible substitu- tion of alternative energy sources such as wind, geothermal, and solar energy.	50 Educa- tional meetings, mass media, publications.	50 Coop Ext. Staff, EES Staff and field agents, EES Speakers Bureau.	Target audience to be aware of alternative energy sources.	50' Coop. Ext. Agents to organize group meeting 1 person month -1 member of the speakers bureau 1 person month -1 EES Pro- gram Spec. .50 person month				
		Extension Agents in conjunction with local planning group will carry out energy awareness programs on alternative energy sources such as wind, geothermal and solar energy.				Personnel ²			
						Professional/Technical	1.5	51	7251
						Secretarial/Clerical	1	1	661
						Volunteers	1	1	
						Subtotal - Personnel	3.5	53	7912
						Other Costs ³			540
						Total	3.5	53	8452
		No RTS	No RTS		No RTS				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

EXHIBIT 1

Page 18

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Agricultural Program #8

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
							Person- Month	Number of Persons	EES Grant Funds	Other Funds
50% of 3,904 irrigated farm operators in affected countries.	Agricultural producer awareness of alternative production, harvesting and delivery systems that are fuel efficient.	50 Educa- tional meetings, mass media, publications. Extension Agents in Agronomic counties conduct energy awareness program planned with local advisory group that include information on alter- native production, harvesting and delivery systems that are fuel efficient.	Co-Op Ex- tension Service, 50 agents	Awareness and adaption of energy efficient systems by 2% of target audience.	50 Coop Ext. Agents - 1 person month 1 member of Speakers Bureau - 1 person month 1 EES Program Spec. - .50 person month					
						<u>Personnel</u> ²				
						Professional/Technical	1.5	51	7251	
						Secretarial/Clerical	1	1	661	
						Volunteers	1	1		
						Subtotal - Personnel	2.5	53	7912	
						<u>Other Costs</u> ³			540	
						Total	3.5	53	8452	
		No RTS	No RTS		No RTS					

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

EXHIBIT 1
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(if not included in indirect costs).

SIXTH EES PROGRAM SERVICES AND TECHNICAL SUPPORT

Agricultural Program #9

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
Approximately 5,000 farms or ranches with reported livestock.	Agricultural pro- ducer awareness of potential energy savings in live- stock management including feed handling, waste disposal, trans- portation, water heating, water distribution, and grazing systems.	50 Educa- tional meetings, mass media, bulletins and person- al contacts.	50 Coop Ext. Agents, EES Staff & field agents and speakers bureau.	Livestock producer awareness of methods for energy con- servation in livestock management.	50 Coop Ext. Agents - 1 person month 1 member of Speakers Bureau - 1 person month 1 EES Pro- gram Spec. - .50 person month				
						<u>Personnel</u> ²			
						Professional/Technical	1.5	51	7251
						Secretarial/Clerical	1	1	661
						Volunteers	1	1	
						Subtotal - Personnel	3.5	53	7912
						<u>Other Costs</u> ³			540
						Total	3.5	53	8452
		No RTS	No RTS		No RTS				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

EXHIBIT 1
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Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

STATE EES PROGRAMS: GENERAL AND TECHNICAL SUPPORT

Agricultural Program #10

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
Producers with irrigation wells in seven counties which represent the greatest potential for energy savings: Curry, Lea, Roosevelt, Chaves, Dona Ana, Eddy, Luna. Total Contacts will be 3,000 farm & ranch operators.	Agricultural pro- ducer awareness of inefficient irrigation pumping plants through a testing and informa- tion program in selecting high energy use counties.	490 Audits Pump testing, educational meetings, mass media, personal contacts.	Coop Ext. Ser. Staff	Testing of 490 pumping units and providing information to the owner for repairs and improve- ments that will result in efficient energy con- sumption of the pumping unit. A multiplier effect is expected from the program.	1 EES Prog. Spec. .50 per month 9 Coop Ext. Staff Spec. 2.5 person month 1 Sec. 3 per month				
						<u>Personnel</u> ²			
						Professional/Technical	22.5	10	36,500
						Secretarial/Clerical	3	1	3,000
						Volunteers			
						Subtotal - Personnel	25.5	11	39,500
						<u>Other Costs</u> ³			30,900
						Total	25.5	11	70,400
		No. RTS	No RTS		No RTS				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Small Business Class "C" Energy Audits Program (#1)

Professional staff supported by funds from DOE, EPA grant and other sources including subcontracts and volunteer staff who work on EES activities. Limit secretarial/clerical staff.

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

STATE FIN PROGRAM SERVICES AND TECHNICAL SUPPORT

SMALL BUSINESS PROGRAM # 2

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
							Person- Month	Number of Persons	EES Grant Funds	Other Funds
27,000 owners of general small businesses statewide with equal distribu- tion based on EES Field Dis- trict small business totals	Solar and/or other alternate energy techniques and tech- nologies as applied to small business operations. This will include retro- fit applications for existing struc- tures and new build- ing design	On-site tours and workshops at 10 different business firms loc- ated around the state that use solar/alter- nate energy forms (10 workshops at each of the 10 sites) over a per- iod of 14 months, with 7 workshops conducted per month beginning March 1, 19- 78. Expect- ed attn: 50 per workshop	EES New Mexico Solar Energy Association Speaker Bur. Business Op- erators NMSUEI	To stimulate interest of 5,000 members of the small business sec- tor to seek new power sources such as solar or biomass. To convince between 1-3% of the 5,000 to adopt new energy source, either wholly or partially	Program Spec. working 33% of his/her time a total of 1 person month to iden- tify specific business types for inclusion in workshops. 14 NMSEA mem- bers to conduct workshops working 25% of the time 1.2 person months. (vol- unteer) 4 speakers bur- eau members for expert lec- tures at work- shops working 1% of their time for 12 person months. (Volunteers) 3 staff members of the NMSEI to develop work- shops, litera- ture and train NMSEA members	Personnel ²	1.75	4	5,800	
						Professional/Technical Secretarial/Clerical Volunteers	1	1	600	
						Subtotal - Personnel	13.2	18	--	
						Other Costs ³	14.95	22	6,400	
						Total			4,000	
							14.95	22	10,400	
		RTS	RTS							
		Plan and conduct workshops.	NMSU-EI			RTS: to conduct workshops Requires 42% of each members time working .75 months				

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

EXHIBIT 1
Page 23

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

RESIDENTIAL PROGRAM # 10 ----- TROMBE WALLS--SOLAR HEAT COLLECTION

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget				
1,000 interested citizens, state- wide, in selec- ted locales	Construction of con- vection loop Trombe walls for solar heat collection and storage.	25 1-day workshops and hands- on instruc- tion in the construction of convec- tion loop Trombe wall	NMSEA through NMSU-EI.	Members of targeted au- dience will be able to construct their own Trombe wall	NMSEA through NMSU-EI 2 instructors to conduct workshops and concepts, 20% time for 6 months.					
						<u>Personnel</u> ²				
						Professional/Technical				
						Secretarial/Clerical				
						Volunteers				
						Subtotal - Personnel				
<u>Other Costs</u> ³										
Total										

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
Dmit secretarial/clerical staff.

EXHIBIT 1
Page 10

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

ENERGY MANAGEMENT SMALL BUSINESS PROGRAM (#3)

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget								
						Person- Month	Number of Persons	EES Grant Funds	Other Funds					
27,000 owners of general small businesses statewide	Building Energy Management. Capture and reuse of heat lost in commercial process. Major/Minor building envelope and mechanical retrofit options.	10 half-day workshops/ shortcourses at each of the 5 field districts to dissemin- ate general and specific approaches and appli- cations of techniques and tech- nologies at a rate of 4 work- shops per month for 11 months. (Attn: 100 per work- shop)	EES Speakers Bureau Gas and Elec- tric Utility Bill Stuffers Chamber of Commerce UNMEI RTS: From UNMEI, Speak- ers Bureau	To reach 10,000 small businesses through work- shops/short- courses and brochures. To have at least 1% of participants to take steps to modify building com- ponents for energy efficiency. To have at least 10% of participants take energy conservation steps of any sort. To reach 27,000 small busi- nesses via utility bill stuffers relaying general bldg. Energy Management Tips.	1 - Program Specialist to coordinate workshops, determine workshop needs, brochure needs, working 10% of his/her time for .75 person/ months 4 - Speakers Bureau Members to be avail- able at work- shop presen- tations 1% of their time for 12 person/months. (volunteers) 20 - Chamber of Commerce members to present work- shops 1% of their time for 12 person/months. (volunteers) RTS 3 - UNMEI staff to develop work- shops, brochures and train (of C. members on workshop presentation; 20% of their time for 3 person/months.									
						Personnel ²								
						Professional/Technical	3.75	4	8,500					
						Secretarial/Clerical	1	1	600					
						Volunteers	24	24						
						Subtotal - Personnel					28.75	29	9,100	
						Other Costs ³							2,000	
						Total					28.75	29	11,100	
						RTS								
						Develop and present work shops, print brochures and bill- stuffers.								

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities.
omit secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits
(if not included in indirect costs).

SMALL BUSINESS PROGRAM # 4

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. Limit secretarial/clerical staff.

include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

STATE FOR ECONOMIC SERVICES AND TECHNICAL SUPPORT

UNALLOCATED FUNDS FOR SMALL BUSINESS

Target Audience/ Geographic Area	Energy Techniques and Technologies	Services	Delivery Mechanisms	Outcome Objectives	Staffing ¹	Budget			
							Person- Month	Number of Persons	EES Grant Funds
Small business sector	Not yet determined	Not yet determined	Not yet de- termined	Not yet deter- mined	Not yet deter- mined				
						<u>Personnel</u> ²			
						Professional/Technical			
						Secretarial/Clerical			
						Volunteers			
						Subtotal - Personnel			
		<u>RELATED TECHNICAL SUPPORT</u>	<u>RELATED TECHNICAL SUPPORT</u>		<u>RELATED TECHNICAL SUPPORT</u>	<u>Other Costs</u> ³			
		Not yet determined	Not yet de- termined		Not yet deter- mined	Total			59,053

Professional staff supported by funds from both EES grant and other sources including subcontracts and volunteer staff who work on EES activities. Do not include secretarial/clerical staff.

Include all personnel mentioned under staffing column and secretarial/clerical staff. Costs of paid staff should include salary and fringe benefits (if not included in indirect costs).

Other costs include travel, supplies, and equipment (if not included in indirect costs).

RATE OF SERVICE ACTIVITY:
Residential Component-Ext. Service Home/Weatherization Workshops

Residential
Program #1

RATE OF SERVICE ACTIVITY:

Residential Component - Weatherization for Low Income

Residential Program #2

RATE OF SL .ICE ACTIVITY:

RESIDENTIAL PROGRAM # 3---HOME ENERGY EFFICIENCY AUDITS

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

3,500

3,000

2,500

2,000

1,500

1,000

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
						2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500

EXHIBIT 2

Page 3

PAGE OF SA .ACE ACTIVITY:

RESIDENTIAL PROGRAM # 4---MOBILE HOME WEATHERIZATION

RATE OF SERVICE ACTIVITY:

RESIDENTIAL COMPONENT - HOTLINE

RESIDENTIAL PROGRAM #5

63 weeks - 300 Calls per week - 1300 calls per month

60 calls per day

RATE OF SERVICE ACTIVITY:

Residential Component - Speakers Bureau

Residential Program #6

RATE OF SERVICE ACTIVITY:

Residential Component - Public Information

Residential Program #7

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

Rate of service for public information program will be submitted following the completion of media campaign plans in January, 1978.

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.

STATE OF SE .ICE ACTIVITY:

RESIDENTIAL PROGRAM # 8----ATTACHED SOLAR GREENHOUSES

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

300

250

200

150

100

50

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
						200	200	200	200	200	200						

RESIDENTIAL PROGRAM # 9--HEAT LOOP WINDOW BOXES

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

300

250

200

150

100

50

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
						200	200	200	200	200	200						

RESIDENTIAL PROGRAM # 10 --- TROMBE WALLS

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

300

250

200

150

100

50

DATE OF SERVICE ACTIVITY:

RESIDENTIAL PROGRAM # 11----CLASS "C" ENERGY AUDITS

RATE OF SERVICE ACTIVITY: Youth Assessment of Energy Needs
Agricultural Program #1

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

RATE OF SERVICE ACTIVITY
Alternative Energy Sources
Agricultural Program #2

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

/ = Grants

EXHIBIT 2
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RATE OF SERVICE ACTIVITY: 4-H Energy Conservation

Agricultural Program #3

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

RATE OF SERVICE ACTIVITY

Youth Weatherization Program

Agricultural Program #4

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

5000 .
4000 .
3000 .
2000 .
1000 .
500 .
50 .

Contacts .

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
---	---	---	50	500	1,000	5,000	5,000	5,000	5,000	5,000	3,000	450					

EXHIBIT 2
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RATE OF SERVICE ACTIVITY: Agricultura-field Machine & Power Unit Conservation
Agricultural Program #5

RATE OF SERVICE ACTIVITY

Agriculture - Irrigation Systems
Agricultural Program #6

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

/ = Conference
* = Mass Mailing

EXHIBIT 2
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RATE OF SERVICE ACTIVITY: Agriculture - Alternative Energy Sources

Agricultural Program #7

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

500
450
400
300
200
150
100
50

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
---	---	---	50	400	450	400	450	440	400	440	440	440	400	400	400	400	

Exhibit 2
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RATE OF SERVICE ACTIVITY

Agricultural Program #8

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

Contacts

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
				200	250	250	250	250	250	250	250						

RATE OF SERVICE ACTIVITY

Agricultural Program #9

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

Contacts

500
450
400
300
200

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
					400	400	450	450	450	450	400	400	400	400	400	400	

EXHIBIT 2
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RATE OF SERVICE ACTIVITY

Agricultural Program #10

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

Contacts

Audits

950
900
800
500
300
200
100

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
							190	200	100								
							950	950	500	300	300						

EXHIBIT 2
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RATE OF SERVICE ACTIVITY

Small Business Program #1

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

Contacts

2,500
2,000
1,500
1,000
500

Peak
2,500

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.

500 500 1,000 1,500 2,000 2,500 2,500 2,000 1,000 1,000 500

EXHIBIT 2
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RATE OF SERVICE ACTIVITY

SMALL BUSINESS PROGRAM #2

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

1 = mass mailing to approx. 5,500

RATE OF SERVICE ACTIVITY

Small Business Program #3

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

RATE OF SERVICE ACTIVITY

Small Business Program #4

FY 1978

FY 1979

Oct. Nov. Dec. Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar.

MARKET FACTORS FEEDBACK PLAN

Market Factors Feedback Coordinator: W. G. MAYHON 505-827-2386

Selected Target Audience	Program Service, Delivery Mechanisms, Techniques and Technologies	Possible Topics of Market Factors Feedback	Within-State Energy Decisionmakers	Methods/Responsibility for Collecting Information	Responsibility for Information Analysis and Synthesis	Methods/Responsibility for Reporting to Decisionmaker	Methods/Responsibility for Responding to Target Audience	Staffing Requirements	Budget ERDA Other
Random sampling of 10% of participants in mobile home workshops	Specific weatherization techniques and energy conservation measures for mobile home dwellers. Major and minor building retrofit applications. No cost and low-cost adoptions. Delivery of service will be through a series of 50 3-hour workshops to an average audience of 50. These will be carried out by staff of the UNM Energy Institute under contract to EES.	Installation problems Supply problems Lack of interest Incentive Finances Not worth spending that much time on. Waiting on better or easier way	Construction Industries Commission County & city commission Bankers Association ERB	Feedback directly, during workshop from audience. Later feedback, unsolicited Feedback solicited by phone and mailed questionnaire through random sampling to ten percent.	State EES Director State EES Residential Specialist	Personal letter from, or personal interview requested by State EES Director	Personal letter or phone call from EES office to those of the sample group who encountered problems	10% of residential specialist's time for 8 months to collect MFF data, compile it, and prepare a report.	Personnel Other Total

BUDGET

Category	Budget Level From EES Grant	Amount Provided By Others	Groups Providing These Funds	Total Budget
Program services and related technical support (by target Audience)				
Residential	460,650			460,650
Agricultural	139,633			139,633
Small Business	108,500			108,500
Unallocated	59,053			59,053
Administration	332,164			332,164
Total Direct Costs	1,100,000			1,100,000
Total Indirect Costs	-0-			-0-
Total	1,100,000			1,100,000
NON ADD ON ITEMS				
Information Exchange	(11,985)			(11,985)
Amount of Total	(31,438)			(31,438)
Allocated to Market				
Factors Feedback				
Amount of Total	(24,000)			(24,000)
Allocated to ERDA				
Evaluation				

Budget Categories

Personnel	\$ 286,466
Fringe Benefits	37,240
Travel	25,000
Equipment	10,000
Supplies	12,745
Contractural	663,949
Other*	64,600

TOTAL	\$ 1,100,000
-------	--------------

* Other:

Rent	30,000
Phone Network	14,600
Postage	20,000
	<hr/> 64,600

STAFFING FOR EES

A)	<u>Administrative Function</u>		<u>Salary</u>
	1 EES Director	\$	<u>27,006</u>
	1 Account Auditor		14,165
	2 Clerical		<u>18,998</u>
	Subtotal		<u>60,169</u>
B)	<u>Field Operation Function</u>		
	1 Field Operations Manager		22,272
	5 Field Office Liaisons		84,383
	3 Clerical		<u>27,706</u>
	Subtotal		<u>134,361</u>
C)	<u>Technical Support Function</u>		
	1 Information Specialist		17,216
	2 Hotline Operators		24,500
	3 Program Specialists		<u>50,220</u>
	Subtotal		<u>91,936</u>
		TOTAL	<u><u>286,466</u></u>

ADMINISTRATIVE COSTS

EES Director		
Salary		\$ 27,006
Fringe		3,511
	Subtotal	30,517
 EES Field Operations Manager		
Salary		22,272
Fringe		2,895
	Subtotal	25,167
 5 Field Office Managers		
Salary		84,383
Fringe		10,970
	Subtotal	95,353
 1 Account Auditor		
Salary		14,165
Fringe		1,841
	Subtotal	16,006
 5 Clerical		
Salary		46,704
Fringe		6,072
	Subtotal	52,776
	Total - Admin. Personnel	219,819
 Operational Cost (rent, equip., supplies, travel, etc.)		<u>112,345</u>
	GRAND TOTAL	<u><u>332,164</u></u>

MILESTONE SCHEDULE

NNEES MILESTONE SCHEDULE

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT.	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
A. Start-up Activities																				
1. Implementation Plan																				
a. Complete design of services.																				
b. Develop MFF plan.																				
c. Prepare draft Implementation Plan																				
d. Revise draft & submit final plan.																				
2. Staff																				
a. Determine detailed staff needs.																				
b. Advertize positions.																				
c. Screen & interview applicants.																				
d. Conduct hiring.																				
e. Plan staff training																				
f. Conduct staff training.																				

MILESTONE SCHEDULE

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
A. Start-Up Activities (cont'd.)																				
3. Advisory Board																				
a. Define Board functions	=====																			
b. Establish criteria for selection of members	=====																			
c. Select members		=====																		
d. Plan and conduct meetings		=====	meeting conducted																	
4. General Program Publicity																				
a. Plan publicity program			=====																	
b. Prepare press release																				
c. Design brochures																				
d. Produce and distribute brochures			=====																	
▽ Brochures disseminated																				
5. Negotiate with principal contracting agencies, i.e., Energy Institutes, Community Action Agency, Agricultural Ext. Service, N.M. Solar Energy Assn.																				
	=====																			

NWES
MILESTONE SCHEDULE

RESIDENTIAL
PROGRAM #1

Activity/Tasks	1977		FY 1978		DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	FY 1979		DEC	JAN	FEB	MAR
	AUG	SEPT	OCT	NOV											OCT	NOV				
B. Program Implementation (Cont.)																				
1. Homemakers Weatherization																				
a. Training of Homemakers and CAP agents by Institutes in techniques of weatherization, and how to obtain MFF.																				
b. Homemakers conduct weatherization workshops.																				
c. Conduct formal review of program with Homemakers.																				
d. Analyze MFF; transmit to energy decision makers.																				
e. Prepare progress report to state directors.																				
f. Prepare report on service for interium report to ERDA.																				
g. Prepare final report on service to ERDA																				

MILESTONE SCHEDULE

NRCES MILESTONE SCHEDULE

RESIDENTIAL PROGRAM #2

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (con't.)																				
2. Weatherization for Low Income Homeowners																				
a. Train staff and contractors' staff.																				
b. Publicity notices locally at appropriate times informing public of workshop dates.																				
c. Conduct workshops.																				
d. Individual counseling by field agents and contracting staff members.																				
e. Collect MFF data from participants.																				
f. Progress report for State Director																				
g. Prepare interim report to ERDA.																				
h. Prepare final report to ERDA.																				

MILESTONE SCHEDULE

Residential Program #3

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (cont'd.)																				
3. Energy efficiency audits																				
a. Develop info. brochure																				
b. Train staff in audit procedures																				
c. Conduct audits; send copy to homeowner with recommendations; complete program activity forms & send to ERDA																				
d. Review program with auditing agencies																				
e. Progress report for state dir.																				
f. Prepare material on services to submit with interim report to ERDA.																				
g. Prepare material for final report to ERDA																				

NMES
MILESTONE SCHEDULE

RESIDENTIAL
PROGRAM #4

MILESTONE SCHEDULE

NMEES MILESTONE SCHEDULE

RESIDENTIAL, FARM & SMALL BUSINESS
PROGRAM #5

Activity/Tasks	1977		FY 1978		DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	FY 1979		DEC	JAN	FEB	MAR
	AUG	SEPT	OCT	NOV											OCT	NOV				
B. Program Implementation (con't.)																				
5. Hotline																				
a. Develop information file.																				
b. Develop publicity program.																				
c. Operate hotline; complete program activity forms & send to ERDA.																				
d. Prepare progress report on service for state director.																				
e. Prepare material on service to be included in final report for submission to ERDA.																				
f. Prepare material on service to include in final report for submission to ERDA.																				

RESIDENTIAL PROGRAM # 10----SOLAR HEAT COLLECTION--TROMBE WALLS

Activity/Task	1977		1978												1979			
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN
B. Program Implementation (cont'd)																		
9. Trombe walls																		
a. Schedule workshops with contractor																		
b. Publicize locally at appropriate times																		
c. Conduct workshops																		
d. Conduct review of program with contractor																		
e. Progress report																		
f. Interim report to ERDA																		
g. Final report to ERDA																		

▽ Major Milestone

▽ Completed Major Milestone

Date: _____

MILESTONE SCHEDULE

Residential, Farm & Small Business #6

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT.	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (cont'd.)																				
6. Speakers Bureau																				
a. Develop list of organizations			=																	
b. Survey orgs. to determine interests & needs			=																	
c. Assemble list of potential speakers					=															
d. Contact & secure commitments						=														
e. Develop publicity																				
f. Conduct programs																				
g. Prepare progress report on services for state dir.																				
h. Prepare material on service to include in interim report to submit to ERDA																				
i. Prepare material on service to include in final report for submission to ERDA																				

Speakers Bureau established

Operation Begins

NMES
MILESTONE SCHEDULE

RESIDENTIAL, FARM & SMALL BUSINESS
PROGRAM #7

PUBLIC INFORMATION PROGRAM

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
7. Public Information Program																				
a. Information specialist will establish communication with major T.V. newspapers & Radio stations from state levels.																				
b. Field Agents will communicate with T.V., radio, and newspapers in their areas																				
c. Free and paid advertising Program at state and local levels will be prepared by Info. Specialist & Field Agents in conjunction with program in process at a given time.																				
d. Present Public Info. Program.																				
e. Collect MTF data																				
f. Progress report																				
9. Interim report																				
10. Final report																				

RESIDENTIAL PROGRAM #8--ATTACHED SOLAR GREENHOUSES FOR SPACE HEATING

Activity/Task	1977			FY1978												FY1979				
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	
<div>B. Program Implementation (con't.)</div> <div>8. Solar Space Heating</div> <div>a. Schedule workshops w/contractor (NMSEA)</div> <div>b. Publicize locally at appropriate time.</div> <div>c. Conduct workshops</div> <div>d. Contractor col- lects MFF data & submits to EES.</div> <div>e. Conduct review of program with contractor.</div> <div>f. Progress report.</div> <div>g. Interim report to ERDA.</div> <div>h. Final report to ERDA.</div>																				

▽ Major Milestone

✓ Completed Major Milestone

Date: _____

RESIDENTIAL PROGRAM # 11---CLASS "C" ENERGY AUDITS

Activity/Task	1977		1978												1979	
	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV
B. Program Implementation (cont'd)																
11. Class "C" Energy Audits																
a. Negotiate with contractor & develop audit forms and instructions.																
b. Publicize program																
c. Begin program																
d. Review program																
e. Prepare interim report for ERDA																
f. Prepare final report to ERDA																

▽ Major Milestone

▽ Completed Major Milestone

Date: _____

MILESTONE SCHEDULE
Agricultural Program #1

Activity/Tasks	1977		FY 1978		DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	FY 1979		DEC	JAN	FEB	MAR
	AUG	SEPT	OCT	NOV											OCT	NOV				
B. Program Implementation (Cont.)																				
11. Assessment of energy needs by youth																				
a. Provide training for youth leaders and youth to assess energy conservation needs.																				
b. Youth clubs assist elderly or handicap persons.																				
c. Conduct review of program with youth leaders.																				
d. Prepare progress report for state EES Director.																				
e. Prepare interim report for ERDA.																				
f. Prepare final ERDA Report.																				

MILESTONE SCHEDULE
Agricultural Program #2

Activity/Tasks	1977		FY 1978		DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	FY 1979		DEC	JAN	FEB	MAR
	AUG	SEPT	OCT	NOV											OCT	NOV				
B. Program Implementation (Cont.)																				
12. Alternative energy sources.																				
a. Provide training to youth leaders.																				
b. Youth clubs compete for mini grants.																				
c. Provide mini grants to youth clubs.																				
d. Youth clubs prepare projects.																				
e. Evaluate program progress.																				
f. Prepare and submit progress report to EES Director.																				
g. Prepare interim report to ERDA.																				
h. Prepare final report to ERDA.																				

MILESTONE SCHEDULE
Agricultural Program #3

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
13. Energy Conservation around the farm or ranch.																				
a. Work/study program conducted by Coop Ext. Staff.																				
b. Coop Ext. Agents conduct speaking tour for 4-H Clubs.																				
c. Conduct review with Coop Ext. Agents and 4-H leaders.																				
d. Prepare progress report for EES Director.																				
e. Prepare Interim Report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE

Agricultural Program #4

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
14. General weath- erization for ranch or farm.																				
a. Conduct training for Coop Ext. agents.					=															
b. Coop Ext. agents conduct training for youth leaders.						=====														
c. Youth leaders conduct training and provide information to 4-H youth.						=====														
d. Conduct review of program with Coop Ext. agents and youth leaders.										=====										
e. Prepare progress report for ERDA Director.													=							
f. Prepare progress interim report for ERDA.														=						
g. Prepare final report to ERDA.																	=			

MILESTONE SCHEDULE
Agricultural Program #5

Activity/Tasks	1977		FY 1978											FY 1979						
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
15. Increase operational efficiency of field machinery and power units.																				
a. Conduct speaking engagements for farm and ranch operators.																				
b. Outreach program by Coop. Ext. Agents																				
c. Conduct review with Coop. Ext. Agents.																				
d. Prepare progress report for EES Director.																				
e. Prepare Interim Report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE

Agricultural Program #6

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
16. Improved design of irrigation systems.																				
a. Conduct conferences for farm and ranch operators.																				
b. Mass mailing.																				
c. Conduct review with Coop Ext. agents and farm and ranch operators.																				
d. Prepare progress report for EES operator.																				
e. Prepare interim report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE
Agricultural Program #7

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
17. Substitution of alternative energy sources, i.e. wind, geothermal, etc.																				
a. Outreach by Coop. Ext. Agents to farm & ranch operators.																				
b. Conduct lectures by speakers bureau.																				
c. Conduct review with Coop. Ext. Agents.																				
d. Prepare progress report for EES Director.																				
e. Prepare interim report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE
Agricultural Program #8

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
18. Alternative production, harvesting and delivery systems that are fuel efficient.																				
a. Outreach by Coop Ext Agents to farm and ranch operators.																				
b. Conduct lectures by speakers bureau.																				
c. Conduct review with Coop. Ext. Agents.																				
d. Prepare progress report for EES Director.																				
e. Prepare interim report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE

Agricultural Program #9

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
19. Energy Savings in livestock management																				
a. Substitution of alternative energy sources, i.e. wind, geothermal, etc.																				
b. Conduct lectures by speakers bureau.																				
c. Conduct review with Coop. Ext. Agents.																				
d. Prepare progress report for EES Director.																				
e. Prepare interim report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE

Agricultural Program #10

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont.)																				
20. Irrigation Pumping Audits																				
a. Conduct audits																				
b. Conduct educational meetings by Coop Ext. Staff.																				
c. Conduct review with Coop. Ext. Agents.																				
d. Prepare progress report for EES Director.																				
e. Prepare interim report for ERDA.																				
f. Prepare final report for ERDA.																				

MILESTONE SCHEDULE

Small Business Program #1

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (cont'd)																				
12. Class "C" Energy Audits																				
a. develop information brochure																				
b. train volunteers and staff in audit procedures.																				
c. conduct audits																				
d. review program with volunteers																				
e. prepare progress report for state director																				
f. prepare interim report to ERDA																				
g. prepare final report to ERDA																				

MILESTONE SCHEDULE

Small Business Program #2

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (cont.)																				
B. Alternate Energy																				
a. Prepare material for small business																				
b. Establish contacts for on-site tours																				
c. Conduct tours in conjunction with workshops																				
d. Review program progress with delivery personnel																				
e. Prepare progress report for EES Director																				
f. Prepare interim report for ERDA																				
g. Prepare final report to ERDA																				

MILESTONE SCHEDULE
Small Business Program #3

Activity/Tasks	1977		FY 1978		DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	FY 1979		DEC	JAN	FEB	MAR
	AUG	SEPT	OCT	NOV											OCT	NOV				
B. Program Implementation (cont'd)																				
14. Energy Management																				
a. Develop info. brochures																				
b. Conduct training workshops																				
c. Conduct mass mailing																				
d. Review program with delivery personnel																				
e. Prepare progress report for state director																				
f. Prepare interim report for ERDA																				
g. Prepare final report to ERDA																				

MILESTONE SCHEDULE

Small Business Program #4

Activity/Tasks	1977		FY 1978												FY 1979					
	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR
B. Program Implementation (Cont'd)																				
15. Class B Energy Audits																				
a. Develop into brochure																				
b. Train staff in audit procedures																				
c. Establish mailing list for audit																				
d. Conduct Audits; send copy to owner with recommendations;																				
e. Review program with Energy Institutes																				
f. Prepare program report for state Director.																				
g. Prepare interim report for ERDA																				
h. Prepare final report to ERDA																				

Quarterly Targets Report

Period Covered: Nov 1, 1977 - Jan. 31, 1978

A. Start up Activities

1. Complete Staffing
2. Complete Staff training
3. Issue Press Release
4. Finalize Implementation Plan
5. Complete Negotiations With Contractors

B. Program Implementation

1. Extension Service Home Weatherization Program
 - a. complete contracting negotiations
 - b. complete training of Weatherization teachers
 - c. develop methods for gathering NEF
2. Weatherization for low-income home owners
 - a. complete contract negotiations
 - b. complete training of teachers (Home Ext., & CAP, SEA)
 - c. begin program operation
3. Energy Efficiency Audits
 - a. complete negotiations with contractor
4. Mobile Home Weatherization
 - a. complete negotiations with contractor
 - b. contractor begins staff training & program planning
5. Hotline
 - a. complete information file
 - b. develop publicity program
 - c. begin Hotline operation
6. Speakers Bureau
 - a. complete list of target organizations
 - b. complete list of speakers
7. Public Information Program
 - a. Information specialist contacts media
 - b. Field agents contact media in their area
 - c. Publicity program developed
 - d. Publicity program in operation
8. Solar water and space heating
 - a. Complete negotiations with contractor
 - b. Workshops begun
 - c. NEF data collection begins

Publications/Materials Schedule

Audience	Publications/Material	Schedule
General	New Mexico Solar Energy Businesses (a list)	December 1977
General	Solar Energy Association & Information Services	December 1977
Farm Ranch	Selecting Windmills for Pumping Water	December 1977
Homeowners	Fireplaces	December 1977
Homeowners	Hot Water Heaters	December 1977
Farm Ranch	Windmill Sales and Service in New Mexico	January 1978
General	New Mexico Solar Energy Resources	January 1978
Homeowners	Solar Tax Credits for the Home	January 1978
Homeowners	Homeowners Guide	January 1978
Homeowners	Low-Cost Measures for Homeowners	January 1978
Homeowners	Mobile Homes	January 1978
Homeowners	Appliances	January 1978
Small Business	Energy Saving Measures for Small Businesses	Spring 1978
Homeowners	Lighting	Spring 1978
Homeowners	Shading	Spring 1978
Homeowners	Your House in Summer	Spring 1978
Homeowners	Water-Saving Devices for the Home	Spring 1978
Homeowners	Energy Saving Tips for New Home Buyers & New Home Builders	Spring 1978
Small Business	Energy Saving Measures for Owners of Multiple Unit Dwellings	Spring 1978
Homeowners	Energy Saving Measures for Renters	Spring 1978

Quarterly Targets Report (cont'd)

9. Small business demonstration project

- a. Develop list of possible demonstration projects
- b. Select projects; secure owner permission and commitments

10. Business Structure-Energy Audit

- a. Develop information brochure

C. Evaluation

- a. Begin collecting activity data on all flight(s) programs for EES and ERDA

D. Information Exchange

- a. Submit Quarterly Report

E. Publication/Materials

- a. New Mexico Solar Energy Businesses (a list)
- b. Solar Energy Associations & Information Services
- c. Selecting windmills for pumping water
- d. Windmill sales and service in N.M.
- e. New Mexico solar energy resources
- f. Solar tax credits for the home

Quarterly Targets Report

Period Covered: Nov 1, 1977 - Jan. 31, 1978

A. Start-up Activities

1. Complete Staffing
2. Complete Staff training
3. Issue Press Release
4. Finalize Implementation Plan
5. Complete Negotiations With Contractors

B. Program Implementation

1. Extension Service Home Weatherization Program
 - a. complete contracting negotiations
 - b. complete training of Weatherization teachers
 - c. develop methods for gathering MFF
2. Weatherization for low-income home owners
 - a. complete contract negotiations
 - b. complete training of teachers (Home Ext., & CAP, SEA)
 - c. begin program operation
3. Energy Efficiency Audits
 - a. complete negotiations with contractor
4. Mobile Home Weatherization
 - a. complete negotiations with contractor
 - b. contractor begins staff training & program planning
5. Hotline
 - a. complete information file
 - b. develop publicity program
 - c. begin Hotline operation
6. Speakers Bureau
 - a. complete list of target organizations
 - b. complete list of speakers
7. Public Information Program
 - a. Information specialist contacts media
 - b. Field agents contact media in their area
 - c. Publicity program developed
 - d. Publicity program in operation
8. Solar water and space heating
 - a. Complete negotiations with contractor
 - b. Workshops begun
 - c. MFF data collection begins

Quarterly Targets Report (cont'd)

9. Small business demonstration project
 - a. Develop list of possible demonstration projects
 - b. Select projects; secure owner permission and commitments
10. Business Structure Energy Audit
 - a. Develop information brochure
- C. Evaluation
 - a. Begin collecting activity data on all light(s) programs for EES and FEBA
- D. Information Exchange
 - a. Submit Quarterly Report
- E. Publication/Materials
 - a. New Mexico Solar Energy Businesses (a list)
 - b. Solar Energy Associations & Information Services
 - c. Selecting windmills for pumping water
 - d. Windmill sales and service in N.M.
 - e. New Mexico solar energy resources
 - f. Solar tax credits for the home

Publications/Materials Schedule

Audience	Publications/Material	Schedule
General	New Mexico Solar Energy Businesses (a list)	December 1977
General	Solar Energy Association & Information Services	December 1977
Farm Ranch	Selecting Windmills for Pumping Water	December 1977
Homeowners	Fireplaces	December 1977
Homeowners	Hot Water Heaters	December 1977
Farm Ranch	Windmill Sales and Service in New Mexico	January 1978
General	New Mexico Solar Energy Resources	January 1978
Homeowners	Solar Tax Credits for the Home	January 1978
Homeowners	Homeowners Guide	January 1978
Homeowners	Low-Cost Measures for Homeowners	January 1978
Homeowners	Mobile Homes	January 1978
Homeowners	Appliances	January 1978
Small Business	Energy Saving Measures for Small Businesses	Spring 1978
Homeowners	Lighting	Spring 1978
Homeowners	Shading	Spring 1978
Homeowners	Your House in Summer	Spring 1978
Homeowners	Water-Saving Devices for the Home	Spring 1978
Homeowners	Energy Saving Tips for New Home Buyers & New Home Builders	Spring 1978
Small Business	Energy Saving Measures for Owners of Multiple Unit Dwellings	Spring 1978
Homeowners	Energy Saving Measures for Renters	Spring 1978

Publications/Materials Schedule

Audience	Publications/Material	Schedule
Small Business	3-5 flyers geared to specific types of small business structures and operations	Spring 1978
Agriculture	1-2 energy conservation flyers for agricultural consumers	Spring 1978
Homeowners	Solar Building Codes-What the Homeowner Should Know	Spring 1978
Farm Ranch	Water Pumping Windmills in New Mexico	Spring 1978
General	New Wind Energy Developments	Spring 1978
General	Using the Wind to Generate Electricity in New Mexico	Spring 1978
General	Sources of Wind Energy Information	Spring 1978
Homeowners	Solar Water Heating for the Home	Spring 1978
Homeowners	Heat Pipes	Spring 1978
Homeowners	Heat Pumps	Spring 1978
Homeowners	Solar Greenhouses	Spring 1978
General	1-3 flyers on transportation (speed vs. efficiency, maintenance, size of cars, high altitude adjustments, etc.)	Spring 1978
Homeowners	Whole HOG	Spring 1978
Homeowners	Residential Passive Heating & Cooling Systems	Summer 1978
Homeowners	Residential Active Heating & Cooling Systems	Summer 1978
Low Income	Solar Energy for Low and Fixed Income New Mexico Residents	Summer 1978
Homeowners	Financing Your Solar Home or Business	Summer 1978
General	New Mexico Wind Energy Resources	Summer 1978

STATE OF NEW MEXICO ENERGY CONSERVATION PLAN
ENVIRONMENTAL IMPACT ASSESSMENT

TBTU SAVINGS PER PROGRAM

	GAS	NET ¹ NON-ELECTRICAL COMMERCIAL			RESIDENTIAL		NET ¹ ELECTRICAL
		N GAS	D OIL	R OIL	N GAS	D OIL	
ESP/STATE AGENCIES	-	0.753	0.049	0.041	-	-	0.125
EMP/STATE AGENCIES	0.191	-	-	-	-	-	-
ESP/PUBLIC SCHOOLS	-	4.436	0.288	0.243	-	-	0.499
EMP/PUBLIC SCHOOLS	0.047	-	-	-	-	-	-
SOLAR WATER HEAT	-	0.056	-	-	-	-	-
SOLAR PORTABLES	-	0.047	-	-	-	-	-
ESP/C & M GOVT	-	0.979	0.064	0.054	-	-	0.299
EMP/C & M GOVT	0.248	-	-	-	-	-	-
ESP/COMMERCIAL	-	3.818	0.248	0.210	-	-	0.936
ESP/RESIDENTIAL	-	-	-	-	2.557	0.011	0.042
PROJECT CONSERVE	-	-	-	-	2.552	0.040	0.146
WEATHERIZATION	-	-	-	-	4.365	0.019	0.479
SOLAR SUSTENANCE	-	-	-	-	0.009	-	-
ESP/HOSPITALS	-	0.537	0.035	0.029	-	-	0.118
ESP/INDUSTRIAL	-	0.112	0.007	0.006	-	-	0.089
CAR/VANPOOLING	0.018	-	-	-	-	-	-
PROJECT 55	4.192	-	-	-	-	-	-
WASTE OIL	0.002	-	-	-	-	-	-
UTILITIES	-	-	-	-	-	-	1.042
AGRICULTURE	-	-	-	-	-	-	-
PROCUREMENT	-	-	-	-	-	-	-
MODIFICATION	-	-	-	-	-	-	-
PUB. INFORMATION	-	-	-	-	-	-	-
ADMINISTRATIVE	-	-	-	-	-	-	-
TOTAL	4.698	10.738	0.691	0.583	9.483	0.070	3.775

¹ Savings minus energy additions.

TALLY SHEET
OF REDUCTIONS IN EMISSIONS, ETC.
(WATER)

	ACIDS	BASES	DIS. SOLIDS	SUS. SOLIDS	NON-DEG. ORG	BIO. O.D.	CHEM. O.D.
GASOLINE VEHICLES	-	-	-	-	-	-	-
DIESEL BUS	-	-	-	-	-	-	-
REFINERY, VEHICLE FUEL	-	-	1.88	3.57	11.32	3.57	21.89
SPACE HEAT, COMMERCIAL-GAS	-	-	-	-	0.22	-	-
SPACE HEAT, COMMERCIAL-DIST. OIL	-	-	0.28	0.53	1.66	0.53	3.22
SPACE HEAT, COMMERCIAL- RES. OIL	-	-	0.23	0.44	1.41	0.44	2.72
SPACE HEAT, COMMERCIAL-COAL	-	-	-	-	-	-	-
SPACE HEAT, RESIDENTIAL-GAS	-	-	-	-	0.19	-	-
SPACE HEAT, RESIDENTIAL-DIST. OIL	-	-	0.03	0.05	0.17	0.05	0.33
ELECTRIC GENERATION-GAS TUR.-GAS	-	-	-	-	-	-	-
ELECTRIC GENERATION-GAS TUR.-OIL	-	-	-	-	-	-	-
ELECTRIC GENERATION-STEAM-GAS	-	-	-	-	-	-	-
ELECTRIC GENERATION-STEAM-OIL	-	-	-	-	-	-	-
ELECTRIC GENERATION-STEAM-COAL	1.73	0.14	8.94	1.29	0.19	-	-
TOTALS	1.73	0.14	11.36	4.59	14.97	4.59	28.16

**TALLY SHEET
OF REDUCTIONS IN EMISSIONS, ETC.
(AIR)**

	PARTICU- LATES	OX. OF NITRO.	SULFUR DIOXIDE	HYDRO- CARBONS	CO	CO ₂	ALDEHYDES
GASOLINE VEHICLES	291.28	1,400.00	70.47	944.30	9,959.76	350,001.00	-
DIESEL BUS	-	-	-	-	-	-	-
REFINERY, VEHICLE FUEL	15.03	122.15	110.40	122.15	14.09	-	19.50
SPACE HEAT, COMMERCIAL-GAS	99.33	1,632.82	3.37	42.42	104.37	655,018.00	52.62
SPACE HEAT, COMMERCIAL-DIST. OIL	39.57	167.90	94.98	25.68	51.83	58,735.00	7.88
SPACE HEAT, COMMERCIAL-RES. OIL	46.68	132.28	315.11	21.22	2.02	49,555.00	4.37
SPACE HEAT, COMMERCIAL-COAL	-	-	-	-	-	-	-
SPACE HEAT, RESIDENTIAL-GAS	87.62	1,209.08	2.94	37.55	91.80	578,463.00	46.09
SPACE HEAT, RESIDENTIAL-DIST. OIL	2.74	4.84	9.55	2.60	1.46	5,950.00	0.79
ELECTRIC GENERATION-GAS TUR.-GAS	0.18	1.80	0.33	0.03	0.07	212.00	-
ELECTRIC GENERATION-GAS TUR.-OIL	0.39	3.63	1.39	0.34	1.91	814.00	0.04
ELECTRIC GENERATION-STEAM-GAS	6.48	251.54	0.26	17.26	0.18	53,436.00	2.98
ELECTRIC GENERATION-STEAM-OIL	83.33	1,049.80	1,526.74	91.00	7.95	232,985.00	20.56
ELECTRIC GENERATION-STEAM-COAL	9.47	49.76	58.49	1.20	3.30	14,872.00	0.10
TOTALS	682.10	6,031.60	2,193.73	1,306.02	10,238.74	2,000,041.00	154.93

TALLEY SHEET
OF REDUCTIONS IN EMISSIONS, ETC.
(OTHER)

	THERMAL REJECT	OCCUPATIONAL DEATH	OCCUPATIONAL INJURY	OCCUPATIONAL PERSON-DAY LOST	SOLID WASTE
GASOLINE VEHICLES	-	-	-	-	-
DIESEL BUS	-	-	-	-	-
REFINERY, VEHICLE FUEL	-	0.00	0.24	11.75	225.50
SPACE HEAT, COMMERCIAL-GAS	9.56	0.00	0.32	996.49	-
SPACE HEAT, COMMERCIAL-DIST. OIL	-	0.00	0.04	1.73	33.17
SPACE HEAT, COMMERCIAL-RES. OIL	-	0.00	0.03	1.47	28.00
SPACE HEAT, COMMERCIAL-COAL	-	-	-	-	-
SPACE HEAT, RESIDENTIAL-GAS	8.44	0.00	0.28	8.54	-
SPACE HEAT, RESIDENTIAL-DIST. OIL	-	0.00	0.00	0.18	3.36
ELECTRIC GENERATION-GAS TUR.-GAS	0.00	0.00	0.00	0.00	-
ELECTRIC GENERATION-GAS TUR.-OIL	-	0.00	0.00	0.03	0.53
ELECTRIC GENERATION-STEAM-GAS	0.78	0.00	0.07	2.89	-
ELECTRIC GENERATION-STEAM-OIL	2.44	0.00	0.30	13.76	131.57
ELECTRIC GENERATION-STEAM-COAL	35.61	0.01	0.19	13.77	199.42
TOTALS	56.83	0.01	1.04	1,050.61	422.13

STATE OF NEW MEXICO 6/24/77

TABLE VII-2

TITLE: DIRECT EMISSIONS FROM AUTOMOBILE OPERATION

(Environmental Impact per 10^{12} BTU)

Impact	Col. A	Col. B	Col. C
	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.			
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	62	4.698	291.276
Oxides of Nitrogen	298	4.698	1,400.004
Sulfur Dioxide	15	4.698	70.470
Hydrocarbons	201	4.698	944.298
Carbon Monoxide	2,120	4.698	9,959.760
Carbon Dioxide	74,500	4.698	350,001.000
Aldehydes			
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)			
Occupational Injuries (Men)			
Occupational Man Day Lost (Man-day)			
Solid Waste Tons			

TABLE VII-4

TITLE: EMISSIONS FROM PRODUCTION AND DISTRIBUTION OF VEHICLE FUEL

(Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.	0.4	4.698	1.879
Suspended Solids	0.76	4.698	3.570
Non-Degradable Org.	2.41	4.698	11.322
Biological Oxygen Dem.	0.76	4.698	3.570
Chemical Oxygen Demand	4.66	4.698	21.893
AIR (TONS)			
Particulates	3.2	4.698	15.034
Oxides of Nitrogen	26	4.698	122.148
Sulfur Dioxide	23.5	4.698	110.403
Hydrocarbons	26	4.698	122.148
Carbon Monoxide	3	4.698	14.094
Carbon Dioxide			
Aldehydes	4.15	4.698	19.497
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)	0.0007	4.698	0.003
Occupational Injuries (Men)	0.05	4.698	0.235
Occupational Man Day Lost (Man-day)	2.5	4.698	11.745
Solid Waste Tons	48	4.698	225.504

TABLE VII-5

TITLE: SPACE HEAT, COMMERCIAL, NATURAL GAS

(Environmental Impact per 10^{12} BTU)

Impact	Col. A	Col. B	Col. C
	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.	0.02	10.738	0.215
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	9.25	10.738	99.327
Oxides of Nitrogen	152.06	10.738	1,632.820
Sulfur Dioxide	.314	10.738	3.372
Hydrocarbons	3.95	10.738	42.415
Carbon Monoxide	9.72	10.738	104.373
Carbon Dioxide	61,000	10.738	655,018.000
Aldehydes	4.9	10.738	52.616
OTHER			
Thermal Rejection (BTU)	0.89	10.738	9.557
Occupational Death (Men)	0.0002	10.738	0.002
Occupational Injuries (Men)	0.03	10.738	0.322
Occupational Man Day Lost (Man-day)	92.8	10.738	996.486
Solid Waste Tons			

TABLE IV-6

TITLE: SPACE HEAT, COMMERCIAL, DISTILLATE OIL

(Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.	0.4	0.691	0.276
Suspended Solids	0.76	0.691	0.525
Non-Degradable Org.	2.4	0.691	1.658
Biological Oxygen Dem.	0.76	0.691	0.525
Chemical Oxygen Demand	4.66	0.691	3.220
AIR (TONS)			
Particulates	57.26	0.691	39.561
Oxides of Nitrogen	242.98	0.691	167.899
Sulfur Dioxide	137.45	0.691	94.978
Hydrocarbons	37.17	0.691	25.684
Carbon Monoxide	75.00	0.691	51.825
Carbon Dioxide	85,000	0.691	58,735.000
Aldehydes	11.4	0.691	7.877
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)	0.0007	0.691	0.000
Occupational Injuries (Men)	0.05	0.691	0.035
Occupational Man Day Lost (Man-day)	2.5	0.691	1.728
Solid Waste Tons	48	0.691	33.168

TABLE VII-7

TITLE: SPACE HEAT, COMMERCIAL, RESIDUAL OIL
 (Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.	0.39	0.583	0.227
Suspended Solids	0.76	0.583	0.443
Non-Degradable Org.	2.41	0.583	1.405
Biological Oxygen Dem.	0.76	0.583	0.443
Chemical Oxygen Demand	4.66	0.583	2.717
AIR (TONS)			
Particulates	80.06	0.583	46.675
Oxides of Nitrogen	226.9	0.583	132.283
Sulfur Dioxide	540.5	0.583	315.112
Hydrocarbons	36.4	0.583	21.221
Carbon Monoxide	3.47	0.583	2.023
Carbon Dioxide	85,000	0.583	49,555.000
Aldehydes	7.5	0.583	4.373
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)	0.0007	0.583	0.000
Occupational Injuries (Men)	0.049	0.583	0.029
Occupational Man Day Lost (Man-day)	2.52	0.583	1.469
Solid Waste Tons	48.02	0.583	27.996

TABLE VII-9

TITLE: SPACE HEAT, RESIDENTIAL, NATURAL GAS

(Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.	0.02	9.483	0.190
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	9.24	9.483	87.623
Oxides of Nitrogen	127.5	9.483	1,209.083
Sulfur Dioxide	0.31	9.483	2.940
Hydrocarbons	3.96	9.483	37.553
Carbon Monoxide	9.68	9.483	91.795
Carbon Dioxide	61,000	9.483	578,463.000
Aldehydes	4.86	9.483	46.087
OTHER			
Thermal Rejection (BTU)	0.890	9.483	8.440
Occupational Death (Men)	0.0002	9.483	0.002
Occupational Injuries (Men)	0.03	9.483	0.284
Occupational Man Day Lost (Man-day)	0.90	9.483	8.535
Solid Waste Tons			

TABLE VII-10

TITLE: SPACE HEAT, RESIDENTIAL, DISTILLATE OIL

(Environmental Impact per 10^{12} BTU)

Impact	Col. A	Col. B	Col. C
	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.	0.4	0.070	0.028
Suspended Solids	0.76	0.070	0.053
Non-Degradable Org.	2.41	0.070	0.169
Biological Oxygen Dem.	0.76	0.070	0.053
Chemical Oxygen Demand	4.66	0.070	0.326
AIR (TONS)			
Particulates	39.16	0.070	2.741
Oxides of Nitrogen	69.18	0.070	4.843
Sulfur Dioxide	136.45	0.070	9.552
Hydrocarbons	37.17	0.070	2.602
Carbon Monoxide	20.80	0.070	1.456
Carbon Dioxide	85,000	0.070	5,950.000
Aldehydes	11.34	0.070	0.794
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)	0.0007	0.070	0.000
Occupational Injuries (Men)	0.05	0.070	0.004
Occupational Man Day Lost (Man-day)	2.5	0.070	0.175
Solid Waste Tons	48	0.070	3.360

TABLE VII-11

TITLE: ELECTRIC GENERATION, GAS TURBINE (GAS-FIRED)

(Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.			
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	46	0.004	0.184
Oxides of Nitrogen	450	0.004	1.800
Sulfur Dioxide	6.4	0.004	0.026
Hydrocarbons	7.9	0.004	0.032
Carbon Monoxide	17.7	0.004	0.071
Carbon Dioxide	53,000	0.004	212.000
Aldehydes	?		
OTHER			
Thermal Rejection (BTU)	0.89	0.004	0.004
Occupational Death (Men)	0.0002	0.004	0.000
Occupational Injuries (Men)	0.024	0.004	0.000
Occupational Man Day Lost (Man-day)	0.90	0.004	0.004
Solid Waste Tons			

TABLE IV-12

TITLE: ELECTRIC GENERATION, GAS TURBINE (OIL-FIRED)

(Environmental Impact per 10^{12} BTU)

Impact	Col. A	Col. B	Col. C
	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.			
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	35	0.011	0.385
Oxides of Nitrogen	330	0.011	3.630
Sulfur Dioxide	126	0.011	1.386
Hydrocarbons	31	0.011	0.341
Carbon Monoxide	174	0.011	1.914
Carbon Dioxide	74,000	0.011	814.000
Aldehydes	4	0.011	0.044
OTHER			
Thermal Rejection (BTU)			
Occupational Death (Men)	0.0007	0.011	0.000
Occupational Injuries (Men)	0.05	0.011	0.001
Occupational Man Day Lost (Man-day)	2.5	0.011	0.028
Solid Waste Tons	48	0.011	0.528

TABLE VII-13

TITLE: ELECTRIC GENERATION, STEAM (NATURAL GAS-FIRED)

(Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.			
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	7.4	0.876	6.482
Oxides of Nitrogen	294	0.876	257.544
Sulfur Dioxide	0.3	0.876	0.263
Hydrocarbons	19.7	0.876	17.257
Carbon Monoxide	0.2	0.876	0.175
Carbon Dioxide	61,000	0.876	53,436.000
Aldehydes	3.4	0.876	2.978
OTHER			
Thermal Rejection (BTU)	0.89	0.876	0.780
Occupational Death (Men)	0.0008	0.876	0.001
Occupational Injuries (Men)	0.08	0.876	0.070
Occupational Man Day Lost (Man-day)	3.3	0.876	2.891
Solid Waste Tons			

TABLE VI-14

TITLE: ELECTRIC GENERATION, STEAM (RESIDUAL OIL-FIRED)
 (Environmental Impact per 10^{12} BTU)

	Col. A	Col. B	Col. C
Impact	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids			
Bases			
Dissolved Solids, Mis.			
Suspended Solids			
Non-Degradable Org.			
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	30.4	2.741	83.326
Oxides of Nitrogen	383	2.741	1,049.803
Sulfur Dioxide	557	2.741	1,526.737
Hydrocarbons	33.2	2.741	91.001
Carbon Monoxide	2.9	2.741	7.949
Carbon Dioxide	85,000	2.741	232,985.111
Aldehydes	7.5	2.741	20.558
OTHER			
Thermal Rejection (BTU)	0.89	2.741	2.439
Occupational Death (Men)	0.0013	2.741	0.004
Occupational Injuries (Men)	0.109	2.741	0.299
Occupational Man Day Lost (Man-day)	5.02	2.741	13.760
Solid Waste Tons	48	2.741	131.568

TABLE VII-15

TITLE: ELECTRIC GENERATION, STEAM (COAL-FIRED)

(Environmental Impact per 10^{12} BTU)

Impact	Col. A	Col. B	Col. C
	Coefficient for Reduction	Energy Reduction	Resultant Emission Reduction
WATER (TONS)			
Acids	12.1	0.143	1.730
Bases	1.0	0.143	0.143
Dissolved Solids, Mis.	62.5	0.143	8.938
Suspended Solids	9.0	0.143	1.287
Non-Degradable Org.	1.3	0.143	0.186
Biological Oxygen Dem.			
Chemical Oxygen Demand			
AIR (TONS)			
Particulates	66.2	0.143	9.467
Oxides of Nitrogen	348	0.143	49.764
Sulfur Dioxide	409	0.143	58.487
Hydrocarbons	8.4	0.143	1.201
Carbon Monoxide	23.1	0.143	3.303
Carbon Dioxide	104,000	0.143	14,872.000
Aldehydes	0.68	0.143	0.097
OTHER			
Thermal Rejection (BTU)	249	0.143	35.607
Occupational Death (Men)	0.0759	0.143	0.011
Occupational Injuries (Men)	1.32	0.143	0.189
Occupational Man Day Lost (Man-day)	96.26	0.143	13.765
Solid Waste Tons	1,394	0.143	199.342