DOCUMENTATION OF DOE-U535-0-A CALCULATIONS

ILLINOIS ENERGY CONSERVATION PLAN

NOVEMBER 6, 1979

DISCLAIMER

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951 0116

Price Waterhouse & Co.

200 EAST RANDOLPH DRIVE
CHICAGO, ILLINOIS 60601
312-565-1500

November 6, 1979

Mr. Robert H. Bauer
Regional Representative of
the Secretary
U.S. Department of Energy
175 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Bauer:

As a result of a contractual arrangement with the State of Illinois--Institute of Natural Resources, we are submitting to you a completed Form DOE-U535-A-0. This form reports on the estimated energy conservation achieved by programs included in the Illinois Energy Conservation Plan.

The completed Form U535 has been reviewed by the Institute of Natural Resources and the Institute concurs with the data contained therein. Your instructions stipulate that all data on the U535 are to be documented according to a suggested format.

Our documentation follows your suggested guidelines. We have made one addition to the format which we believe is appropriate to fully appreciate the progress that Illinois has made. We have added a section titled "Accomplishments" which describes the likely status of each measure as of December 31, 1979.

Generally, there are four points we believe you should be aware of as you review our submission.

1. The staff in the conservation division of the Institute of Natural Resources is "in place." Turnover has dropped dramatically and the resultant staff continuity is a positive development which strengthens the assumptions of the Illinois Energy Conservation Plan each day.

2. Before the somewhat ambitious conservation goal of 5% can be achieved, it will first be necessary to stimulate a desire to conserve on the part of the Illinois energy consuming community. One method for creating this "desire" is through outreach programs which offer information not only about the need, but also about the methods for conserving energy. As our report explains, Illinois is now making substantial progress in the area of outreach.

3. Our report shows a lower estimate of annual energy savings than that reported by Illinois in 1978. The 1979 estimates, we believe, are realistic and reflect accurately actual savings. Illinois, as we suspect of most states, has not had the resources to launch a commercial/industrial audit program necessary to achieve the targeted results. Utilities have been cautious about implementing conservation activities due to the impending release of RCS, EES, and other regulations. Finally, the Illinois General Assembly has been reluctant to challenge Illinois' traditionally strong concept of local government home rule by legislating a statewide building code.

4. We conducted a thorough evaluation of Project Conserve in Illinois. This evaluation is described in detail in the Appendix. Our evaluation was limited to a sample of those persons who actually completed a Project Conserve questionnaire. Based on preliminary results from 10,500 mailed questionnaries, of which 3,500 have been returned, about one-third of the respondents indicated that Project Conserve helped them to decide to make an energy conservation improvement.

We will be pleased to elaborate on any points raised in our report. Initially, we would prefer that you direct your questions to us through Mr. Steve Thomas at the Institute of Natural Resources who can be reached at (217) 785-2800.

Very truly yours,

Price Waterhouse & Co.

SUMMARY OF 1979 SAVINGS ESTIMATES
ILLINOIS ENERGY CONSERVATION PLAN

INSTITUTE OF NATURAL RESOURCES

(in trillion BTUs)

	Current estimate of 1979 energy savings
State and Local Procurement Standards	4.29
Carpooling, Vanpooling, Public Transit	0.64
Homeowner's Extension Program	12.53
Agricultural Resource Applications	0.30
Commercial Industrial Program	10.90
Public Utilities Program	4.80
Energy Management for State Buildings	1.83
Waste to Energy and Resources Recovery	0.10
Total	35.39

STATE OF ILLINOIS

ENERGY EFFICIENT THERMAL AND LIGHTING STANDARDS (CODE 1)

A. Description of Methodology

The savings estimate for Energy Efficient Thermal and Lighting Standards consists of two components:

- Thermal and Insulation Standards
- Lighting Standards

(See attached summary sheets for detailed methodology.)

B. Definition of Data Elements

The data elements have been described as an integral portion of the methodology description in (A) above.

C. Statement of Assumption

The calculation of energy savings was originally based on the assumption that the thermal and lighting codes and standards would be passed into law by the Illinois General Assembly. These, however, have not been passed by the General Assembly or adopted by the Illinois Commerce Commission. In addition, there has been little success in adoption of the codes and standards by units of local government (see Section N of this report).

1. Thermal efficiency standards

Assumption: Mandatory thermal efficiency standards and insulation requirements will generate 7.3 trillion BTUs of energy savings, or 56% of the planned savings.

Comment: These standards and codes have not been adopted. No savings, therefore, will be generated by this measure in 1979.

2. Lighting Efficiency Standards

Assumption: Mandatory lighting efficiency standards will generate 5.7 trillion BTUs of energy savings, or 44% of the planned savings.

Comment: These standards and codes have not been adopted. No savings, therefore, will be generated by this program in 1979.

D. Data

No data have been collected in connection with this program.

E. Accomplishments

The following is a measure-by-measure account of the accomplishments of this program through the end of 1979.

1. Measure: INR thermal and lighting personnel will promote the adoption of thermal and lighting efficiency standards by Illinois municipalities and counties.

Status: INR personnel have analyzed the two federal laws governing thermal and lighting standards and have found that the two laws conflict. INR personnel have concluded that it would not be prudent at this time to comply with either of the laws, pending resolution of the conflict.

2. Measure: INR thermal and lighting personnel will encourage adoption by either the Illinois Commerce Commission or the General Assembly of thermal and lighting standards. This will include a provision that requires compliance with the standards as a condition for utility service for new buildings.

Status: INR thermal and lighting personnel prepared studies for the legislature to use in adopting thermal and lighting standards. Neither the General Assembly nor the Commerce Commission has adopted this measure to date.

3. Measure: Thermal and lighting personnel will investigate the potential impact of the conflicting federal laws on the promotion of codes to Illinois municipalities and counties.

Status: Thermal and lighting personnel concluded that at this time the state should not make a commitment on a long term basis to either of the two federal laws, pending resolution of the conflict.

INR thermal and lighting personnel determined that promotion of either of these laws would jeopardize their credibility if the federal government should make a commitment to the other law. As a result of Home Rule, implementation of either of the laws would be time consuming, since each municipality and county would have to pass a law.

4. Measure/ Status: INR personnel have prepared a guide for building managers entitled Energy Contingencies Building Management Plan. The guide outlines energy savings measures to be taken under emergency conditions.

INR personnel distributed these booklets at a regular meeting of Building Management personnel, representing eight state agencies (e.g., the Board of Education, Division of Administrative Services). These representatives offered specific suggestions for altering the text to conform to agency requirements. The final copy of the plan will be distributed by the end of 1979.

This measure was not included in the State Energy Conservation Plan.

5. Measure/ Status:

INR personnel have prepared a computer software package and accompanying user manual for a program called CBERS II (Consolidated Building Energy Reporting System). The computer program is designed to improve energy efficiency by providing comparative energy usage data for state buildings.

INR plans to have 200 facilities on-line by the end of 1979.

This measure was not included in the State Energy Conservation Plan.

ENERGY EFFICIENT THERMAL AND LIGHTING STANDARDS

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)
Residential Buildings		
Single family - one unit detached	2412.0 (x 10^9)	228.4 (x 10^9)
Low density - one unit attached and 2-4 unit structures	647.4 (x 10^9)	50.3 (x 10^9)
Low rise - structures with 5 or more units and 3 stories or less	326.6 (x 10^9)	27.5 (x 10^9)
High rise - structures with 5 or more units and 4 or more stories	167.2 (x 10^9)	14.9 (x 10^9)
Non-Residential Buildings		
Office buildings	811.4 (x 10^9)	62.9 (x 10^9)
Retail stores and other mercantile buildings	596.5 (x 10^9)	58.9 (x 10^9)
Educational buildings	452.5 (x 10^9)	43.4 (x 10^9)
Hospitals and other institutional buildings	189.3 (x 10^9)	19.5 (x 10^9)
Other	444.2 (x 10^9)	52.8 (x 10^9)
Subtotals: ΣE_h	6047.1 (x 10^9)	558.6 (x 10^9) ΣE_s
	x	x
F_h	State Heating factor: 1.03 (Table IV.G)	State Cooling factor: 1.98 F_c (Table IV.G)
	=	=
	6228.5 (x 10^9) +	1106.0 (x 10^9) = 7334.5 (x 10^9) x 10^{-3}

Total Energy Savings = 7.3345 ($\times 10^{12}$) E_s Btu's

Summary Formula: $E_s = F_h(\Sigma E_h) + F_c(\Sigma E_c)$

*Detailed Worksheets available from Illinois Institute of Natural Resources.

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:	.2426 ($\times 10^{12}$)
Retail Stores:	.5574 ($\times 10^{12}$)
Schools:	.2182 ($\times 10^{12}$)
Hospitals:	.1731 ($\times 10^{12}$)
Other:	.5175 ($\times 10^{12}$)
SubTotal	1.7088 ($\times 10^{12}$)ΣL_s
Calculate total energy savings in terms of source fuel, by multiplying the subtotal by 3.33, (the factor to correct for generating efficiency).	x 3.33
Total	= 5.6903 ($\times 10^{12}$) E_s

Summary Formula: $E_s = 3.33 \Sigma L_s$

*Detailed worksheets available from Division of Energy.

Water Res 775-0[illegible]
INR

STATE OF ILLINOIS
CONSOLIDATED BUILDING ENERGY CBERS I
REPORTING SYSTEM
CALENDAR YEAR 1977

CBERS II 1/30/78 (BY LOCATION CODE)

ITEM NO. 00001

DEPARTMENT OF MENTAL HEALTH
401 STRATTON BUILDING
SPRINGFIELD, IL 62706

LOCATION CODE – 4620001800000
LOCATION NAME – DIXON DEV. CENTER

PREPARED BY ELS
PHONE (815) 268-5561
BLDG AREA 1,132,008

INDEX	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEP	OCT	NOV	DEC	YR TOTAL TO DATE IN BTU/SF
BTU/SF/MONTH	53,000	57,808	47,556	34,126	28,851	24,580	23,374	25,012	24,918	27,536	34,076	54,458	435,298
PREVIOUS MONTH	54,458	53,000	57,808	47,556	34,126	28,851	24,580	23,374	25,012	24,919	27,536	34,076	
% INCR/DECR	-2.68%	+9.07%	-17.73%	+28.24%	-15.46%	-14.80%	-4.91%	+7.01%	-0.37%	+10.50%	+23.71%	+59.81%	
SAME MO/PREV YR	60,061	52,040	37,281	32,748	25,367	24,059	26,458	26,345	24,576	31,246	41,580	48,471	430,232
% INCR/DECR	-11.76%	+11.08%	+27.56%	+4.21%	+13.73%	+2.17%	-11.66%	-5.06%	+1.40%	-11.87%	-18.05%	+12.35%	
ZONE I UNITS REPORTING	37	37	37	37	37	37	37	37	37	37	37	37	ENERGY USE %INCR/DECR
ZONE RANKING	25	28	18	19	20	20	23	28	22	26	27	28	+1.18%

STATE OF ILLINOIS
CONSOLIDATED BUILDING ENERGY
REPORTING SYSTEM
CALENDAR YEAR 1977

CBERS II 1/30/78 (BY LOCATION CODE)

ITEM NO. 00002

DEPARTMENT OF MENTAL HEALTH
401 STRATTON BUILDING
SPRINGFIELD, IL 62706

LOCATION CODE – 4620004600000
LOCATION NAME – WAUKEGAN MH CTR

PREPARED BY WBZ
PHONE (312) 249-0600
BLDG AREA 211,196

INDEX	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEP	OCT	NOV	DEC	YR TOTAL TO DATE IN BTU/SF
BTU/SF/MONTH	24,010	24,318	20,448	12,699	13,295	10,502	12,296	9,450	11,974	9,417	10,516	19,777	178,702
PREVIOUS MONTH	19,777	24,010	24,318	20,448	12,699	13,295	10,502	12,296	9,450	11,974	9,417	10,516	
% INCR/DECR	+21.40%	+1.13%	-15.91%	-36.44%	+4.69%	-21.00%	+17.08%	-23.15%	+26.71%	-21.35%	+11.67%	+88.07%	
SAME MO/PREV YR	21,472	16,690	13,844	9,919	12,033	11,633	11,420	11,486	10,648	14,995	20,005	23,868	174,763
% INCR/DECR	+11.82%	+45.70%	+47.70%	+28.02%	+10.03%	-9.72%	+7.67%	-17.73%	+12.45%	-37.20%	-47.43%	-17.14%	
ZONE I UNITS REPORTING	37	37	37	37	37	37	37	37	37	37	37	37	ENERGY USE %INCR/DECR
ZONE RANKING	12	10	15	8	9	7	5	6	8	3	4	8	+2.25%

STATE OF ILLINOIS
CONSOLIDATED BUILDING ENERGY
REPORTING SYSTEM
CALENDAR YEAR 1977

CBERS II 1/30/78 (BY LOCATION CODE)

ITEM NO. 00003

DEPARTMENT OF MENTAL HEALTH
401 STRATTON BUILDING
SPRINGFIELD, IL 62706

LOCATION CODE – 4620004900000
LOCATION NAME – E MOLINE MH HOSP

PREPARED BY CWS
PHONE (309) 755-4511
BLDG AREA 546,799

INDEX	JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEP	OCT	NOV	DEC	YR TOTAL TO DATE IN BTU/SF
BTU/SF/MONTH	35,067	34,948	33,180	24,081	22,997	25,616	29,974	28,804	24,572	22,896	28,348	36,962	347,438
PREVIOUS MONTH	36,962	35,067	34,948	33,180	24,081	22,997	25,616	29,974	28,804	24,572	22,896	28,348	
% INCR/DECR	-5.13%	-0.34%	-5.06%	-27.42%	-4.50%	+11.39%	+17.01%	-3.90%	-14.69%	-6.82%	+23.81%	+30.39%	
SAME MO/PREV YR	41,953	33,432	29,286	23,291	25,062	27,531	30,773	29,758	26,179	26,194	32,996	38,308	364,763
% INCR/DECR	-16.41%	+4.53%	+13.30%	+3.39%	-8.24%	-6.96%	-2.60%	-3.20%	-6.14%	-14.09%	-3.51%		
ZONE I UNITS REPORTING	37	37	37	37	37	37	37	37	37	37	37	37	ENERGY USE %INCR/DECR
ZONE RANKING	17	16	12	11	12	15	29	28	21	18	19	22	-4.75%

STATE OF ILLINOIS

LIGHTING STANDARDS (CODE 1)

Illinois has integrated this program with Thermal/Lighting Standards. See Section B for a description of 1979 progress in lighting standards.

STATE OF ILLINOIS

STATE AND LOCAL GOVERNMENT PROCUREMENT STANDARDS (CODE 1)

A. Description of Methodology

There are four components that are used to estimate the energy savings achieved under this program:

- Life Cycle Costing
- Recycled Material Specifications
- Utilization Monitoring
- Value Incentive Contract Provisions

The methodology is described below generally, and later more specifically.

General

Screening processes will be developed for both the Life-Cycle-Costing and Recycled Materials Specifications elements of the program. These processes will identify products to be included in the program and will provide data on the unit-volume of purchases for selected products. Until this data is available, it will not be possible to reliably predict the amount of energy savings which will result from this program.

Even for the products on which energy savings have been calculated below, no hard data are available on the amount of these products purchased by local governments. Because this program depends upon local governments for a large portion of its impact, assumptions concerning the volume of local government purchases relative to State government purchases had to be made. Discussion with local purchasing officials and State agency personnel, as well as spotchecks

of actual unit-volumes for various products, revealed that the ratios of unit purchases of local governments to State government unit-volumes vary greatly, depending upon the item under consideration.

The BTU savings projections are based upon these varying purchasing ratios and expected local government response for each item.

Further detail regarding these projections may be found in:

* Memorandum from R. R. Swager to M. Pavlisin dated January 9, 1979 regarding projections of possible energy savings.

* Memorandum from J. Perry to M. Pavlisin dated January 10, 1979 regarding liaison BTU savings projections.

* Memorandum from N. P. Hall to M. Pavlisin dated January 9, 1979 regarding projections of possible energy savings.

* Memorandum from R. R. Swager to R. M. Lohrenz dated September 14, 1978 regarding air conditioners.

* Memorandum from R. R. Swager to R. M. Lohrenz dated September 5, 1978 regarding fluorescent lamp ballasts.

* Memorandum from R. R. Swager to M. Pavlisin dated December 20, 1978 regarding refrigerator specifications.

* Memorandum from N. P. Hall to M. Pavlisin dated June 26, 1978 regarding report on energy saving soap.

1. Life Cycle Costing

Savings from the Life-Cycle Costing Specifications will be assessed on an annual basis (beginning January 1, 1978) as follows:

SAVINGS for Year = (# of items added to stock on an LCC basis since 1/1/78) X (Average annual energy consumption of equivalent item prior to LCC program - Average annual energy consumption of item purchased on LCC basis)

2. Recycled Materials Specifications

Savings from Recycled Materials Specifications will be assessed annually as follows:

SAVINGS for Year = (Volume of product purchased in year) X (Energy intensity - Vol. prior to specification program / Energy intensity Vol. as a result of specification program)

3. Utilization Monitoring

Savings from the Utilization Monitoring system will be assessed annually as follows:

SAVINGS for Year = (Change in number of units of item in service as a result of program X Energy consumption per unit of item) + (Average energy savings per unit from change in use characteristics of item as a result of program X # of items affected by change in use characteristics)

4. Value Incentive Contract Provisions

Savings, if any, under this program will be calculated from Value Change Proposals submitted by vendors.

The methodology for calculating these savings consists of a computer program which, we understand, has been reviewed by DOE and cited as a model for other states. The program code is available to DOE on request.

Illinois has a separate methodology to account for reductions in the State of Illinois vehicle fleet.

Obviously, energy conserved as a result of the purchase of energy-efficient products accrues not only in the year purchased, but also over the life of the product.

In the case of Illinois, the energy saved in 1979 was 2.17 trillion BTUs, while over time the savings will amount to an additional 2.12 trillion BTUs for a total of 4.29 trillion.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

Assumption: The Procurement program estimated that the switch to emulsified asphalt from cutback asphalt could save 3.8 trillion BTUs (79% of the total savings generated by the program per year by 12/31/80).

Status: Recent developments may affect the decision to formally commit resources to this program.

The U.S. EPA has adopted mandatory standards effective January 1, 1981, which (with limited exceptions) permanently prohibit the use of cutback asphalt between May 1 and September 30. This period corresponds to the peak period of highway construction activity - the primary use to which asphalt is put.

Emulsified asphalt can also be substituted for more expensive cutback asphalt with relatively little difficulty.

Officials at both the Illinois Environmental Protection Agency and the Illinois Department of Transportation attribute the recent decline in the use of cutback asphalt in Illinois and the resulting increase in emulsified asphalt consumption to the two aforementioned factors.

Assumption: The Procurement program estimates the energy-efficient procurement measure (excluding asphalt) will save 0.7 trillion BTUs (14% of the total savings generated by this program) per year by 12/31/80.

Status: The assumption is realizable.

Assumption: The procurement program estimates the reduction in the state fleet will save 0.3 trillion BTUs (7% of the total savings generated by this program) per year by 12/31/80.

Status: The assumption has been achieved in 1979.

D. Data

Data under this measure are collected on a continuous basis based on actual purchases by the State of Illinois and by the variance ratios explained in the "Methodology."

E. Accomplishments

1. Measure: Perform rough calculations of potential energy savings for product groups in order to determine existence of energy savings potential in procurement practices.

   Status: Procurement personnel examined 119 types of products to determine where efforts should be focused. The results of this examination constituted the plan that was used to establish priorities for implementing the measure.

2. Measure: Design and install product accounting procedure to provide for automatic reporting of products at the time of purchase.

Status: Measure completed. Based on actual data, DAS has precise information as to products purchased and energy estimated to have been saved.

3. Measure: Design and institute a utilization monitoring program which will provide the data required to measure the actual energy savings produced by this program.

Status: Measure completed. Program is cited by U.S. DOE as a "model" for other states to follow.

4. Measure: Eliminate both stringent performance specifications which exclude the use of recycled materials and "over-design which effectively requires an item to be manufactured from virgin material and/or excludes the use of recycled materials."

Status: If possibilities for use of recycled materials are identified but use is prohibited because of manufacturing standards regarding use of recycled materials in the product, DAS procurement staff will seek to have these standards changed.

5. Measure: Provide in-house training for DAS procurement personnel.

Status: Six formal seminars for the entire staff have been held. Topics addressed during these seminars were life-cycle costing and value incentives.

6. Measure: Install data processing capabilities required to implement the program.

Status: Measure completed. This measure was necessary to ensure the completion of measure 3 discussed above.

7. Measure: Perform life-cycle costing calculations.

Status: Savings expected from energy-efficient procurement for thirteen product groups have been calculated. Savings expected from energy-efficient procurement for twenty different products are presently being calculated.

8. Measure: Coordinated through the DAS, the state will offer loans to companies to manufacture energy-efficient products on a short-run basis, which they otherwise would not produce.

   Status: This measure was dropped due to its failure to receive passage by the General Assembly.

9. Measure: Implement 10% reduction in Illinois State auto and truck fleet.

   Status: Start-up phase implemented June 29, 1979. Fully implemented on September 8, 1979.

STATE OF ILLINOIS

CARPOOLING, VANPOOLING, PUBLIC TRANSIT (CODE 1)

A. Description of Methodology

The average automobile occupancy involving work trips in the State is currently about the same as that for the nation as a whole. With the help of the Metropolitan Planning Organizations in the State, auto occupancy for work trips in each region of the State will be determined early in the program as well as at review points in the development of this program. Any increase/decrease in the rate of auto occupancy, between the outset of the program and the end of 1980, will be used to evaluate this effect of the Ride-Sharing Program upon the use of carpooling.

The number of vans presently operated as part of ride-sharing programs within the State will be established at the outset of the program. Employers presently encouraging the organization of vanpools have already been identified. It will be necessary to take a similar inventory at the end of CY 1980, for purposes of evaluating the impact of this program.

The objective of the ride-sharing program measure is to remove approximately 29,000 cars from the roads during peak traffic hours throughout the State. This objective translates into having about 2,900 additional vans operated for ride-sharing purposes by the end of the program.

The methodologies for estimating the savings resulting from carpooling and vanpooling are excerted from the Illinois Energy Conservation Plan.

ASSUMPTIONS AND METHODOLOGY FOR CAR POOLING

$$E_s(CP) = 2B \sum_{i=1}^{5} \left[M(1) - N'(i) \right] \left[\frac{L(i)\ (1\ (i-1)\ 0.04}{MPG\ (i)} - \frac{\frac{1}{2}LI}{MPG\ (a)} \right]$$

where:

$E_s(CP)$ = trillions of Btu/year saved by car-pooling

B = Btu/gallon for motor gasoline (average) x work days/year (248): 10^{12}

N(i) = number of cars carrying i occupants (no incentives)

N'(i) = number if incentives were used to promote car-pooling

L(i) = average one-way trip length of car pool with i occupants

MPG(i) = average fuel economy of car carrying i occupants

LI = average VMT of a car left at home

a = average occupancy for non-work daytime automobile trips.

In Chicago and Springfield, the estimated changes in auto occupancy per hundred commuters would be:

One-person cars	-.25
Two-person cars	-1.00
Three-person cars	0
Four-person cars	+.45

("-" denotes a decrease and "+"an increase.)

The values of MPG (i) were taken from FEA methodology guidelines. The other values assumed were:

B = 124,952 x 248/10^{12}

L(i) = from Table 8.2. Although it is generally believed that car-pool trips are longer than single-driver trips, letting 1(i) reflect this fact in Formula (2) would lead to an error (since energy saving estimates would go down when the opposite effect is what should occur). Therefore, we simply took L(i) from Table 8.2. It should be noted that again we are being conservative.

LI = 1.5

a = assumed to be 2

ASSUMPTIONS AND METHODOLOGY FOR VAN POOLING

$$E(VP) = 2BV\left[\frac{O_v}{O_c}\ \frac{L}{MPG(O_c)} - \frac{\frac{1}{2}1.1}{MPG\ (a)}\qquad -\frac{L(1+\ (^{O_v-1})\ (0.04)}{VMPG}\right]$$

where:

$E_s(VP)$ = trillions of Btu's/year saved by van-pooling

V = number of van-pools to be formed

O_v = average van-pool occupancy

O_c = average automobile occupancy for work trips

L = average trip length of commuter

VMPG = van fuel economy

$MPG\ (O_c)$ = fuel economy of car carrying O_c occupants.

For Van-pooling the following values were used:

		remarks
B	= $124,952 \times 248/10^{12}$	Taken from FEA estimates provided for state car-pooling plans; p. 23
O_v	= 10	(the number many van-pool programs now use).
O_c	= 1.5	FEA estimates; p. 26
L	= 25 for Chicago, 15 for other MPO's	Pratsch, 1975
L1	= 1.5	FEA estimates, p. 25
$MPG(O_c)$	= MPG (a) = 12	FEA estimates, p. 25. (non-work trips have high occupancy).
VMPG	= 10	

V = 1,000 for Chicago, assuming Option 7 is implemented.

= 50 for Springfield, including 40 for state complex.

= 25 for Peoria. = 20 for Rockford.

= 50 for Quad Cities. = 35 for Decatur.

= 60 for East St. Louis. = 0 for Champaign-Urbana.

= 10 for Bloomington. 1,200 vans.

Applying these methodologies to the 1980 target objectives, about 1.86 trillion BTUs will be saved. At the end of 1979, Illinois will have achieved 46.8% of its 1980 objective in carpooling and 14.0% of its 1980 vanpooling objective. This can be translated to a 0.54 trillion BTU savings from carpooling and a 0.10 trillion BTU savings from vanpooling for a total of 0.64 trillion BTUs.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

The assumptions regarding savings estimates for carpooling and vanpooling were explained in the "Methodology" portion. In accordance with the Illinois Energy Conservation Plan, the assumptions will not be tested until 1980. We concur as to their reasonableness.

D. Data

The sources of data in connection with this program are, for the most part, primary data in the case of vanpools, and estimated data in the case of carpools.

E. Accomplishments

1. Measure: Create regional ride-sharing organizations.

   Status: The Chicago area has a two year effort planned for calendar years 1980 and 81. It is funded through the Regional Transit Authority in the amount of $500,000. Springfield has a less tightly organized, but nevertheless effective, organization which can be utilized by any community in downstate Illinois.

2. Measure: Eliminate legal/regulatory barriers to car/vanpooling.

   Status: Legislation has cleared the General Assembly and has been signed by the Governor.

3. Measure: Develop a marketing program.

   Status: Some 125,000 brochures have been printed supplemented by 550 posters and 350 manuals. No funds are presently available for purchase of prime time to advertise car/vanpooling. Non-prime time has been judged to be cost-ineffective. MPO's are becoming increasingly active as evidenced by a seminar in Rockford and promotional activities in Bloomington and the Quad cities

STATE OF ILLINOIS

RIGHT TURN ON RED

Energy savings in Illinois resulting from 1975 passage of a "right turn on red" law are not included in the Illinois Energy Conservation Plan estimate of 1980 savings.

STATE OF ILLINOIS

ENERGY DATA INFORMATION SYSTEM

This program provides data support to conservation activities, but is not an energy conservation program which generates savings.

STATE OF ILLINOIS

HOMEOWNER'S EXTENSION PROGRAM (CODE 1)

A. Description of Methodology

The savings estimate for the Homeowner's Extension Program consists of three components:

- Computerized Energy Audits
- Insulation
- Residential Conservation Service Program (RCS)

1. STATE ENERGY CONSERVATION PROGRAM

Worksheet for Estimating Energy Savings from Home Energy Savers Program (Project Conserve)

Step 1 - Enter State-supplied data

a. Degree of compliance with winter Thermostat Decrease (TD) .10

b. Degree of compliance with summer Thermostat Increase (TD) .10

c. Degree of compliance with Caulking and Wheatherstripping (CW) .12

d. Degree of compliance with Storm Windows (SW) .10

e. Degree of compliance with Attic Insulation (AI) .08

f. Check box with average no. degrees Fahrenheit that winter thermostats will be decreased 4° [X] 6° [ ] 8° [ ]

Step 2 - Enter fractional savings for independent measures, assuming full compliance with each

a. TD (Table C, column corresponding to box checked in line 1.f) .14

b. TI (Table C) .17

c. CW - Winter (given) .02

d. CW - Summer (given) .03

e. SW - Winter (given) .10

f. AI - Winter (given) .15

g. AI - Summer (given) .09

Step 3 - Compute effective fractional savings for independent measures, considering expected degree of compliance

a. TD (line 1a X 2a) .014

b. TI (line 1b X 2b) .017

c. CW - Winter (line 1c minus 1d) X (line 2c) .0004

d. CW - Summer (line 1c X 2d) .0036

e. SW - Winter (line 1d X 2e) .01

f. AI - Winter (line 1e X 2f) .012

g. AI - Summer (line 1e X 2g) .0072

Step 4 - Compute overlap factors for thermostat adjustments

a. TD (Subtract line 3a from 1.0) .986

b. TI (Subtract line 3b from 1.0) .987

Step 5 - Compute effective fractional heating savings for overlapped measures (Winter)

a. CW (line 3c X 4a) .0003944

b. SW (line 3e X 4a) .00986

c. AI (line 3f X 4a) .001832

d. TD (line 3a) .014

e. Total (line 5a + 5b + 5c + 5d) .036

Step 6 - Compute effective fractional cooling savings for overlapped measures (Summer)

a. CW (line 3d X 4b) .00355

b. AI (line 3g X 4b) .0071

c. TI (line 3b) .017

d. Total (line 6a + 6b + 6c) .0276

Step 7 - Compute State Heating and Cooling Savings

a.	Enter State heating demand (Table C)	481.04 (10^{12} Btu's)
b.	Compute State heating savings (line 5e X 7a)	17.32 (10^{12} Btu's)
c.	Enter State cooling demand (Table C)	25.87 (10^{12} Btu's)
d.	Compute State cooling savings (line 6d X 7c)	.71 (10^{12} Btu's)
e.	Compute total State savings (line 7b + 7d)	18.03 (10^{12} Btu's)

Activities accomplished in 1979 are forty percent of what is expected to be accomplished by 12/31/80; thus X.40

Total 1979 savings 7.21 trillion BTUs

The methodology used to derive the 1980 energy savings is used to calculate the 1979 savings by prorating 1979 activity measures against 1980 estimates.

2. ENERGY SAVINGS FOR 1980 FROM SIDEWALL AND FOUNDATION INSULATION

	Foundation	Sidewalls	Total Savings
Potential Energy Savings (10^{12} Btu's)	43.31	14.25	
Estimated Compliance Factor	10%	5%	
Energy Savings (10^{12} Btu's)	4.33	.7	5.03 *

Actual 1979 compliance factor estimated at 9.2% for foundations and 9.3% for sidewalls. 1979 estimated savings is 5.32 trillion BTU's.

Foundation Insulation Energy Savings:

a. 2,364,430 single family dwelling units.*

b. 63% of homes have no crawl-space or basement insulation.*

c. Estimated potential savings of 43.31 X 10^{12} Btu's if the foundation and crawl-space were insulated.*

d. FEA has found that they can expect a response rate of 21%; of this 21%, 48% would take some retrofit action. This gives an average compliance of approximately 10%. If 60% of the homes need foundation insulation, then it is reasonable to assume that 6% will comply (.60 X .10) with an effective promotional effort. The compliance rate can be increased to at least 10%. This will produce an expected savings of 4.3 X 10^{12} Btu's--(.10 X 43.31 X 10^{12}).

Sidewall Insulation:

a. 22% of homes have no sidewall insulation.

b. Estimated potential savings = 14.25 X 10^{12} Btu's.

c. Average compliance rate of 10% X 22% need = .022 will take action to improve their sidewall insulation.

d. With the promotion directed more toward sidewall insulation, an effective compliance rate of 105 can be obtained.

e. Expected savings is equal to .7 X 10^{12} Btu's--(.05 X 14.25 x 10^{12}).

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*Energy Usage Characteristics of Single Family Residences and Their Occupants in Illinois (Volume II of IIEQ Doc. No. 76/18 by Custom Research Service, A. C. Nielsen Company.)

*The methodology used to derive the 1980 energy savings is used to calculate the 1979 savings.

ASSUMPTIONS AND SOURCES OF NUMERICAL DATA

1. The Btu savings from all of the elements of the energy conservation extension program will be viewed as integral parts of the homeowners extension Program and, therefore, the savings of the whole program will be calculated using the FEA methodology and the form for Project Conserve. Programs like the flyovers, the adult education programs and the energy efficiency index will all increase the awareness and the compliance with certain energy conservation measures. In the past when Project Conserve was used along with flyovers, the response increased tremendously.

2. The methodology and form used for Project Conserve does not consider the savings from sidewall insulation, fireplace closures, and especially foundation insulation. Foundation insulation will be promoted quite extensively due to the large potential for savings in this category and its cost effectivenss. Previously foundation insulation has not been promoted enough.

3. The easiest method to use to calculate expected savings from the other actions is to use FEA methodology and data from the A.C. Nielsen survey, "Energy Usage Characteristics of Single Family Residences and Their Occupants in Illinois."

3. Energy Savings for 1979 From Residential Conservation Service Program (RCS)

DOE has estimated that the total savings from RCS would be approximately .38 Quads/year for the nation. INR estimates that Illinois' share would be 1/50 or 7.6 trillion BTUs per year at a minimum. No savings will be realized in 1979.

B. Definition of Data Elements

See "Methodology" above.

C. Statement of Assumptions

The energy savings from the Homeowner's Extension Program is based on the following assumptions:

1. Computerized Energy Audits

Assumption: The Homeowner's Extension Program estimates that 18.03 trillion BTUs (59% of the program total) would be saved per year by 12/31/80 based on the following assumptions:

- 100,000 energy audits would be performed between January 1978 and December 1980.
- Follow-up action by homeowners would be conducted according to DOE-developed predictions.

Status: At present, INR has no data to confirm the DOE assumptions. INR will have processed 42,225 energy audits by the end of 1979.

2. Insulation

Assumption: The Homeowner's Extension Program estimates that 5.03 trillion BTUs (16% of the program total) would be saved per year by 12/31/80.

Comment: All of the savings expected to be generated by this program are based on DOE-developed assumptions regarding compliance rates. We have adjusted the compliance rates.

3. RCS Program

Assumption: The DOE estimates that the total savings from RCS would be approximately 0.38 Quads per year for the nation by 1985. INR estimates that 7.6 trillion of that or 1/50 would be attributable to energy savings in Illinois.

Comment: No savings are anticipated from the RCS program in 1979, pending release of the final DOE regulations. INR is in the process of developing a work plan to implement the program.

D. Data

Project Conserve is the source of the data for the computerized energy audits. About 1,347,000 questionnaires will be distributed to homes in 1979 with 42,225 responses anticipated. See Appendix 1 for a complete evaluation of the effect of Project Conserve in stimulating energy conservation.

Savings from the insulation and RCS programs are based on information derived by DOE and adjusted for savings achieved in Illinois.

E. Accomplishments

The Homeowner's Extension Program has made progress as described below.

1. Measure: The INR Homeowner's program will co-sponsor infrared flyovers for 120 communities.

Status: The INR Homeowner's program will complete flyovers for 78 communities during 1979.

2. Measure: INR Homeowner's personnel will develop an Energy Efficiency Index (EEI) and work with the utilities to obtain the data for specific geographical areas. INR will also develop a form that homeowners can use to calculate their own EEI.

   Status: INR has developed the EEI and collected data on energy consumption from utilities for the 1976-1977 and 1977-1978 periods. These data showed a reduction in average electric usage of 11.2% and an average reduction of residential natural gas usage of 8.2% between 1977 and 1978. INR has collected data from the thirteen utilities for the 1978-1979 period and will complete the analysis of the information by the end of 1979. INR is in the process of developing the self-help EEI form for individual homeowners and should have the forms completed during 1980.

3. Measure: Energy Conservation Extension Centers will provide an informational and promotional line between INR Homeowner's Extension Program measures and the homeowners.

   Status: INR has 31 Energy Conservation Extension Centers throughout the State. Three workshops have been held in 1979 for personnel responsible for disseminating information at each of the centers. The 31 Energy Conservation Extension Centers in turn have held workshops for homeowners.

4. Measure: INR Homeowner's Extension personnel will seek the cooperation of the larger savings and loans, the Illinois Board of Realtors, local realtor boards, and utilities in establishing financial assistance for capital- intensive energy improvements.

   Status: INR personnel have received cooperation from the Illinois Board of Realtors during 1979 and plan to work with the board in developing workshops for local realtors. These workshops will probably be held in the spring, 1980. INR personnel are negotiating with the Northeastern Illinois Planning Commission during 1979 to develop a demonstration project to test-market the financing measure.

5. Measure: INR will seek to have utilities distribute to homeowners questionnaires designed to determine the homeowner's energy usage. Homeowners will receive detailed information on potential corrective actions, probable costs, and the payback period.

   Status: INR will have 1,347,000 questionnaires distributed to homeowners through Project Conserve in 1979. INR anticipates 42,225 questionnaires returned and processed from homeowners in 1979. In addition, an evaluation will have been completed of the Project Conserve program (see appendix).

6. Measure: An adult education program will be offered through community colleges.

   Status: INR in conjunction with the Small Homes Council developed an instructor's manual and a set of student notes for the education courses during 1979. Community colleges have offered 27 courses with an average course attendance of 15 students.

7. Measure: Community development awards will be made for all community-sponsored energy conservation activities. The activity is open to all communities that receive funds through HUD's Community Development Block Grants. INR will send participating communities a list of energy conservation programs which can be incorporated into their existing program.

   Community development awards have been presented by individual communities in 1979 to persons conserving energy. INR has continued to work with communities to encourage their participation in the program.

8. Measure: A manual will be developed and education sessions provided to owners and managers of multi-family complexes and public housing authorities. Information will be provided on methods to reduce their energy usage.

   Status: INR will have completed two manuals (for complexes with 16 or more units and for complexes with less than 16 units) during 1979. Three education sessions will be held before the end of 1979.

9. Measure: INR will develop an Energy Conservation Clinic for homeowners and groups such as Kiwanis. INR will coordinate the program, including scheduling the clinics, training instructors, and promoting the clinics. INR expects to hold 200 clinics with an average attendance of 15 people.

Status: INR will hold 76 clinics with over 1,400 participants during 1979. INR has developed slides, brochures, and energy-saving devices such as caulking and shower aerators for the clinic participants. INR located 14 instructors from community college instructors, League of Women Voters, and other volunteers to develop and hold additional training programs in 1979.

10. Measure/ Status: In response to problems perceived as a result of the passage of NECPA, INR personnel initiated the following actions during 1979:

- Held a meeting July 11, 1979 to discuss with other states implications of the rules proposed by DOE and the apparent lack of federal funding to assist states in implementing NECPA.
- Requested the Midwestern Governors' Conference Task Force on Energy and Natural Resources to present a resolution to both the Secretary of DOE and Congress requesting that DOE amend the present rules to provide more flexibility to states in implementing the program.
- Presented testimony to the DOE at regional hearings in St. Louis in May, 1979.

This measure is not included in the State Energy Conservation Plan.

11. Measure/ Status: INR personnel will have developed two-page fact sheets for 25 home energy conservation areas by the end of 1979. Over 370,000 fact sheets will be sent out to homes in 1979.

This measure is not included in the Illinois Energy Conservation Plan.

12. Measure/ Status: INR has developed a one-hour television show, "The Energy Saving Family," based on the adult education manual in 1979. The film is designed to instruct viewers on measures they can adopt to conserve energy.

INR has contacted nineteen television stations in Illinois to encourage them to air video tapes. In addition, 5 copies of the film are available upon request at the INR energy library.

This measure is not included in the Illinois Energy Conservation Plan.

13. Measure/ Status: INR developed four energy-related spot television messages - 2 sixty seconds long, and 2 thirty seconds long, in 1979.

This measure is not included in the Illinois Energy Conservation Plan.

STATE OF ILLINOIS

AGRICULTURAL RESOURCE APPLICATIONS (CODE 1)

A. Description of Methodology

The amount of energy saved in Illinois in 1979 as a result of low energy grain drying has been affected by near-perfect harvest conditions. Practically no rain fell in September which provided an opportunity for corn and soybeans to dry "on the stalk" rather than in the bin.

The Illinois Department of Agriculture forecasts that 27% of the corn dried in Illinois in 1980 will rely on some form of low temperature drying (133 million bushels). The quantities to be dried and the energy required are estimated to be:

Conventional drying

(359.7 million bushels) X (14,800 BTUs per bushel)
= 5.3 trillion BTUs

Combination temperature drying

(34.5 million bushels) X (11,840 BTUs per bushel)
= 0.41 trillion BTUs

Low temperature drying

(98.6 million bushels) X (10,360 BTUs)
= 1.02 trillion BTUs

Using the same methodology, it is possible to compare expected results of the program with what would have occurred without the program:

	Energy used in trillion BTUs before program	Energy used in trillion BTUs with program	Savings
Conventional	6.40	5.30	1.10
Combination	0.12	0.41	-0.29
Low temperature	0.51	1.02	-0.51
Total			0.30

In view of the significant accomplishments of this program and the enthusiastic reception by farmers, we believe 0.30 trillion BTUs is a reasonable saving estimate for 1979.

The Biomass Conversion project has not yet realized any energy savings from the energy plantation project which requires a three to five year development period while the trees are growing.

Estimates of the energy production of the plantation will be based on:

> (Number of acres) times (number of pounds of harvested biomass per acre) times (BTU value of a pound of biomass) = BTU value of energy produced

B. Definition of Data Elments

See "Methodology."

C. Statement of Assumptions

1. Assumption: Biomass Conversion will save 0.68 trillion BTUs per year by 12/31/80.

   Comment: The lead time for an energy plantation is three to four years under optimum conditions. The pilot plantation will be planted in 1980. The estimate is based on 500 acres - thirty acres will be planted.

2. Assumption: Low energy corn drying will conserve 0.30 trillion BTUs annually by 12/31/80.

   Comment: Data has not been collected to verify this estimate. However, the decline in demand for propane (as reported by Illinois Department of Revenue) and the success of the workshops appear to support the estimate (propane is the principal fuel used to dry grain).

D. Data

Workshop evaluations are collected and analyzed. No quantitative data have yet been collected.

E. Accomplishments

This program has achieved several notable successes:

1. Measure: Conduct twelve workshops statewide to provide information on low-temperature grain drying systems.

   Status: Twelve workshops with total attendance of 600 - 1,400 persons have been held. Twelve more are planned. Follow-up surveys are made to determine effectiveness of workshops. Nearly 49% of respondents plan to take some energy conservation action.

2. Measure: Conduct five one-day tours of pilot demonstration projects.

   Status: Two tours were held in 1979. Each tour emphasized a different approach (all participants on buses vs. each participant in his/her individual vehicle). The most effective approach will be used for the remaining five tours.

3. Measure: Development information packets for distribution at workshops and tours.

   Status: Before developing the packets, surveys were conducted to determine what farmers would like to read about. The packets have been developed and the first printing is almost fully distributed .

4. Measure: Power companies will be encouraged to expand three phase service and to work with farmers to encourage power use during off-peak periods.

   Status: Limited progress has been made in this area.

5. Measure: Assess the feasibility of converting corn stover to ethyl alcohol.

   Status: An eighteen month demonstration project has begun.

6. Measure: Develop an energy plantation to produce large quantities of trees whose wood has a high BTU value. Municipal sludge will be used as a fertilizer.

   Status: A thirty acre demonstration plot, developed in conjunction with the Chicago Metropolitan Sanitary District and the University of Illinois, will be initiated during spring 1980. Site preparation has begun.

STATE OF ILLINOIS

FARM ENERGY CONSERVATION (CODE 1)

A. Description of Methodology

As described in the Illinois Energy Conservation Plan, the Farm Energy Program has three components:

- Fertilizer Reduction
- Tillage Practice Changes
- Changes in Power Unit Fuel Requirements.

1. ENERGY SAVINGS FROM FERTILIZER REDUCTION

	Usage in 10^5 tons		Btu's x 10^6 per ton of fertilizer	10^{12} Btu's Energy Consumed		10^{12} Btu's Energy Savings
	1980(a)	1980(b)		1980(a)	1980(b)	
Nitrogen	11.01	10.46	66.7	73.41	69.73	3.67
Potassium	8.28	7.86	8.3	6.87	6.53	.35
Phosporus	4.54	4.32	12.1	5.50	5.23	.27
TOTALS	23.83	22.64	87.1	85.78	81.49	4.29

(a) Projection from 1975 usage assuming 5.9% growth rate for nitrogen, 5.3% for potassium and a constant growth rate for phosphorus.
(b) Assuming 5% reduction as a result of increased soil testings.
(c) Illinois Energy Conservation Feasibility Report, D.C.E., 5/76, p.285.

2. ENERGY SAVINGS FROM TILLAGE PRACTICE CHANGES

	TOTAL ACREAGE(a)	ACRES CONVERTED TO NO-TILLAGE(b)	ENERGY SAVED PER ACRE(c)	(10^{12} Btu's) ENERGY SAVINGS
Corn	10,710,000	535,500	1,105,904 Btu	0.59
Soybeans	8,220,000	411,000	221,180 Btu	0.09
Total	18,930,000	946,500		0.68

(a) Acreage based on historical projection.
(b) 5% increase in no-tillage practices by program implementation.
(c) Refer to Nelson and Burrows, The U. S. Agricultural Energy Picture, for the corn crop. For soybean crop, energy savings will be 1.6 gallons of diesel fuel per acre, as extended from Nelson and Burrows. There are 138,238 Btu's per gallon of diesel fuel.

3. ENERGY SAVINGS FROM CHANGE IN POWER UNIT[a]

	1980[b]	1980[c]	(10^{12} Btu's) ENERGY SAVINGS
Number of Diesel Tractors	148,435	187,497	
10^7 Btu's Consumed by Each Diesel Tractor	15	15	
10^{12} Btu's Consumed by All Diesel Tractors	22.27	28.13	
Number of Gas Tractors	111,977	72,915	
10^7 Btu's Consumed by Each Gas Tractor	17 17	17 17	
10^{12} Btu's Consumed by All Gas Tractors	19.04	12.40	
TOTALS (10^{12} Btu's)	41.31	40.53	.78

(a) Total number of tractors in 1980 is 260,412, based on 0.5% annual reduction from 1975 base of 268,363 tractors.
(b) USDA, Economic Research Service projection for 1980 without program.
(c) Illinois Department of Agriculture projection for 1980 with program.

In terms of 1979 energy savings, the Illinois Farm Energy Program appears to be an anomaly. There have been savings. Although we have estimated the savings to be 16.28 trillion BTUs, we believe that only a small portion of this savings, if any, can be attributed to the Farm Energy Program.

There appear to be no data available to support attribution. In addition, much of the efforts of the Farm Energy people was oriented to promoting gasohol. Farm Energy did conduct an extensive outreach program, but data do not exist to tie the outreach activities to energy savings.

In the absence of data, we believe that there is not a sufficient basis to attribute savings to the Farm Energy Program.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

1. Assumption: The Farm Energy Conservation program originally estimated that fertilizer consumption would be reduced by 119,000 tons per year, thus saving 4.29 trillion BTUs.

   Comment: Based on actual USDA data through spring, 1978, fertilizer consumption has been reduced in Illinois by 432,000 tons. The claimed savings is 16.26 trillion BTUs. The BTU savings estimate is based on 1975 data which are not documented as to source. The extent to which the savings are attributable to program activities is not determinable due to the absence of data regarding program participation by farmers.

2. Assumption: Energy savings from changes in tillage practices is estimated to be 0.68 trillion BTUs at 12/31/80 based on 946,500 acres converted to no-till.

   Comment: As of fall, 1978, 214,000 acres had converted to no-till, saving 0.23 trillion BTUs, and 1,990,000 acres had been converted to reduced tillage, saving 1.17 trillion BTUs. The extent to which the savings is attributable to program activities is not determinable due to the absence of data regarding program participation.

3. Assumption: Changes in fuel types for farm implements will result in savings.

   Comment: Based on data developed independently by Price Waterhouse assisted by the Illinois Department of Revenue, there is evidence that farm fuel use is declining. In 1975, Revenue made refunds of motor fuel taxes on 190 million gallons of agriculture fuel. By contrast, in 1978 Revenue made refunds on 150 million gallons - a 21% reduction equivalent to 5.3 trillion BTUs. During the same period, corn acreage increased about 3% and bean acreage increased 11%. As in the other assumptions, this savings cannot be directly or indirectly attributed to Farm Energy.

D. Data

No data were collected in connection with this program.

E. Accomplishments

This portion of the report is a description of the status of the various Farm Energy measures.

1. Measure: The program will include a soil testing activity to encourage the use by farmers of the proper amount of fertilizer relative to soil types and crops potential.

Status: No data are available regarding the number of soil tests or the number of farmers requesting tests. There is a "feeling" on the part of the program coordinator that more tests are being made every year. The testing is performed by the University of Illinois Extension Service and the local Soil and Water Conservation District.

2. Measure: Zero or reduced tillage practices will be encouraged through demonstration projects.

Status: Eight demonstration projects have been established. Zero or reduced till acreage has increased by 500% when comparing the 1979 crop year to 1978. A variety of economic factors (i.e., higher fuel prices, less time for farm work) suggest that the reasons for the increased no-till acreage should not necessarily be totally attributed to this program.

3. Measure: The energy conservation staff will make use of available energy and efficiency information to encourage farmers to investigate diesel powered equipment as an alternative in their tractor buying decisions.

Status: No actual progress has been made in promoting this measure.

STATE OF ILLINOIS

COMMERCIAL/INDUSTRIAL PROGRAM (CODE 1)

A. Description of Methodology

The savings estimate for the Commerical/Industrial Program comprises three components:

- Commercial and Industrial Organizations
- Waste Heat Recovery
- Schools and Hospitals

1. Energy Savings from Commercial and Industrial Organizations

INR has conducted a survey of 34 organizations where Class A energy audits have been performed. INR found that the organizations have saved an estimated .21 trillion[1], or an average of .006 trillion per organization. These estimates were developed as follows:

a.	Total amount of BTU consumption by the 34 organizations responding to the survey.	1.8 trillion
b.	Estimated percentage of savings resulting from implementation of audit recommendations.	11.8%
c.	Estimated actual savings at the 34 organizations (trillion BTUs) (axb)	.21 trillion
d.	Average actual savings per organization.	.006 trillion

Based on the 1,818[2] organizations expected to participate in INR programs, it is estimated that 10.9 trillion will be saved based on INR recommendations:

1,818 x .006 trillion = 10.9 trillion

[1]All numbers in BTUs onless otherwise labeled.

[2]During 1979, 41 organizations received audits, 777 organizations attended seminars, and 1,000 organizations received audit manuals.

41 + 777 + 1000 = 1818

2. Energy Savings from the Waste Heat Recovery Program

The fuels used to produce steam are:

Fuel	Total Annual Consumption
Natural Gas	381.7 trillion
Residual Oil	71.0 trillion
Distillate Oil	26.0 trillion
Coal	93.3 trillion
	572.0 trillion

Of this amount, approximately 40% or 228.8 trillion was actually used to produce steam. Approximately 25% or 57.2 trillion of the energy used in steam production is wasted, and 50% or 28.6 trillion of this amount could be recovered. INR expects to recover 10% or 2.86 trillion of the recoverable waste heat energy over the life of the program based on INR-recommended changes. It is not anticipated that any savings will occur during 1979 because INR started this program in late 1979.

3. Energy Savings from the Schools and Hospitals Program

The information available in the Contract Research Corporation (CRC) Pilot Project, "Energy Conservation in Schools," indicates that the potential Operations and Maintenance (O&M) savings may be 5% of the estimated energy usage. Projected O&M savings, therefore, would equal:

$$5\% \times 134.8 \text{ trillion} = 6.74 \text{ trillion}$$

CRC also projects retrofit savings to be between 20% and 35%. Assuming that on the average, organizations achieved 30% savings through the installation of retrofits, the total retrofit savings would equal:

$$30\% \times (134.8-6.74) \text{ trillion} = 38.42 \text{ trillion}$$

Schools and hospitals, however, will not receive funding under the National Energy Conservation Policy Act until 1980. Therefore, no savings are anticipated from this program in 1979.

The total estimated energy usage for all participating organizations, 134.8 trillion, is based on a sample of preliminary energy audit forms already received from participating institutions.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

Savings from the Commercial/Industrial Program are based on the following assumptions:

1. Commercial/Industrial Program

Assumption: The Commercial/Industrial Program originally estimated that 93.18 trillion BTUs will be saved per year by 12/31/80 based upon the following:

- 250 Class A energy audits will be performed (100 a year for 2-1/2 years).
- 5,000 organizations will send representatives to the INR management seminars by 12/31/80.
- INR will publish and distribute brochures explaining energy conservation techniques throughout the state by 12/31/80.
- Commercial buildings which adopt INR recommended conservation practices will reduce their energy consumption by 25% and industrial buildings which adopted INR practices will reduce their energy consumption by 20%.

Comment: The INR staff will have conducted 41 Class A energy audits by the end of 1979.

INR cosponsored five management-oriented seminars with four Illinois utilities to which 377 organizations sent 522 individuals.

INR has conducted seven Operations & Maintenanc (O&M) workshops for about 475 individuals.

INR will have completed eight Class C Audit manuals and have available an additional four manuals by the end of 1979.

The potential savings attributable to the INR recommendations at the 34 organizations where Class A audits have been completed averaged 21.7% of the estimated energy used. However, the actual savings averaged 11.8% of the estimated energy used because the organizations did not implement all the recommended changes.

2. Waste Heat Recovery

Assumption: The program estimated that an additional 18.61 trillion BTUs will be saved per year by 12/31/80 based upon the following:

- 744.5 trillion BTUs of industrial fuel will be used to produce steam.
- Approximately 20% of the energy used in steam production is wasted.
- Approximately 50% of the wasted energy is recoverable.
- The INR program will succeed in encouraging organizations to develop waste heat recovery programs such that 25% of the recoverable energy actually will be recovered.

Comment: The current C/I program administrator indicated that his research disclosed the following information:

- In 1977 the fuels used to produce steam were:

	Total Annual BTU consumption
Natural gas	381.7 trillion
Residual oil	71.0 trillion
Distillate Oil	26.0 trillion
Coal	93.3 trillion
	572.0 trillion

Only 40% of the above amount or 228.8 trillion is used to produce steam.

- Approximately 25% of the energy used in steam production is wasted.

- Approximately 50% of the wasted energy is recoverable.

- Current estimates are that 10% of the recoverable waste heat energy will actually be recovered over the life of the program when INR-recommended retrofit changes are made. Negligible savings, however are anticipated from the program in 1979.

3. Schools and Hospitals

Assumption: The C/I Program estimated that schools and hospitals will save 37.34 trillion BTUs per year by 12/31/80 based upon the following:

- Approximately half of the public schools and hospitals in Illinois will adopt energy conservation practices during the first phase of NECPA.

- Participating organizations will curtail energy consumption in operational or maintenance (O&M) activities an average of 15%.

- Participating organizations will retrofit the facilities such that they will save on average an additional 30% of their energy consumption.

- The O&M savings will be in effect for all of 1980, while the retrofit savings will be in effect for only the last six months of 1980.

Comment: The State of Illinois expects to receive $11.3 million by the end of 1979 to help pay for energy audits of schools and hospitals and to install energy conservation and solar energy measures.

A pilot project on energy conservation in Illinois schools found that most of the pilot schools have an informal energy conservation program but that another 5% savings could be achieved from changes in operations or maintenance practices. The study also found that another 20% to 35% could be saved through the installation of retrofits.

Organizations will begin receiving their funds probably in the second quarter of 1980. Therefore, no savings will be realized in 1979.

D. Data

See "Description of Methodology" (A) above. Also see the instrument used to actually estimate savings which is included at the end of this section.

E. Accomplishments

INR has made progress in achieving their planned objectives.

1. Measure: 100 Class A demonstration audits will be conducted each year.

   Status: 41 Class A audits will be conducted during 1979.

2. Measure: INR will conduct boiler efficiency checks as part of the energy audits and develop a boiler efficiency workbook. INR will also develop a waste heat recovery program.

   Status: INR will have completed thirty boiler efficiency checks and a boiler efficiency workbook by the end of 1979.

   INR will develop a manual for a waste heat recovery program during 1979. INR also has a $40,000 grant to further develop the program.

3. Measure: Members of the Energy Outreach Team will conduct technology-transfer O&M (Operations & Maintenance oriented workshops in each part of the state.

   Status: Seven O&M workshops have been conducted throughout the state. 475 have attended the workshop.

4. Measure: An energy-conservation educational effort co-sponsored with local utilities will be developed for top management personnel and interested union leaders within the commercial and industrial sectors.

   Status: 377 organizations have sent 522 individuals to five management-oriented seminars which have been co-sponsored by INR and four Illinois utilities.

5. Measure: INR will develop Class C audit manuals for a wide range of organizations.

Status: INR will complete and distribute audit manuals for the following types of organizations in 1979:

- Restaurants
- Supermarkets
- Department stores
- Industrial buildings
- Metal fabrication plants
- Primary metal mills
- Boiler operations and maintenance manual
- HVAC operations and maintenance manual.

In addition, INR has audit manuals available for the following types of organizations:

- Machinery manufacture
- Chemical processing industries
- Food processing plants
- Office buildings

6. Measure: The INR will develop a "Consolidated Building Energy Reporting System" (CBERS II) which will be used in 3,300 significant state buildings by December 31, 1980.

Status: INR has developed CBERS II and will have 200 facilities on-line by the end of 1979.

C/I SECTION DEMONSTRATION CLASS A ENERGY AUDIT SUMMARY

Facility Name Contact Person Address Phone Number	SIC and Description	Annual BTU Consumption	Square Footage or Production Figures	Energy Index Number	Date Audited	Potential BTU & % Savings from Our Recommendations	Actual BTU Savings from Our Rec

STATE OF ILLINOIS

ENERGY MANAGEMENT BY PUBLIC UTILITIES (CODE 1)

A. Description of Methodology

The savings estimate for Energy Management by Public Utilities consists of four components:

- R-30 Ceiling Insulation
- Electronic Ignition (IID)
- Public Utility Energy Audits
- Utility-Load Management

Each is explained on the following pages. Parenthetical references, unless otherwise noted, are from Volume 2 of an A. C. Nielsen Co. survey performed for the Illinois Institute of Environmental Quality in 1976 and titled "Energy Usage Characteristics of Single Family Residencies and Their Occupants in Illinois."

1. R-30 Ceiling Insulation

The Nielsen Survey presents the following housing characteristics (1, Table 24):

Ceiling Insulation Characteristics for Houses Heated by Natural Gas - 1975

No Insulation	1-5" Insulation	6-8" Insulation	Total
331,942	996,021	633,867	1,961,830
16.92%	50.77%	32.12%	100%

One important finding of this study was the potential energy savings, if all single-family residences in Illinois were brought up to an "ideal house" standard. The "ideal" standard for ceiling insulation was R-19, the current FHA-HUD Minimum Property Standard.

Potential Energy Savings by Natural Gas Heated Houses in Illinois (1, Summary Table)

Ceiling Insulation	Energy Savings (Trillion BTU)	Fuel Savings (Billion cubic feet)
R-19	27.41	26.56

This 26.56 billion cubic feet was derived by dividing the BTU savings by 1032 BTU/cubic feet:

$$\frac{\text{BTU}}{\text{BTU/cubic feet}} = \text{cubic feet}$$

To calculate the additional energy savings to be realized by insulating each house to R-30, one must determine the marginal or incremental reduction in heat loss (BTU) when insulation goes from R-19 to R-30. Unlike the ASHRAE procedures (5) for heat loss calculations, average yearly heat losses were determined. The ASHRAE methodology is calculated on the designed "worst" heating requirement.

These marginal energy savings calculations were based on the average Illinois house and then extrapolated to the total residential housing stock.

Average house characteristics were weighted to consider population density.

Ceiling Area = 1000 square feet
Roof-Wall Area = 150 square feet
Roof Area = 1120 square feet
Uc = 0.05 for R-19 and 0.033 for R-30
Uw = .31
Ur = .44
Ventilation Rate = .1 CFM/square feet
Heating Days = 245
Heating-Degree Days = 6000

The following methodology was used in these calculations:

Attic Temperatures (2, p. 54 and 3, p. 376)

$$Ta = \frac{AcUcTi + To(ArUr = AwUw + 1.08\ Acv)}{AcUc + ArUr + AwUw + 1.08\ AcV}$$

where Ta = attic temperature

Ti = inside air temperature = 70 F

To = outside air temperature

V = ventilation rate of attic in CFM/square feet of ceiling

1.08 = specific heat of air x density of air x minutes per hour = .24 x .075 x 60

and small case

c = ceiling

r = roof

w = end walls of attic

Ta is computed at average To where average To = 40(F) (ref. 2, P. 52)

Ta is recomputed for each increment of insulation.
Thus, Ta-19 = 42.1(F) Ta-30 = 41.5(F)

Hourly heat loss into attic (H_L):

$H_L = U_C (Ti-Ta)$ $H_{L-(19)} = 1.40$ and $H_{L-(30)} = 0.94$

Annual heat loss (H_{AL}):

$H_{AL} = H_L \times HD \times 24$

$H_{AL(19)} = 8232$ $H_{AL(30)} = 5527.2$

Annual heat loss reduction (H_{AL}) from R-19 to R-30

$H_{AL} = H_{AL(30)} - H_{AL(19)} = 2704.8$ BTU/ year/square feet

Since the average house is equal to 1000 square feet, the BTU savings per year for each house is equal to 2,704,800. The total number of houses that would enjoy this savings is equal to 1,961,830. The additional energy savings by going from R-19 to R-30 ceiling insulation is computed to be 5.30 Trillion BTU's.

The total energy savings is equal to the energy saved by bringing all inadequately insulated houses to R-19 plus the marginal savings from R-19 to R-30.

To R-19 (Ref. 1)	27.41 trillion BTU's
R-19 to R-30	+ 5.30 trillion BTU's
Total	32.71 trillion BTU's/year

For the 1980 energy savings, a percentage of completion of 35.7% for the insulation phase and 28.5% for the IID phase was used. These figures were based on program completion on July 1, 1980 to allow for those houses that would not have a full year's energy savings in 1980.

Year	BTU SAVINGS	Natural Gas
1980	11.7 trillion BTU's	11.3 B.C.F.
1985	32.7 trillion BTU's	31.7 B.C.F.

The Residential Thermal Perfomrance Survey by A. C. Nielsen Co. did not address the possible energy savings by the reduction of summer heat gain. This potential energy savings should be of

great concern to the electric utilities. The reduction in electrical demand for air conditioning would reduce summer-peak generation requirements, ie, the most expensive electricity to produce, and forestall the need for new generating capacity. Since peak-capacity power plants are generally natural gas or oil-fired units, the reduction in summer demand would conserve those fuels which are in short supply.

To calculate the electrical energy savings, a similar procedure to that described for the heating calculations was used. The incremental BTU reduction to the "ideal house" in summer (R-30) is calculated for all three levels of existing ceiling insulations.

Attic temperatures were first calculated for each insulation level as follows:

Summer Attic Temperatures (F)

Insulation Level			
R-2(U=0.5)	R-10(U=0.1)	R-19(U=0.05)	R-30(U=0.033)
94.1(F)	104.4(F)	106.5(F)	115.1(F)

Summer attic temperatures were calculated from (2, P. 56):

$$Ta = \frac{AcUcTi + ArUrTsr + AwUwTsw + 1.08\ AcVTo}{AcUc + ArUr + AwUw = 1.08\ AcV}$$

Where Tsr = sol-air temperature equivalent of roof = 115(F)

Tsw = sol-air temperature equivalent of walls = 95(F)

To = outside dry bulb temperature = 87 (F)
TI = Inside temperature = 75 (F)

Ta is computed for average outdoor dry bulb temperature during cooling hours above 80 (F) = 87 (F) (Ref. 4). Sol-air temperature equivalents for 95M were used for roofs and walls. (3,p441)

The hourly heat gain from the attic was derived from:

Hg = Uc(TaTi) (2,P. 56)

Thus:

Hourly Attic Heat Gain by Insulation Level
(BTU/square feet)

R-2	R-10	R-19	R-30
9.55	2.94	1.58	1.32

The summer heat gain is simply:

$$Qg = 1000 (Hg \times SCH) \qquad (5, p. 31)$$

Where: Qg = summer heat gain

Hg = Heat gain/square feet/hour

SCH = Summer Cooling Hours = 800 (weighted)

1000 = square feet/house

Summer Ceiling Heat Gain
By Insulation Level (BTU)

R-2	R-10	R-19	R-30
7,640,000	2,352,000	1,264,000	1,055,000

The marginal energy savings may now be determined. The annual heat gain reduction (Qag) is merely the difference between the various heat gains and the heat gain for R-30:

$$Qag(x) = Qg(x) - Qg(30)$$

Annual Heat Gain Reduction
By Insulation Level (BTU)

R-2	R-10	R-19
Qg(2)-Qg(30)	Qg(10)-Qg(30)	Qg(19)-Qg(30)
6,585,000	1,297,000	209,000

The often referenced Residential Performance Survey denotes that 72% of all Illinois single-family detached dwellings that have natural gas space heat also have air conditioning. The number of houses with gas heat and air conditioning and the total annual BTU savings are presented by existing insulation level.

	Existing Insulation			
	R-2	R-10	R-19	Total
Houses/ Category	232,998	717,135	456,384	1,412,517

	Existing Insulation			
	R-2	R-10	R-19	Total
BTU-Reduction (Trillions)	1.57	0.93	0.095	2.595

It should be noted that these calculations do not include the latent heat effect of water vapor. The ability of home air conditioners to remove moisture from the air is limited. This is especially true when the reduction in cooling load results in less frequent utilization.

Air conditioners generally provide 6000 to 8000 BTU per kilowatt-hour. This corresponds to a coefficient of performance of approximately two. The coefficient of performance being an efficiency factor.

The annual electrical energy savings (KWH) is determined by:

$$KWH = \frac{Qagt}{3413\ (COP)}$$

Where: Qagt = total annual heat gain reduction
COP = 2 = Coefficient of Performance

3413 = BTU/KWH

The resulting energy savings is equal to 380 million KWH. This is a savings to the consumer of electricity. On the utility side, generation efficiences and transmission losses require the utility to use about three times as much energy to deliver electricity (33% efficient). Thus, the total potential energy savings due to reduced A/C demands would be equal to 3.89 trillion BTU's.

As with space heating energy, 35.7% of this reduction would be realized by the end of 1980. In summary, the potential energy savings by insulating Illinois' houses to a level of R-30 ceiling insulation are presented as follows:

Potential Energy Savings by R-30 Ceiling Insulation
(Trillion BTU's)

	1980	1985
Heating	11.7	32.7
Cooling	1.39	3.89
Total	13.09 Trillion BTU's	36.59 Trillion BTU's

2. Electronic Ignition (IID) Phase

The potential energy savings in natural gas by replacing all residential standing pilot lights in Illinois has been estimated (6, P. 109). Extrapolation of this energy savings to 1980 has also been predicted (7, P. 254). However, these predictions are for all standing pilot light use. This program measure acknowledges the temperature maintainence effect of pilot lights on hot water heaters. Thus, the retrofit program is designed to include clothes dryers, gas ranges, and furnaces. Water heater pilots account for 17.3% of the aforementioned potential energy savings. Under the implementation schedule presented, utilities would begin installing electronic igniters on or about 1 January 1979. With the seven year installing schedule, 28.5% of the potential energy savings would be realized by the end of 1980.

Potential Energy Savings of Electronic Igniters (Trillion BTU's)

Primary Energy Consumption-1973 (9, P. 109)	Potential Energy Savings-1980 All Pilots (10, P. 254)	Potential Energy Savings from EPCA-1980
43.4	41.4	11.7

Combined Potential Energy Savings Under EPCA Program Measure (Trillion BTU's)

Phase	1980	1985
R-30 Ceiling Insulation		
Heating	11.70	32.70
Cooling	1.39	3.89
Electronic Igniter (IID)	11.79	32.90
Total	24.88	69.49

To allow for inaccessibility of attics and possible consumer rejection to these "free" conservation devices, a 95% acceptance rate is assumed. Thus, the total potential energy savings from this program measure follows.

Total Potential Energy Savings from EPCA Program Measure (Trillion BTU's)

Phase	1980	1985
Ceiling Insulation		
Heating	11.12	31.07
Cooling	1.32	3.70
Electronic Igniter (IID)	11.20	31.30
Total	23.64	66.07

These total energy savings except for cooling are all natural gas savings. It goes without saying that this would be a savings in a most critical energy source. The cooling energy saved may contain additional natural gas savings depending upon the type of peaking facilities used.

Natural Gas Savings (Billion Cubic Feet)

	1980	1985
R-30 Heating	11.3	30.1
Electronic Igniter	11.4	30.3

ENERGY MANAGEMENT BY PUBLIC UTILITIES - 98

Attachment B

REFERENCES

1. "Energy Usage Characteristics of Single Family Residences and Their Occupants in Illinois", Vol. 2, A. C. Nielsen Co., For: Illinois Institute for Environmental Quality and Division of Energy, August, 1976.

2. "Retrofitting Existing Housing for Energy Conservation: An Economic Analysis", Stephen R. Peterson, Building Science Series 64, United States Department of Commerce/NBS and Federal Energy Administration, December, 1974.

3. "ASHRAE Handbook of Fundamentals", 1972, American Society of Heating, Refrigerating, and Air Conditioning Engineers, New York, New York, 1972.

4. "AFM 88-8, Chapter 6, Engineering Weather Data", Departments of Air Force, Army, and Navy, United States G.P.O., Washington, D.C., 15 June 1967.

5. "The Dawning of an Age", Barfield Et. al, Sangamon State University, Springfield, Illinois, July, 1976.

6. "Energy Conservation in Illinois: Report II", R. Herendeen, K. Kirkpatrick, J. Shelton, ERG, Center for Advanced Computation, University of Illinois, November, 1974.

7. "Illinois Energy Conservation Feasibility Report", Division of Energy, Department of Business and Economic Development, May, 1976.

3. Public Utility Energy Audits(1)

		Commercial (10^{12} BTUs)	Industrial (10^{12} BTUs)
a.	Energy consumption-1980	584.4	1015.2
b.	Adjusted for savings from commercial/industrial audits	5.5	5.5
c.	Net consumption (a-b)	578.9	1009.7
d.	Percent potential savings by utility audits (cxd)	10%	10%
e.	Expected degree of co-operation (dxc)	40%	40%
f.	Number of audits completed in 1979 (estimated)	15,645	
g.	Estimated savings 1980	4.7	8.1

(Note: There are 206,953 commercial/industrial/service establishments in Illinois. The number of locations is not known. Source: Illinois Data Book-1978 and Statistical Abstract of U.S.-1972.)

(1) All figures provided by Illinois Commerce Commission.

4. Utility-Load Management

The Illinois SECP, relying on FEA worksheets, forecasts an energy savings of 0.82 trillion BTUs at the end of 1980 resulting from utility load management.

5. Calculations

Calculations of the energy savings associated with each methodology follow: They are elaborated upon in part C of this report.

Methodology	Savings
. R-30 Ceiling Insulation	-0-
(The R-30 program has been postponed pending RCS regulations.)	
. Electronic Ingition (IID)	-0-
(The IID program was not approved by the Illinois General Assembly.)	

	Savings
. Public Utility Energy Audits	3.2
(Some progress has been made here, though utilities have been reluctant to commit resources due to impending release of final RCS and EES regulations. We have estimated, based on discussions with INR, the Illinois Commerce Commission, and the review of results reported by public utitilites, that one-fourth of the targeted savings of 12.8 trillion BTUs in 1980 has been achieved in 1979.)	
. Utility-Load Management	1.6
(Illinois' largest employer (about 50,000 persons) is operating under load management. We believe it is reasonable, in light of the energy intensity of the manufacturing processes used by this employer, to presume that one-fifth of the 1980 energy savings has been achieved.)	
Total savings - 1979	4.8

B. Definition of data elements

The data elements have been described as an integral portion of the methodology description in (A) above.

C. Statement of Assumptions

1. R-30 Ceiling Insulation

Assumption: The Public Utilities R-30 Ceiling Insulation Program estimated that 12.44 trillion BTUs would be saved per year by 12/31/80 based upon the following assumptions:

- additional ceiling insulation will be installed by 1985 in 95% of the single-family residencies in Illinois.
- 35.7% of the ceiling insulation will be installed by the end of 1980.
- each participating unit will save, on average, 18,659,000 BTUs per year from reduced heating and air conditioning energy needs.

Comment: Problems with sources of funds for the retrofits and answers to difficult political questions (RCS) have prevented any work to be completed in the EPCA/ECPA R-30 Ceiling Insulation Program.

2. Electronic Ignition Program

Assumption: The Public Utilities Electronic Ignition Program estimated that 11.20 trillion BTUs would be saved per year by 12/31/80 based upon the following assumption:

- approximately 41.4 trillion BTUs are consumed each year by residential standing pilot lights in Illinois. All of this energy is wasted and would be saved if electronic igniters were used rather than pilot lights.

Comment: Problems with sources of funds for the electronic igniters and answers to difficult political questions (RCS) have prevented any work to be completed in the EPCA/ECPA program.

3. Public Utility Energy Audits

Assumption: The Public Utilities Energy Audit Program estimated that 90.9 trillion BTUs would be saved per year by 12/31/80 based upon the following assumptions:

- Illinois utilities will be able to complete the following number of audits by 12/31/80:

	1979	1980	Totals
Commerical	1,629	1,527	3,156
Industrial	448	438	886
	2,077	1,965	4,042

- Recommendations which are generated by the audit will help organizations to reduce their energy consumption by 20%.

Comment: Utilities have either slowed or postponed their audits because DOE is currently drafting RCS regulations which should be followed when performing the energy audits. The new regulations are expected to be published in late 1979 or early 1980.

The Illinois Power Company found, when it performed energy audits, that its customers could reduce energy consumption by approximately 10% based upon implementing the energy audit recommendations.

4. Assumption: Two load management studies have been completed, one time-of-day rate experiment is in process and two more are being planned.

Little "hard" data are available yet to measure the results of the demonstrations and experiments.

Comments: The Public Utilities Load Management Program estimated that .82 trillion BTUs would be saved per year by 12/31/80 based upon the following assumptions:

- Public utilities in Illinois will conduct at least three load management demonstrations and three time-of-day rate experiments by 12/31/80.
- Based upon the above demonstrations and experiments, utility customers will alter their consumption patterns such that utilities will be required to produce less energy during the peak usage period.

D. Data

A formalized process for collecting data to verify savings estimates under this program does not yet exist. Whatever data collection activity is eventually initiated is likely to be expensive.

E. Accomplishments

The following is a measure-by-measure account of the accomplishments of this program through October 31, 1979.

1. Measure: Building standards should be adopted within Illinois that would require all newly built structures to meet thermal standards promulgated by the Illinois Commerce Commission (ICC) before being provided service by gas or electric utilities.

Status: The Illinois Commerce Commission has analyzed this measure and has found that several organizations oppose state-wide residential conditions of service requirements. These organizations include:

- the regulated utilities, who do not want to be placed as the enforcer for a "building code";

- the building professions, who do not want to have another government restriction placed upon them; and

- local governments, who may feel that their traditionally strong home rule powers are being usurped.

2. Measure: New regulations should be adopted which will permit utility companies to capitalize (and include in their rate base) the cost of their investments made to help customers conserve energy. Currently, the utilities can capitalize the costs only of energy production facilities.

   Status: This measure was prohibited by the National Energy Act of 1978, but we understand the President's so-called NEA-Phase II may repeal the prohibition.

3. Measure: Public utilities should be encouraged to develop and disburse accurate energy consumption information to both gas and electric heating customers.

   Status: An Energy Efficiency Index (EEI) has been developed by the INR staff to be sent to each customer with the bill for service. It is uncertain whether the customers will understand the EEI or use it properly.

4. Measure: Public utilities should be encouraged to audit their customers' energy usage.

   Status: Implementation of this measure has been delayed. NECPA requires utilities to offer energy audits to their residential customers. However, the DOE has not yet released regulations describing the appropriate procedures to be used when performing an energy audit; therefore, utilities have postponed expanding or implementing an audit program.

5. Measure: Public utilities have been asked to conduct at least three load management demonstrations which will show how residential or commercial/industrial customers can shift their energy consumption patterns. If usage can be rearranged such that the amount of energy required during peak demand periods is reduced, the public utilities will not need to construct new facilities or use inefficient generators to satisfy the peak period energy demands.

Status: Two experiments have been conducted. The Central Illinois Light Company attempted to have its customers control use of air conditioning. The Central Illinois Public Service Company experiment reduced customers' use of hot water heaters during peak power periods.

Additional projects are either planned or inprocess. Commonwealth Edison is experimenting with two-way load control/automatic meter reading devices (AMRAC) in its service territory. Central Illinois Public Service Company has been ordered by the (ICC) to investigate the feasibility of adopting load management equipment for use in its service territory. Likewise, Central Illinois Light Company has been experimenting with Motorola Radio Control devices as a means of load management. Some utilities have formally challenged the ICC's authority in this area.

6. Measure: Public utilities were asked to conduct at least three time-of-day rate experiments.

Status: Two utilities, Central Illinois Light Company and Central Illinois Public Service Company, are having implemented summer/winter rate differentials and have initiated time-of-day rate experiments. The Illinois Commerce Commission required these actions during rate hearings.

7. Measure: Public utilities have been asked to encourage and possibly even subsidize their customers' efforts to utilize alternative sources of power, such as solar power, whenever it would cost less to develop and use the alternative than it would to construct new power-generating capacity at the public utility.

Status: The question of co-generation is being studied by the ICC under a PURPA grant.

8. Measure: Public utilities are being asked to consider restructuring the existing natural gas rates in Illinois. Some of the opportunities to be investigated include eliminating declining block rates, adopting inverted tail block rates, implementing incremental pricing of "new" gas, and reducing rates to customers who have made significant investments to conserve energy.

Status: Promotional gas rates in Illinois have been outlawed and there is a flat rate used by all utilities. (The amount of the rate may vary by utility.)

STATE OF ILLINOIS

SCHOOL ENERGY MANAGEMENT PROGRAM (CODE 1)

A. Description of Methodology

Originally, there were three components to the estimation of energy savings resulting from the School Energy Management Program. Two of these, Fuel Savings in Driver Education, and Efficient School Bus Scheduling, have been dropped.

The remaining component, School Energy Management Workshops, is expected to generate measurable saving with effect in 1980. The effectiveness of this program will be assessed on the basis of baseline data taken from the "Energy Crisis" survey conducted by the Illinois Office of Education during the month of March, 1977. A similar survey is being conducted and the results will be compared with the 1977 survey.

The effectiveness of the workshops is evaluated in two ways. As each workshop draws to a close, all workshop participants return to one large meeting room for a workshop summary. They are asked to complete an evaluation instrument and to give it to Illinois Office of Education staff. Each workshop will be individually evaluated and adjustments in format and content will be made before the next one.

The second form for evaluation of the workshops is through an instrument called "Implementation Survey." The purpose of this instrument is to determine the impact of the workshops on the participants' energy management activities and to gauge the interest in energy conservation among the workshop participants. It also explores the extent and nature of energy conservation activities subsequently undertaken by workshop participants.

The methodology follows:

Total square feet of schools (in millions)	257
Energy consumed in BTUs per square foot (a)	65,000
Total energy consumed in 1980 in 10^{12} BTUs	16.70
Participation %	-
Energy affected in 10^{12} BTUs	15.87
Energy savings % (b)	x 35%
Energy savings in 1979 in 10^{12}	Not measurable at this time

(a) Average between Illinois Capital Development Board's and FEA's energy data (75,000, 55,000)

(b) 9% from thermostat setback, 17% from attic insulation,* and 9% from storm windows, storm doors and weather-stripping.

*Illinois Office of Education data indicate approximately 4000 of the 5700 schools in Illinois have attics.

IOE presently is conducting a survey of all schools to determine the degree to which energy savings can be attributed to IOE programs. The results will be available in early 1980. At present, no estimate of savings is available.

B. Definition of data elements

See "Methodology."

C. Statement of Assumptions

1. Assumption: The Schools Program originally estimated that 5.55 trillion BTUs (72% of this program's total expected energy savings) would be saved each year by 12/31/80 through implementation of savings measures learned at a series of workshops.

This estimate was based on the following assumptions:

a. Representatives from 95% of the public and private primary and secondary schools in the state would participate in these workshops.

b. Attendees would produce on average a 351 reduction in energy consumption at their schools as a result of having attended the workshops.

Comment: Data to verify this estimate are presently being collected and will be available in early 1980. No data are presently available.

D. Data

Data is being collected from school districts throughout the state as described in "Assumptions."

E. Accomplishments

A summary of program accomplishments follows. The program appears to have successfully initiated an outreach activity.

1. Measure: IOE will contract for a consultant to hold seven workshops. The workshops will be designed to provide school personnel information concerning energy conservation measures they can implement in their schools. IOE will select pilot schools from among the workshop attendees in order to field-test the various materials, guidelines and suggestions presented at the workshops. IOE will select three pilot schools from each of the six regions in the state. Four hundred people are expected to attend each workshop.

Status: IOE subcontracted with a consulting firm for joint preparation of workshop materials. The consulting firm presented the seven workshops.

While IOE originally sought to attract a variety of school personnel (adminstrators, janitors, etc.) believing this would be the most effective means for improving the energy effeciency of schools, IOE has since concluded that the primary target should be the maintenance personnel, since it is these people who, having direct access to the plant, most greatly affect energy consumption in the school. IOE selected a total of six (rather than eighteen) pilot schools, one (rather than three) from each of the six regions in the state. About fifty people attended each workshop.

2. Measure: The consultants will hold seven follow-up workshops. These follow-up workshops are designed to disseminate to school personnel energy management guidelines generated by incorporating the experiences of the pilot schools into the materials developed for the first workshop. About 400 people are expected to attend.

Status: The consultants held ten (rather than seven) follow-up workshops. IOE decided that a larger number of workshops would encourage greater attendance, since school personnel would be required to commute a shorter distance. Informational materials developed for the first series of workshops were used. About seventy-five people attended each of the workshops. (A total of 2,800 people were expected to attend. About 750 actually attended.) Though IOE encouraged greater participation by maintenance personnel at the follow-up workshops, rigid lines of authority in most school systems made it difficult to contact these people.

STATE OF ILLINOIS

ENERGY MANAGEMENT ASSISTANCE TO LOCAL GOVERNMENT (CODE 1)

A. Description of Methodology

The methodology used to determine energy savings resulting from the Energy Management Assistance to Local Government program is to assume that one-fourth of the savings attributable to the Thermal/Lighting program will be achieved as a result of local government.

The methodology used in Thermal/Lighting is that recommended by DOE and is predicated on the adoption on a state-wide basis of ASHRAE 90-75, and to a lesser extent, through implementation of Building Energy Performance Standards (BEPS) regulations.

To date, the Illinois General Assembly has not passed ASHRAE 90-75 legislation and, as we understand it, BEPS regulations will be issued in November, 1979.

We believe, based on our understanding of the assumptions and accomplishments as described below, that the energy savings attributable to this program is not yet large enough to measure.

B. Definition of Data Elements

See Section B "Thermal and Lighting Standards."

C. Statement of Assumptions

1. Assumption: This program anticipated voluntary adoption of energy conserving building codes by one-fourth of the 120 Illinois communities which have building codes.

Comment: As of December 31, 1979, ten communities and one county will have adopted these building codes. The savings will occur over time; the near-term outlook (January through December, 1979) is that the amount of savings is small and is not measurable. (See "Accomplishments" below.)

D. Data

The data elements are described in Section B "Thermal/Lighting Standards."

E. Accomplishments

This program has made progress on several measures--particularly in the area of outreach. Some of these strides are included below:

1. Measure: The Department of Local Government Affairs (LGA) is to provide local governments with information concerning methods to reduce energy consumption within the local governmental facilities.

The information will be disseminated:

- By providing LGA staff assistants to advise individual governments.
- By providing speakers to local governmental officials' meetings.
- By organizing 10-15 workshops for local government personnel.
- By publishing literature explaining technical measures of the various programs in the state plan.

Status: During our preliminary review of the local government program, we have found that, as of December 31, 1979;

- LGA will have a supervisor and two or three staff assistants available to advise local governments.
- LGA staff will have given speeches to about 3,000 local governmental officials at 100 meetings during 1979.

- LGA staff will have organized and given three two-day conferences which approximately 400 local officials have attended.

- During 1979, 64 different publications written were distributed to Illinois local government officials. Approximately 60,000 brochures have been distributed.

2. Measure: The LGA is to coordinate energy conservation measures between local governments and other governmental organizations through construction of energy-efficient public buildings and homes and through procurement of energy-efficient goods by government, business and households.

Status: The LGA staff has directly assisted seven Illinois communities to adopt energy conservation building codes, has worked with four towns to develop land use plans and has helped several municipalities to promote solar programs within their areas.

The LGA has distributed articles on Life-Cycle Costing and Gasoline Cost as a Factor in Competitive Bidding. (Land-use plans can effect energy savings by encouraging efficient use of public utilities and by encouraging the development of solar energy projects. The need to construct a new public utility plant can be avoided by locating new residential and industrial units in areas where utilities are currently underutilized.)

3. Measure: The LGA is to develop a close working relationship with the local communities which have shown the greatest interest in implementing the various programs of the Illinois Plan within their communities. As a part of this measure, LGA is to provide local officials with technical assistance concerning energy efficiency in buildings and vehicle operations.

Status: Local officials have attended the seminars on building energy-use efficiency. Three seminars have been offered on vehicle operations.

4. Measure: The LGA will work with the municipalities and county governments "which express a strong early interest in establishing a broad program of energy conservation in their communities" to develop demonstration programs which can serve as examples to other communities of the energy savings that can be accomplished.

Status: The LGA has helped promote the Champaign building code as an example of a conservation code which will promote energy savings in local communities. Other examples of successful energy conservation programs are described in the LGA monthly newsletter "Energy Management News" which is distributed to approximately 600 local officials.

STATE OF ILLINOIS

ADMINISTRATION OF STATE PLAN

This program provides management support to conservation activities, but is not an energy conservation program which generates savings.

STATE OF ILLINOIS

ENERGY CONSERVATION INFORMATION

This program provides data support to conservation activities, but is not an energy conservation program which generates savings.

STATE OF ILLINOIS

ENERGY MANAGEMENT FOR STATE BUILDINGS AND FACILITIES (CODE 2)

A. Description of Methodology

The savings estimate for Energy Management For State Buildings and Facilities is comprised of two components:

- Operational Improvements
- Retrofit Modifications

1. Energy Savings From Operational Improvements and Retrofit Modification

a.	Number of state buildings and facilities to be included in this program	164
b.	Number of square feet of space in these buildings and facilities	11,898,802
c.	Number of BTUs used per square foot per year	300,000
d.	Present energy usage (in trillion BTUs) (bxc)	3.57
e.	Percent savings through recommended operational improvements	10%
f.	Percent savings through recommended retrofit modifications	41.26
g.	Estimated total savings (in trillions) (e+f) (d)	1.83

B. Definition of Data Elements

The data elements are defined in "Description of Methodology," (A) above.

C. Statement of Assumptions

Savings from Energy Management For State Buildings and Facilities are based upon the following assumptions:

Assumption: The State Building Program originally estimated that 2.06 trillion BTUs would be saved by 12/31/80 based upon five assumptions:

The CDB staff will complete Class A energy audits at 164 major and smaller state buildings (with floor space over 50,000 square feet) by 12/30/80.

The 164 major state buildings occupy 11,898,802 square feet.

State buildings use 431,936 BTUs per square foot, per year.

State buildings which adopted CDB's recommended operational improvements would reduce their energy consumption 20%.

State buildings which adopted CDB's recommended retrofit modifications would reduce energy consumption 20%.

Comment: The staff will have completed 118 audits by the end of 1979, and is performing approximately 5 audits per month. At this rate, substantially all the 164 buildings will be audited by 12/31/80.

The program administrator now estimates that the state buildings consume approximately 300,000 BTUs per square foot, per year, and also estimates that state buildings can reduce energy consumption on average 10% by adopting the CDB operational

recommendations.

The program administrator estimates that implementing the recommended retrofit modifications can reduce energy consumption in state buildings an average 41.2%. He indicated the percentage is higher because most of the major state buildings are old and have not previously implemented major retrofit changes to conserve energy.

D. Data

The data elements are described in "Description of Methodology," (A) above.

E. Accomplishments

This program has made progress on several measures. The following lists the measure-by-measure accomplishments of the program:

1. Measure: Governor Thompson will issue a directive to all state agencies directing their employees to pursue efforts to conserve energy.

   Status: The Governor issued the directive on February 10, 1977.

2. Measure: INR will install the Consolidated State Building Energy Reporting System (CBERS II) throughout Illinois.

   Status: INR has developed CBERS II and will have 200 facilities on-line by the end of 1979. (A sample of the CBERS II report is shown at the end of this section.)

3. Measure: Capital Development Board (CDB) staff members will conduct energy audits of all state buildings with more than 50,000 square feet of floor space.

Status: The CDB staff will have conducted 118 energy audits at major state buildings by the end of 1979, out of a total of 164.

4. Measure: Institute of Natural Resources staff members will conduct energy conservation workshops for state building and facility personnel.

Status: Representatives from nine state organizations have attended one of the five INR-sponsored seminars. The CDB staff has organized one seminar which 75 state personnel attended. Additional seminars are planned for the remainder of 1979.

5. Measure: Specific energy-saving goals will be established for each state building and facility.

Status: When CDB completes an audit, energy-saving goals are established. Approximately one year after the audit has been completed, the CDB will review the amount of energy savings the building is achieving by implementing the recommendations. CDB has begun its follow-up reviews.

STATE OF ILLINOIS

SOLAR ENERGY PROGRAM (CODE 2)

A. Description of Methodology

The major effect of solar thermal applications in terms of energy savings is expected to occur in the new residential housing sector and agricultural low-temperature heating requirements. This is primarily due to ease of installation, the limited number of options for space and domestic hot water energy sources, and an unfavorable economic climate for solar utilization in the commercial and industrial sectors of the ecoomy.

Between 1977 and 1980, an estimated 184,000 new dwelling units will be built in Illinois. This number includes the construction of single family dwellings and multi-family dwellings with fewer than 20 units per building. About 75% of these new residential units (138,000) will use electrical resistance systems for providing space heat and domestic hot water. A report titled, The Potential Economic Impacts of Solar Heated Residences in Illinois: 1976-2000 (September 1976), has shown that solar-assisted heating and hot water systems are economically competitive with electrical resistance heating through most of the State. This economic feasibility is based on a 15 year life-cycle cost analysis for new residential structures in the absence of the federally funded incentive programs.

Before solar applications can fulfill these market penetration potentials, public awareness and specific consumer information on solar applications needs to be developed and promoted.

A second requirement is the need for technical development and training of a solar service industry to design, install, and maintain solar thermal systems. The development of Illinois' solar concept manual and solar installation manual is a first step. The wide distribution of these manuals through higher educational institutions and sponsorship of solar-related courses throughout the State is the next procedural step in this program. This program will provide the required manpower to make the extensive use of solar applications a reality.

In order to expedite the design, sizing, and economic analysis of solar systems, a computer simulation model will be made available by INR to homeowners, engineers, architects, and builders at a minimal cost in late 1979 or early 1980.

Under the proposed federal tax rebate program of solar installations, it is estimated that 0.4% of the projected new housing starts will install solar heating and hot water systems. Using data from Springfield, Illinois as an average climatic situation for the State, the net annual energy savings for solar-supplied energy is 36.5 million BTU per dwelling unit. On a statewide basis, INR estimates that the total annual energy savings will amount to 26.8 billion BTUs.

In addition, INR estimates that an additional 3.5% of the new housing starts will incorporate solar domestic hot water heaters. In Illinois, this amounts to a net annual solar energy savings of 82.4 billion BTUs by 1980.

Finally, INR has judged the retro-fitting solar domestic hot water units in residential structures to be within the realm of technical and economic feasibility. The Illinois Energy Conservation Plan estimates that 0.25% of the existing housing stock will add solar hot water heaters by 1980 with the federally funded incentive package. This implies that 5,900

of the existing 2,364,000 residential dwelling units in Illinois will install solar DHW systems by 1980 for a net annual energy savings of 75.5 billion BTUs.

In summary, energy savings estimates from solar conversion will total to 0.19 trillion BTUs in 1980. At the present time data do not exist to estimate 1979 savings. However, as explained in the "Accomplishments" portion of this section, there is considerable demonstrated interest by Illinois energy consumers in solar energy.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

The assumptions have been described above in "Methodology."

D. Data

No data have yet been collected regarding solar installation.

A college student at Southern Illinois University is presently preparing both a directory of distributors of solar energy equipment and an inventory of solar installations.

E. Accomplishments

The solar program has made several accomplishments in 1979 most notably in the area of outreach.

1. Measure: INR Solar Assistance personnel will develop a solar installation manual for distribution to potential installers of solar units.

INR Solar Assistance personnel will develop a technical design manual for distribution to engineers, architects, or other interested people.

Status: Existing solar heating and air conditioning of residential buildings manuals (for solar installation) prepared for the U.S. Department of Commerce are being used. DOE is developing a technical design manual which will be used by INR Solar Assistance personnel.

2. Measure: The Capital Development Board (CDB) energy audit team will perform on-site analyses of the feasibility of solar applications for new and rehabilitated state buildings.

Status: In 108 energy audits performed by the CDB energy audit team, recommendations for solar applications were made in 3 instances.

Plans have been developed to use the outputs of a computer system which is currently near completion (Solar Sizing and Solar Economic Analysis systems). This information will be used for on-site analysis programs and seminars for builders in the state. Plans are to begin these visits in late 1979 and early 1980.

3. Measure: DOE has been developing solar codes and performance standards. Once these are published, INR Solar Assistance personnel will seek to have these codes and standards adopted by the General Assembly.

Status: Federal standards have not yet been issued. Solar Assistance personnel have been involved in efforts to have solar codes passed by the General Assembly. The codes have not passed to date. (A standard is defined as a guideline. A code is a law.)

4. Measure: INR personnel will hold ten seminars (two of which are agricultural) covering a variety of solar-related topics.

Status: Eighteen seminars have been held to date--twelve of which were agricultural seminars. Twelve additional agricultural seminars and two agricultural solar-farm tours are planned through 1980. The agricultural seminars are being managed by the agricultural resources coordinator.

5. Measure: The INR will sponsor a hot water design competition of the 1979 Illinois State Fair open to all Illinois residents but aimed at secondary level and vocational students. This competition is designed to increase public awareness of and involvment in solar energy alternatives.

Status: The contest was held and based on the resulting number of requests for speakers and displays, the competition was successful. There were eleven final contestants.

STATE OF ILLINOIS

WASTE TO ENERGY RESOURCE RECOVERY (CODE 2)

A. Description of Methodology

There are three components to the Waste to Energy Resource Recovery Program:

- Waste to Energy Program
- Waste Oil Program
- Industrial Waste Liquids

1. Waste to Energy

The municipal solid waste to energy and materials recovery systems savings are based on use of EPA data estimates of 2.5 lbs. of solid waste per person per day and that 50% of 2,000 tons of solid waste by weight can be utilized each day for steam production and that refuse-derived fuel has 5,300 BTUs per pound. Such a recovery system will require an investment of $200 - $250 million in a processing plant and a four to five year construction period. No savings from this program will be realized in 1979.

2. Waste Oil

Waste oil savings forecasts are derived from using DOE worksheets on Waste Oil Recovery. INR has estimated that 44 million gallons of oil in Illinois now being "wasted" are potentially recoverable. The 1980 goal is to capture 25%, or 11 million gallons of waste oil and re-refine it. While substantial progress has been made in 1979, data have not yet been collected to indicate how much oil is being recovered. Waste oil programs have been established in one-third of the 1980 targeted communities. The savings calculation follows:

Original savings estimate based on 44 million gallons (trillion BTUs)	1.26
Actual goal (based on 11 million gallons)	.31
Projects in 100 of 300 target communities yields 0.33 times goal of .31	.10

Thus, the estimated 1979 savings is 0.10 trillion BTUs.

3. Industrial Sludge

No progress has been made nor have resources been committed at this time to industrial sludge recovery.

B. Definition of Data Elements

See "Methodology."

C. Statement of Assumptions

1. Assumption: Waste oil recovery projects will be established in 300 Illinois communities.

   Comment: At the end of 1979, about 100 communities will have "mature" projects.

2. Assumption: 2,000 tons of municipal waste will be recovered and used as a fuel source.

   Status: The fiscal resources, estimated to be $200 - $250 million, required to achieve this assumption are not available at this time. (For that matter the technology may not exist.)

D. Data

No data are yet being collected regarding program results.

E. Accomplishments

This program has achieved success in the outreach area and staff members have given a number of speeches. In the case of waste oil, community projects have been established through local groups such as the League of Women Voters.

STATE OF ILLINOIS

INTERGOVERNMENTAL COOPERATION

This program provides coordinating support to conservation activities and performs periodic evaluations of agency programs.

STATE OF ILLINOIS

ADMINISTRATION OF STATE PLAN

This supplemental program provides management support to conservation activities and is fully described in Section O.

STATE OF ILLINOIS

COMMUNITY TECHNOLOGY (CODE 1)

A. Description of Measures

There are four components to the Community Technology energy savings estimate:

- Intracity bicycle transportation
- Residential wood heating
- Appropriate technology
- Low-income-assistance

1. Intracity Bicycle Transportation

The methodology for estimating savings resulting from shifting to bicycles follows:

(BTU's to drive auto 1 mile) times (mileage of bicycles used in lieu of autos) = BTU savings. Data do not exist to apply to this methodology.

2. Residential Wood Heating

The typical home requires about 180 million BTU's per year for heat. If 3,000 wood burning units were installed within Illinois homes during 1979 and 1980 to offset 50% of this load (consuming 4 cords of hardwood) an energy savings will be computed by:

1 cord =	20 million BTU's
60% efficiency burning =	12 million BTU's
	X4 cords consumed
	48 million BTU reduction in fossil fuel requirements

(4x8 million) BTU's
X 3000 units installed during 1979 and 1980

0.14 trillion BTU reduction in fossil fuel requirements

No data exist to confirm this estimate.

3. Appropriate Technology Grants

No savings methodology exists for this program.

4. Low Income Assistance

The State of Illinois has estimated that a home incorporating solar design features will save 36.5 million BTU's annually. Based on four workshops in 1979, five solar projects will be initiated. The savings from these projects will occur in 1980.

B. Definition of Data Elements

See "Methodology"

C. Statement of Assumptions

1. Assumption: 55% of the energy savings in the Community program (0.1 trillion BTUs) will be generated by the Residential Wood Heating measure. The estimate of potential energy savings resulting from this measure is based on the assumption that 300 people in each of 10 communities personally contracted by INR will purchase wood stoves.

Comment: Difficulties in obtaining firewood may impede reaching this objective.

Assumption: 44% of the energy savings in the program (0.1 trillion BTUs) will be generated by the Intracity Bicycle Transportation Measure.

This estimate was based on the assumption that 15% of all automobile owners in two targeted communities would be persuaded to use bicycles as a regular means of alternate transportation.

Comment: After a three-month promotional effort in Springfield, a registration campaign revealed that 0.33% of auto owners were using bicycles as a regular means of alternate transportation.

3. Assumption: 1% of the energy savings in this program will be generated by the remaining two measures: DOE Appropriate Technology Small Grants, and Low-Income Assistance.

Comment: None

D. Data

No data is being collected yet to measure program accomplishments.

E. Accomplishments

This program has several tangible accomplishments.

1. Measure: The intracity bicycle transportation measure is designed to encourage the use of bicycles as an alternative means of transportation. Community technology personnel will encourage bicycle usage by:

   a. Developing a "Guide for Illinois Communities on Bicycle Transporation Programs."

   b. Offering local advisory assistance. Projects in two pilot communities will be developed in 1979.

Status: Two communities are participating in pilot projects. A two day seminar is being developed to familiarize city planners with methods for providing bicycle facilities to commuters.

2. Measure: The residential wood heating measure is designed to encourage the use of wood as a heat source. Community technology personnel will implement this measure by: assessing the wood heating potential in Illinois; preparing a consumer's guide; and preparing a decision-maker's guide.

   Status: All activities will be completed in 1979.

3. Measure: The appropriate technology small grants assistance measure is designed to coordinate the DOE Appropriate Technology (AT) Small Grants Program in Illinois. Tasks will include responding to proposal requests, maintaining state statistical information, and developing and assisting in proposal review panels. Community Technology personnel expect to coordinate the awarding of a total of 10 grants in 1979 for a total of approximately $300,000.

   Status: Community Technology personnel offered assistance to prepare grant requests, maintain statistical information, and coordinate state review panels. Ten grants totaling $280,000 will be awarded in 1979.

4. Measure: Local goverment assistance is designed to promote energy consciousness through involvement of municipality officials.

   Status: The interest generated thus far regarding this measure indicates, in INR's judgement, that there is potential for positive results.

5. Measure: The low-income assistance measure is designed to educate low-income groups about energy-savings devices. Community Technology personnel expect to hold four workshops.

   Status: By the end of 1979, four workshops will have been held including the construction of a solar greenhouse.

6. Measure/ Status: Planning is under way to retrofit commercial greenhouse to solar. The greenhouse will be a demonstration site for the 1980 Illinois State Fair. This will be first commercial solar greenhouse in the area and probably in the State.

This is a new activity not described in the Illinois Energy Conservation Plan.

STATE OF ILLINOIS

STATE FUNDED ENERGY MANAGEMENT FOR STATE BUILDINGS

This supplemental program provides support to conservation activities and is described in Section Q.

NOTE: THE RESULTS OF THE PROJECT CONSERVE EVALUATION SHOWN ON THE FOLLOWING PAGES ARE PRELIMINARY. EVEN THOUGH THE QUESTIONNAIRES HAVE BEEN "OUT" FOR FOUR WEEKS, WE ARE STILL RECEIVING ABOUT 75 RESPONSES EACH DAY. WHEN THE RESPONSE RATE DECLINES, WE WILL RE-RUN THE COMPUTER PROGRAM AND DOCUMENT THE FINAL RESULTS.

EVALUATION OF THE RESULTS OF

PROJECT CONSERVE IN ILLINOIS

Introduction

During September 1979, Price Waterhouse & Co. (PW) mailed 10,500 Project Conserve Evaluation Questionnaires (Exhibit 1) to a randomly selected, statistically valid sample of the 33,000 households which had completed the Illinois Institute of Natural Resources (INR) Project Conserve Class B Audit Questionnaire (Exhibit 2). The evaluation questionnaires were designed to measure the success that the audit questionnaire had in encouraging households to conserve energy by retrofitting their homes or by changing their operating habits.

Our analysis of the evaluation questionnaire responses disclosed that 43% of the 3,383 respondents found Project Conserve helpful and 34% of the participants indicated that this project helped them decide which conservation actions to initiate in their own homes. This infers that Project Conserve was useful to more than 14,000 Illinois households out of 33,000 participating.

Analysis of the respondents

The 3,383 respondents to the evaluation questionnaire were a diversified group. The responses came from all over Illinois. Chicago, with 25% of the responses, was the only community from which more than 5% of the questionnaires were returned. Exhibit 3 lists the towns which provided more than 20 responses. Chicago residents returned 847 questionnaires, Naperville 150, Springfield 140 and Evanston 123.

EXHIBIT 1 (page 1 of 2)

Price Waterhouse & Co.

200 EAST RANDOLPH DRIVE
CHICAGO, ILLINOIS 60601
312-565-1500

Dear Project Conserve Participant:

The Illinois Institute of Natural Resources (INR) has asked our firm, Price Waterhouse & Co., to evaluate the effect that certain taxpayer-funded programs have had on energy conservation in Illinois.

Your name was randomly selected from about 33,000 persons who, like you, filled out a questionnaire regarding your home. The questionnaire asked you about such things as the number of windows in your home, the number of doors, how old your home is, etc. As a result of mailing the completed questionnaire, you should have received an analysis of the estimated cost of making energy conservation improvements and an estimate of how much money you would save by making the improvement. INR is now studying how important this analysis was in your decision to make (or not make) conservation improvements to your home.

Listed below and on the reverse side are several questions of a follow-up nature which we would like you to consider answering. Your response will help INR judge how well tax dollars are being spent. You can be sure that your responses will be held in strictest confidence. The information that we are requesting will not identify you by name. A business envelope has been enclosed for your convenience.

If you have comments or questions regarding the survey, please call Mr. Ted Downey during business hours at (217) 528-1600.

Thank you for your cooperation,

1. What is your postal zip code number? _ _ _ _ _
2. What is your annual household gross income?
   A. __less than $10,000 C. __$20,000 to $30,000
   B. __$10,000 - $20,000 D. __more than $30,000
3. How old are you? __years
4. How old is your home? _ _years
5. How long have you lived there? _years _months
6. Have you moved since completing the previous questionnaire? _yes -No
   (If you have moved, stop here and please return the questionnaire)
7. What type of heating fuel do you use? _gas _oil _electricity _wood
   _other

(over)

EXHIBIT 2

Illinois Energy Conservation Program

Cooperative Extension Service
College of Agriculture
University of Illinois
at Urbana-Champaign

Here is your

Project Conserve Questionnaire

Sponsored by the
Illinois Institute of Natural Resources

General Information

1. When was your home built?
☐ prior to 1920 ☐ 1946-1965
☐ 1921-1945 ☐ 1966 to present

2. What type is your home?

☐ one-story ☐ two-story
☐ split-level ☐ three or more stories

3. When was your heating system last cleaned or serviced?
☐ less than 6 months ago ☐ 1 to 2 years ago
☐ 6 months to 1 year ago ☐ more than 2 years ago
☐ not serviced

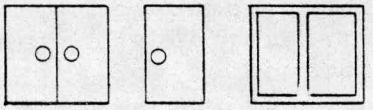
4. What indoor temperature do you attempt to maintain in your home in the winter during:

daytime:	evening:	night:
☐ 55°-59°	☐ 55°-59°	☐ 55°-59°
☐ 60°-64°	☐ 60°-64°	☐ 60°-64°
☐ 65°-68°	☐ 65°-68°	☐ 65°-68°
☐ 69°-75°	☐ 69°-75°	☐ 69°-75°
☐ above 75°	☐ above 75°	☐ above 75°

5. Approximately, what is the total square footage of heated living area in your home? (To estimate living area, multiply the length × width of your home by the number of heated and utilized stories.)
☐ 800 or less ☐ 1,601-1,800
☐ 800-1,000 ☐ 1,801-2,000
☐ 1,001-1,200 ☐ 2,001-2,200
☐ 1,201-1,400 ☐ 2,201-2,400
☐ 1,401-1,600 ☐ 2,401 or more

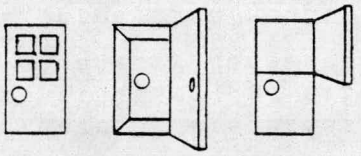
Doors

6. The following are diagrams of common types of exterior (outside opening) doors. Enter below each diagram that most closely resembles your doors the number of each type of door in your home. Do not include doors that open into garages.



Double Wood | Wooden | Sliding Glass Door

Number of Doors: ☐ ☐ ☐



Wood & Glass | Door with Vestibule | Dutch Door

Number of Doors: ☐ ☐ ☐

7. How many of your doors are equipped with storm doors?
☐

8. On a cold, windy day can you feel air leakage near the doors even when the doors are closed?
☐ all ☐ none ☐ some

9. Do you have weather stripping and/or caulking around your exterior doors?
☐ all ☐ none ☐ some

Air Conditioning

10. Is the entire living area of your home air-conditioned?
☐ yes ☐ no

If your home is not air-conditioned, skip to Question No. 13.

11. What type of equipment is used in your home for summer cooling?
☐ electric central air conditioning ☐ one or more window or wall mounted units
☐ gas central air conditioning

12. What indoor temperature do you attempt to maintain in your home in the summer during:

daytime:	night:
☐ 70° or less	☐ 70° or less
☐ 71°-74°	☐ 71°-74°
☐ 75°-78°	☐ 75°-78°
☐ above 78°	☐ above 78°

EXHIBIT 3

PROJECT CONSERVE

RESPONDENTS BY COMMUNITY
ILLINOIS INSTITUTE OF NATURAL RESOURCES

	Number	Percent
Highland Park	52	1.5%
Lake Bluff	20	.6
Lake Forest	20	.6
Libertyville	48	1.4
Mt. Prospect	93	2.8
Mundelein	29	.9
Waukegan	54	1.6
Winnetka	27	.8
Bloomingdale	30	.9
Wheaton	47	1.4
Evanston	123	3.6
Downers Grove	31	.9
Hinsdale	82	2.4
Naperville	150	4.4
Chicago	847	25.0
Rockford	29	.9
Macomb	30	.9
Peoria	51	1.5
Bloomington	91	2.7
Normal	92	2.7
Charleston	37	1.1
Jacksonville	44	1.3
Springfield	140	4.2
	2,167	64.1
Other communities	1,216	35.9
	3,383	100.0%

Largest communities listed above:

Evanston	123	
Naperville	150	
Chicago	847	
Springfield	140	
	1,260	37.2%

Price Waterhouse & Co.

The responding household's average annual income is slightly higher than the average household income in Illinois. More than 35% of the respondents reported income greater than $30,000 while less than 30% reported income less than $20,000. (The 1975 median family income in Illinois was $16,062.)

Sixty-five percent of the respondents live in houses built within the last thirty years. Almost 18% live in houses built more than fifty years ago. Eighty-eight percent of the respondents live in gas-heated houses and approximately 56% of the people have lived in their houses less than 10 years.

Analysis of responses

We compared the answers to each major question to the respondents reported income and heating fuel. The following is a summary of those comparisons:

Income vs. heating fuel

Table 1 combines the respondents' answers to income and fuel oil. These were both background questions used to determine if the respondents were representative of the general population in Illinois. The answers reveal that the respondents' annual household gross income is higher than the median family income in Illinois. There appears to be no significant relationships between the type of heating fuel used and income level.

PRICE WATERHOUSE & COMPANY

PROJECT CONSERVE EVALUATION

TABLE 1
Q.2 ANNUAL HOUSEHOLD GROSS INCOME

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3383	252	742	1049	1201	139	2917	162	206	113	32	116
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LESS THAN $10,000	252	252					219	16	9	4	1	8
	7.4	100.0					7.5	9.9	4.4	3.5	3.1	6.9
$10,000-$20,000	742		742				624	47	50	32	11	24
	21.9		100.0				21.4	29.0	24.3	28.3	34.4	20.7
$20,000-$30,000	1049			1049			912	48	69	45	11	25
	31.0			100.0			31.3	29.6	33.5	39.8	34.4	21.6
MORE THAN $30,000	1201				1201		1075	49	69	31	9	17
	35.5				100.0		36.9	30.2	33.5	27.4	28.1	14.7
NO RESPONSE	139					139	97	2	9	1		42
	4.1					100.0	3.0	1.2	4.4	.9		36.2

Age of respondents

Table 2 compares the age of the respondents with their annual income and heating fuel. Approximately 75% of the people in our sample with annual income less than $10,000 were over 60 years old. There appears to be no other unusual significant relationship.

PRICE WATERHOUSE & COMPANY

PROJECT CONSERVE EVALUATION

TABLE 2

Q.3 AGE OF PEOPLE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3383	252	742	1049	1201	139	2917	162	206	113	32	116
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNDER OR EQUAL TO 20	2		2				2					
	.1		.3				.1					
21-25	76	6	29	30	5	6	58	7	7	4	2	4
	2.2	2.4	3.9	2.9	.4	4.3	2.0	4.3	3.4	3.5	6.2	3.4
26-30	310	1	102	123	77	7	245	9	35	16	5	20
	9.2	.4	13.7	11.7	6.4	5.0	8.4	5.6	17.0	14.2	15.6	17.2
31-35	490	7	86	214	175	8	420	13	42	18	6	16
	14.5	2.8	11.6	20.4	14.6	5.8	14.4	8.0	20.4	15.9	18.7	13.8
36-40	403	2	65	120	205	11	349	22	26	17	5	9
	11.9	.8	8.8	11.4	17.1	7.9	12.0	13.6	12.6	15.0	15.6	7.8
41-45	310	4	47	105	148	6	280	12	17	9	4	2
	9.2	1.6	6.3	10.0	12.3	4.3	9.6	7.4	8.3	8.0	12.5	1.7
46-50	325	8	42	108	161	6	294	15	18	9	1	2
	9.6	3.2	5.7	10.3	13.4	4.3	10.1	9.3	8.7	8.0	3.1	1.7
51-55	354	11	69	110	157	7	311	18	18	10	4	8
	10.5	4.4	9.3	10.5	13.1	5.0	10.7	11.1	8.7	8.8	12.5	6.9
56-60	329	22	77	97	124	9	293	20	13	11	1	4
	9.7	8.7	10.4	9.2	10.3	6.5	10.0	12.3	6.3	9.7	3.1	3.4
61-65	253	37	75	62	67	12	225	18	12	5	2	1
	7.5	14.7	10.1	5.9	5.6	8.6	7.7	11.1	5.8	4.4	6.2	.9
OVER 65	448	151	140	68	76	13	405	23	14	11	2	9
	13.2	59.9	18.9	6.5	6.3	9.4	13.9	14.2	6.8	9.7	6.2	7.8
NO RESPONSE	83	3	8	12	6	54	35	5	4	3		41
	2.5	1.2	1.1	1.1	.5	38.8	1.2	3.1	1.9	2.7		35.3

Age of the house

Table 3 compares the age of the house with the respondents' annual income and heating fuel. This table shows that more than 65% of the respondents live in houses built within the last thirty years. Eighteen percent live in houses more than fifty years old. Almost 80% of the electrically heated houses of respondents were built within the last twenty years; 65% within the last ten years. More than 50% of the houses heated by fuel oil were built more than forty years ago.

PROJECT CONSERVE EVALUATION

TABLE 3

Q.4 AGE OF HOUSE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3383	252	742	1049	1201	139	2917	162	206	113	32	116
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
UNDER OR EQUAL TO 5	347	6	51	120	155	15	246		81	19	6	16
	10.3	2.4	6.9	11.4	12.9	10.8	8.4		39.3	16.8	18.7	13.8
5-10	435	12	76	136	202	9	361	4	54	20	8	12
	12.9	4.8	10.2	13.0	16.8	6.5	12.4	2.5	26.2	17.7	25.0	10.3
11-20	687	38	125	227	275	22	633	21	29	18	2	13
	20.3	15.1	16.8	21.6	22.9	15.8	21.7	13.0	14.1	15.9	6.2	11.2
21-30	739	60	186	235	233	25	682	38	13	10	4	14
	21.8	23.8	25.1	22.4	19.4	18.0	23.4	23.5	6.3	8.8	12.5	12.1
31-40	252	24	79	72	71	6	232	14	7	7	1	3
	7.4	9.5	10.6	6.9	5.9	4.3	8.0	8.6	3.4	6.2	3.1	2.6
41-50	235	30	70	72	58	5	215	16	5	7	1	1
	6.9	11.9	9.4	6.9	4.8	3.6	7.4	9.9	2.4	6.2	3.1	.9
51-75	403	52	100	127	116	8	352	34	8	18	5	7
	11.9	20.6	13.5	12.1	9.7	5.8	12.1	21.0	3.9	15.9	15.6	6.0
76-100	171	15	40	45	67	4	136	28	5	9	5	4
	5.1	6.0	5.4	4.3	5.6	2.9	4.7	17.3	2.4	8.0	15.6	3.4
OVER 100	31	5	6	5	15		27	4	1	2		
	.9	2.0	.8	.5	1.2		.9	2.5	.5	1.8		
NO RESPONSE	83	10	9	10	9	45	33	3	3	3		46
	2.5	4.0	1.2	1.0	.7	32.4	1.1	1.9	1.5	2.7		39.7

Time lived in house

Table 4 compares the length of time the respondents report living in their houses with annual income and heating fuels. Almost 50% of the people who have reported that their annual income is less than $10,000 also report that they have lived in their house more than 20 years. Only 12% of the respondents with income over $30,000 have lived in their houses more than 20 years. More than 30% of the residents in oil-heated homes have lived there more than 20 years.

Significantly, 36.5% of the respondents have lived in their homes for less than five years. The payback for most conservation improvements is greater than seven years.

PRICE WATERHOUSE & COMPANY

PROJECT CONSERVE EVALUATION

TABLE 4

Q.5 TIME LIVED IN HOUSE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3383	252	742	1049	1201	139	2917	162	206	113	32	116
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LESS THAN OR EQUAL TO 1 YEAR	177	10	40	70	48	9	108	7	21	7	2	43
	5.2	4.0	5.4	6.7	4.0	6.5	3.7	4.3	10.2	6.2	6.2	37.1
1-2 YEARS	290	10	63	88	122	7	243	6	34	10	7	7
	8.6	4.0	8.5	8.4	10.2	5.0	8.3	3.7	16.5	8.8	21.9	6.0
2-5 YEARS	769	17	155	266	314	17	663	28	75	32	7	8
	22.7	6.7	20.9	25.4	26.1	12.2	22.7	17.3	36.4	28.3	21.9	6.9
5-10 YEARS	685	29	127	231	284	14	621	24	36	27	9	6
	20.2	11.5	17.1	22.0	23.6	10.1	21.3	14.8	17.5	23.9	28.1	5.2
10-20 YEARS	727	52	161	217	276	21	661	40	30	14	4	3
	21.5	20.6	21.7	20.7	23.0	15.1	22.7	24.7	14.6	12.4	12.5	2.6
20-50 YEARS	610	113	174	161	140	22	552	47	5	17	3	7
	18.0	44.8	23.5	15.3	11.7	15.8	18.9	29.0	2.4	15.0	9.4	6.0
OVER 50 YEARS	33	12	9	6	6		27	5	2	2		
	1.0	4.8	1.2	.6	.5		.9	3.1	1.0	1.8		
NO RESPONSE	215	19	44	58	37	57	111	11	14	10	2	81
	6.4	7.5	5.9	5.5	3.1	41.0	3.8	6.8	6.8	8.8	6.2	69.8

Respondents who have moved

Table 5 discloses that 3% of the respondents have moved since they originally answered the audit questionnaire. Another 1% of the evaluation questionnaires were returned undelivered because the original Project Conserve participant had moved such that mail could not be forwarded.

PROJECT CONSERVE EVALUATION

TABLE 5

Q.6 MOVED SINCE COMPLETING PREVIOUS QUESTIONNAIRE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3383	252	742	1049	1201	139	2917	162	206	113	32	115
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
YES	103	8	28	34	26	7	24	3	3	2		76
	3.0	3.2	3.8	3.2	2.2	5.0	.8	1.9	1.5	1.8		65.5
NO	3195	234	700	998	1170	93	2848	155	201	110	32	5
	94.4	92.9	94.3	95.1	97.4	66.9	97.6	95.7	97.6	97.3	100.0	4.3
NO RESPONSE	85	10	14	17	5	39	45	4	2	1		35
	2.5	4.0	1.9	1.6	.4	28.1	1.5	2.5	1.0	.9		30.2

Type of heating fuel used

Table 6 discloses that approximately 5% of the respondents reported having more than one type of heating fuel for their homes. About 88% of the respondents used natural gas as a heat source, while 3.4% used wood.

PROJECT CONSERVE EVALUATION

TABLE 6

Q.7 TYPE HEATING FUEL USE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
GAS	2893	218	619	904	1065	87	2893	3	33	80	11	
	88.2	89.3	86.7	89.1	90.6	65.9	100.0	1.9	16.3	72.1	34.4	
OIL	159	15	47	48	47	2	3	159	4	8	1	
	4.8	6.1	6.6	4.7	4.0	1.5	.1	100.0	2.0	7.2	3.1	
ELECTRICITY	203	9	50	68	67	9	33	4	203	22		
	6.2	3.7	7.0	6.7	5.7	6.8	1.1	2.5	100.0	19.8		
WOOD	111	4	32	45	29	1	80	8	22	111	4	
	3.4	1.6	4.5	4.4	2.5	.8	2.8	5.0	10.8	100.0	12.5	
OTHER	32	1	11	11	9		11	1		4	32	
	1.0	.4	1.5	1.1	.8		.4	.6		3.6	100.0	
NO RESPONSE	40	2	1		2	35						40
	1.2	.8	.1		.2	26.5						100.0

Reasons why the respondents completed the audit questionnaire

Table 7 summarizes the reasons why people completed the INR Project Conserve audit questionnaire. It also compares these responses to the participant's annual income and heating fuel. Respondents to this question were able to give more than one reason. This explains why the total number of answers to this question exceeds the number of respondents.

Sixty-three percent of the respondents indicated they thought the analysis to the Project Conserve questionnaire would help them save money. Fifty-six percent indicated that they thought Project Conserve would help them save energy. Thirty-three percent of the respondents who use gas, oil or electricity as a heating fuel wanted advice concerning which conservation improvements to install in their homes. Over 40% of the respondents who use wood or other heating fuels wanted advice concerning the type of conservation improvement to install. Almost 25% of the total respondents indicated they answered the questionnaire because of curiosity.

Less than 3% had no special reason, 6% had various other reasons and only 1% did not respond to this question.

PROJECT CONSERVE EVALUATION

TABLE 7

Q.8 REASONS COMPLETED QUESTIONNAIRE

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
THOUGHT IT MIGHT HELP SAVE ME MONEY	2076	140	430	695	741	70	1846	98	115	68	21	14
	63.3	57.4	60.2	68.5	63.1	53.0	63.8	61.6	56.7	61.3	65.6	35.0
THOUGHT IT MIGHT HELP SAVE ME ENERGY	1851	120	378	592	693	68	1641	88	119	62	16	13
	56.4	49.2	52.9	58.3	59.0	51.5	56.7	55.3	58.6	55.9	50.0	32.5
TO HELP ME DECIDE ON WHICH ENERGY IMPROVEMENT TO MAKE	1086	59	250	354	386	37	973	58	52	51	13	6
	33.1	24.2	35.0	34.9	32.9	28.0	33.6	36.5	25.6	45.9	40.6	15.0
CURIOSITY	814	31	176	253	326	28	719	47	53	28	7	1
	24.8	12.7	24.6	24.9	27.7	21.2	24.9	29.6	26.1	25.2	21.9	2.5
NO SPECIAL REASON	85	22	21	14	24	4	76	5	4	3	1	1
	2.6	9.0	2.9	1.4	2.0	3.0	2.6	3.1	2.0	2.7	3.1	2.5
OTHER	200	14	44	70	63	9	171	10	22	6	1	1
	6.1	5.7	6.2	6.9	5.4	6.8	5.9	6.3	10.8	5.4	3.1	2.5
NO RESPONSE	36	6	7	3	3	17	13	2	1	1		20
	1.1	2.5	1.0	.3	.3	12.9	.4	1.3	.5	.9		50.0

Reaction to Project Conserve analysis

Table 8 summarizes the reactions to the Project Conserve analysis and then compares the reactions to the respondents' annual income and heating fuel.

Forty-three percent of the respondents found the analysis helpful and used it. Only 12% indicated they thought the analysis was not helpful. Five percent of the respondents were surprised at the costs of the conservation improvements.

Over 20% of the respondents with annual income less than $10,000 either did not remember receiving the analysis or found it too complicated to understand. At the same time, nearly one-third of the respondents with annual income of less than $10,000 found the questionnaire helpful.

PROJECT CONSERVE EVALUATION

TABLE 8

Q.9 STATEMENT WHICH BEST DESCRIBES REACTION TO ANALYSIS RECEIVED

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DONT REMEMBER RECEIVING AN ANALYSIS	206	38	44	53	64	7	179	16	12	8	1	1
	6.3	15.6	6.2	5.2	5.4	5.3	6.2	10.1	5.9	7.2	3.1	2.5
FOUND ANALYSIS HELPFUL AND HAVE USED IT	1423	77	317	497	496	36	1266	71	83	51	14	10
	43.4	31.6	44.4	49.0	42.2	27.3	43.8	44.7	40.9	45.9	43.7	25.0
FOUND IT TOO COMPLICATED TO UNDERSTAND	92	12	28	30	19	3	86	3	4	2		
	2.8	4.9	3.9	3.0	1.6	2.3	3.0	1.9	2.0	1.8		
ANALYSIS DIDNT SEEM CORRECT	142	13	31	37	53	8	120	8	13	4	1	1
	4.3	5.3	4.3	3.6	4.5	6.1	4.1	5.0	6.4	3.6	3.1	2.5
HAVENT HAD A CHANCE TO STUDY THE ANALYSIS	82	2	16	20	42	2	71	4	5	1		2
	2.5	.8	2.2	2.0	3.6	1.5	2.5	2.5	2.5	.9		5.0
ANALYSIS WAS NOT HELPFUL	407	26	77	134	156	14	355	16	32	11	7	3
	12.4	10.7	10.8	13.2	13.3	10.6	12.3	10.1	15.8	9.9	21.9	7.5
WAS SURPRISED AT THE COST OF CONSERVATION IMPROVEMENTS	163	28	45	49	35	6	149	8	5	6	2	1
	5.0	11.5	6.3	4.8	3.0	4.5	5.2	5.0	2.5	5.4	6.2	2.5
OTHER	645	31	129	173	274	38	578	24	43	23	6	4
	19.7	12.7	18.1	17.0	23.3	28.8	20.0	15.1	21.2	20.7	18.7	10.0
NO RESPONSE	120	17	27	22	36	18	89	9	6	5	1	18
	3.7	7.0	3.8	2.2	3.1	13.6	3.1	5.7	3.0	4.5	3.1	45.0

Reasons for energy improvements

Table 9 summarizes how the analyses influenced the respondents' energy improvements. It also compares these responses to annual income and heating fuel.

Thirty-four percent of the respondents indicated that the analysis helped them decide what type of improvement to make. Thirty-two percent of the respondents have not made a conservation improvement. Approximately 27% have made an improvement but the analysis was not a factor in that decision. Annual income and heating fuels do not appear to have a significant impact on the responses to this question.

PROJECT CONSERVE EVALUATION

TABLE 9

Q.10 IF ENERGY IMPROVEMENT MADE, WAS IT BECAUSE OF ANALYSIS

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DIDNT MAKE AN IMPROVEMENT	1062	79	210	300	432	41	935	51	68	24	8	9
	32.4	32.4	29.4	29.6	36.8	31.1	32.3	32.1	33.5	21.6	25.0	22.5
MADE AN IMPROVEMENT PRIMARILY BECAUSE OF ANALYSIS	149	17	37	41	50	4	134	3	13	6	1	1
	4.5	7.0	5.2	4.0	4.3	3.0	4.6	1.9	6.4	5.4	3.1	2.5
MADE AN IMPROVEMENT AND THE ANALYSIS HELPED ME DECIDE	968	50	223	348	327	20	853	56	57	34	14	5
	29.5	20.5	31.2	34.3	27.8	15.2	29.5	35.2	28.1	30.6	43.7	12.5
MADE AN IMPROVEMENT AND THE ANALYSIS WAS NOT A FACTOR IN THE DECISION	875	66	197	281	298	33	788	37	52	39	9	5
	26.7	27.0	27.6	27.7	25.4	25.0	27.2	23.3	25.6	35.1	28.1	12.5
NO RESPONSE	226	32	47	45	68	34	183	12	13	8		20
	6.9	13.1	6.6	4.4	5.8	25.8	6.3	7.5	6.4	7.2		50.0

Types of improvements made

Table 10 summarizes the types of energy conserving improvements that the respondents have made within the last year. It also compares the reported improvements to annual income and heating fuel. The respondents were able to indicate that they have installed more than one type of energy improvement.

Fifty-three percent of the respondents report that they have added weather stripping or caulking around their doors or windows. Twenty-five percent have installed new storm doors or windows and 25% have added ceiling insulation. Only 18% of the respondents to this question indicated they have made no improvements. Respondents with annual income over $30,000 have installed more automatic thermostat controls and glass fireplace doors but less weather stripping or caulking than the average respondent. People who rely upon wood as a heating fuel are more likely to install glass fireplace doors.

PRICE WATERHOUSE & COMPANY

PROJECT CONSERVE EVALUATION

TABLE 10

Q.11 WHICH OF THE FOLLOWING ENERGY CONSERVING IMPROVEMENTS MADE TO HOUSE IN PAST YEAR

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
INSULATION OF WALLS	306	22	83	98	95	8	259	28	20	19	7	1
	9.3	9.0	11.6	9.7	8.1	6.1	9.0	17.6	9.9	17.1	21.9	2.5
INSULATION OF CEILING	803	45	163	265	305	25	711	45	44	35	8	7
	24.5	18.4	22.8	26.1	26.0	18.9	24.6	28.3	21.7	31.5	25.0	17.5
INSULATION OF FOUNDATION	302	20	82	89	102	9	262	14	25	13	9	
	9.2	8.2	11.5	8.8	8.7	6.8	9.1	8.8	12.3	11.7	28.1	
WEATHERSTRIPPING/CAULKING OF DOORS, WINDOWS	1761	127	415	608	548	63	1584	89	86	71	18	11
	53.7	52.0	58.1	59.9	46.6	47.7	54.8	56.0	42.4	64.0	56.2	27.5
INSTALLATION OF NEW STORM DOORS OR WINDOWS	823	53	176	306	257	31	726	47	54	30	9	1
	25.1	21.7	24.6	30.1	21.9	23.5	25.1	29.6	26.6	27.0	28.1	2.5
INSTALLATION OF AUTOMATIC THERMOSTAT CONTROL	247	16	38	67	117	9	227	12	11	9	2	1
	7.5	6.6	5.3	6.6	10.0	6.8	7.8	7.5	5.4	8.1	6.2	2.5
INSTALLATION OF TIMERS FOR LIGHTS	278	23	58	88	99	10	256	16	8	5	2	
	8.5	9.4	8.1	8.7	8.4	7.6	8.8	10.1	3.9	4.5	6.2	
INSTALLATION OF ATTIC VENTILATION	437	33	91	150	149	14	398	15	25	15	7	1
	13.3	13.5	12.7	14.8	12.7	10.6	13.8	9.4	12.3	13.5	21.9	2.5
INSTALLATION OF GLASS FIREPLACE DOORS	274	5	39	76	145	9	232	12	30	32	3	
	8.4	2.0	5.5	7.5	12.3	6.8	8.0	7.5	14.8	28.8	9.4	
INSTALLATION OF FLUE DAMPER ON FURNACE	148	12	23	50	56	7	137	5	5	13		1
	4.5	4.9	3.2	4.9	4.8	5.3	4.7	3.1	2.5	11.7		2.5
OTHER	454	48	118	142	135	11	394	28	38	33	5	1
	13.8	19.7	16.5	14.0	11.5	8.3	13.6	17.6	18.7	29.7	15.6	2.5
HAVE MADE NO IMPROVEMENTS	586	50	115	155	243	23	503	26	49	6	6	7
	17.9	20.5	16.1	15.3	20.7	17.4	17.4	16.4	24.1	5.4	18.7	17.5
NO RESPONSE	97	10	18	15	29	25	70	4	3	2		19
	3.0	4.1	2.5	1.5	2.5	18.9	2.4	2.5	1.5	1.8		47.5

Comments made to improve Project Conserve

Table 11 reveals that 44% of the respondents had a comment to the following: "This program is known as Project Conserve. It is paid for by your tax dollars. How can the program be more useful to you in terms of helping you decide how to conserve energy?"

We have excerpted several of the 1,500 comments and included them on the following pages.

PROJECT CONSERVE EVALUATION

TABLE 11

Q.12 HOW PROGRAM CAN BE MORE USEFUL IN TERMS OF HELPING DECIDE HOW TO CONSERVE ENERGY

		ANNUAL INCOME					TYPE HEATING FUEL					
	TOTAL	LESS THAN $10M	$10M-$20M	$20M-$30M	MORE THAN $30M	NO RESPONSE	GAS	OIL	ELECTRIC	WOOD	OTHER	NO RESPONSE
TOTAL	3280	244	714	1015	1175	132	2893	159	203	111	32	40
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ANSWERED	1459	101	287	479	548	44	1303	64	95	47	14	11
	44.5	41.4	40.2	47.2	46.6	33.3	45.0	40.3	46.8	42.3	43.7	27.5
NO RESPONSE	1821	143	427	536	627	88	1590	95	108	64	18	29
	55.5	58.6	59.8	52.8	53.4	66.7	55.0	59.7	53.2	57.7	56.2	72.5

PROJECT CONSERVE EVALUATION

COMMENTS FROM RESPONDENTS TO QUESTION 12

"I am a residential energy use advisor and I was quite impressed with "Project Conserve." I would like to see everyone exposed to and strongly encouraged to follow the recommendations of Project Conserve."

"I believe this type of program (technical nature) is more effective than media reminders."

"We found the analysis helpful. All anyone hears about anymore is that we should conserve, but you are not given specifics as to how to do it. We therefore, were glad to give information about our home and our heat settings and receive information on how to conserve and save money in our specific case."

"I think more people would conserve if they felt the state and federal governments were on their helping side. Perhaps a wider program of tax cuts for conservation improvements. I also feel Project Conserve is a good program that will give the people participating in it some direction. Keep up the good work."

"The questionnaire needed 1 or 2 additional questions about insulation under the house (floor, crawl space, basement as well as heat ducts). Other sources (consumer reports, etc.) suggest that the estimated savings for upgrading ceiling insulation from R-11 to R-30 may be moderately overstated. I consider "Project Conserve" nevertheless a splendid use of my tax dollars."

"Conservation is a current topic and the study helped give me an idea of the cost effects of some of the things I had already done and on others I was contemplating."

"The analysis was interesting and called attention to facts we should have been checking. It was, for once, a direct return on our tax dollars."

"Provide a follow-up to the questionnaire of an in-person, low cost house energy "audit" by a qualified specialist. Undoubtedly costs would be high, but if done as a combination research - service project, it might be justifiable. A home can, for example, have storm windows, but the computer questionnaire cannot evaluate how energy-efficient they are. If obsolete or damaged, they might need replacement or repair."

"Supply a list of reputable qualified service agencies who supply service dealing with energy conservation, such as roofing, storm windows, insulation, siding, cement (for small jobs)."

"You need to add a payback analysis. You also need an indication of the market of improvements if you sell the house before the payback period."

"Keep me up-to-date on the developments which should be made in the areas of solar energy, alcohol in place of oil, methane gas from wastes and agricultural by-products."

"An 800 line for telephoning for information would be good. We have conversations at work about energy a lot and the most obvious conclusion is that none of us really knows much about practicalities of conservation - you could settle many arguments. I also believe that schools, municipalities, etc. know next to nothing about energy cost or conservation of energy on a practical basis."

"Set up a low interest loan program which could help in making additional improvements practical basis."

"Give full tax credit for energy conserving expenditures. Federal exemption now is hard for the average person to qualify for."

"The questions were so generalized that homes like ours, new and well insulated don't fit in the questionnaire. The response said there was nothing more we could do, when that is certainly not the case."

"It is almost a useless program and should be discontinued. It really is impossible in most situations for a general computer survey to provide sufficiently individualized and accurate information. Such a program can be helpful only in the most extreme and obvious cases, such as by recommending storm windows for a house without them. But a general newspaper article or TV show can provide such generalized information better, and at No Public Cost."

"Could be more useful by not spending tax dollars. Publish the information in newspapers - save on special mailings and surveys and reports."

"The main reason I sent it in was to get an idea about how to insulate our brick exterior walls, but no individualized attention was given to the questionnaire."

"According to the analysis our home is well insulated. Yet why do our energy bills double every year?"

"I think this is another example of government wasting the tax payer's money. We know what we need but can't print money to get it as the federal government does."

"As long as all energy conserving improvements are so expensive, the "Project Conserve" program is useless to our household."