

**MASTER**

ENVIRONMENTAL IMPACT DETERMINATION

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Based on

The State Energy Conservation Plan and Environmental Assessment

Submitted to the FEA by

The State of Minnesota for Approval and Funding under the Provisions

of

Title III, Part C of the Energy Policy and Conservation Act; State Energy Conservation Program

Prepared by

The Office of Energy Conservation  
Federal Energy Administration

*[Handwritten initials]*

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## I. Introduction

Title III, Part C of the Energy Policy and Conservation Act (EPCA) establishes the State Energy Conservation Program (SECP). The SECP will provide up to \$22.5 million to the States and Territories in FY 1977 and up to \$50 million in FY 1978 for implementation of State developed and State administered programs. Under the FY 1977 funding formula, Minnesota is eligible for an award of \$411,000. The objective of the SECP is to promote the conservation of energy and to reduce the rate of growth of energy demand.

An Environmental Assessment (EA) of the probable nationwide impacts of the SECP was undertaken by FEA. On the basis of said EA, a Determination was published in the Federal Register, Vol. 41. No. 117 (June 16, 1976) as follows:

In accordance with FEA's obligations under the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 et seq.), an evaluation of the potential environmental impacts of the program for State energy conservation plans has been prepared by FEA. While certain adverse environmental impacts have been identified, they were found not to be "significant" as that term is used under NEPA. The overall impacts of the various program measures taken either separately or in combination are clearly beneficial.

The nature and degree of environmental benefit will vary, however, among State energy conservation plans and from program measure to program measure. In the final analysis, the content of any particular State energy conservation plan will be determined by many factors peculiar to that individual State; these include local economic, employment, environmental, social, geographic and climatic conditions.

The FEA evaluation, therefore, in addition to describing the environment to be affected by the plans, the impact of alternative measures likely to be included in the various State plans, and the maximum probable environmental impacts from the implementation of plans in all States, provides formulas for the use of the States which will allow them to compute the environmental residuals likely to flow from measures they propose. This information will be included in the plan reports submitted by the Governors. Prior to approving any plan or making any grants, FEA will review each State's submission of environmental data to determine whether it entails any significant effects on the quality of the human environment. In any case in which FEA discovers significant effects, based on the information submitted and any supplemental information

needed to make an informed judgment, an environmental impact statement will be undertaken by FEA. In cases where there are determined to be no significant effects, FEA will issue a negative determination of environmental impact, citing the State's submission in lieu of a formal environmental assessment pursuant to 10 CFR 203.4.

Potential national economic impacts are discussed in a related inflationary impact statement prepared and filed, in June 1976, with the Council on Wage and Price Stability.

## II. Findings

Minnesota has prepared a detailed and comprehensive EA (attached) of its proposed plan. A review of the plan and the EA has been completed, by FEA, and is the basis for the following conclusions:

- o No significant adverse environmental impacts are expected to result from Plan implementation;
- o Beneficial environmental impacts from plan implementation are expected to have results that substantially outweigh any adverse impacts - but which are, themselves, not considered to be "significant" within the meaning of NEPA;
- o The nature of the process by which Minnesota's plan has been developed has been such that the environmental factors have been identified and considered at each stage of development for each program measure.

## III. Program Description

The objective of the SECP is the wise and efficient use of energy. That is:

- o To conserve energy - especially non-renewable fossil fuels;
- o To increase the number of output units per BTU of energy input, e.g., miles per gallon of gasoline,

square feet of building space illuminated, heated or cooled per kilowatt hour, therm or gallon, etc.; and, in general,

- o To eliminate waste and inefficiency in the use of energy and, thereby, to promote economic, social, environmental and other benefits.

The program presently does not encompass, provide funding for, or otherwise encourage such actions as:

- o Fuels switching;
- o Changes in pollution control efforts, air or water quality standards, etc.

In other words, the program is designed to operate within existing social, economic, environmental, political, legal, etc. constraints. The most tangible environmental effects, therefore, are likely to be the changes in environmental residuals which result from the changes in specific fuel consumption. These changes in all cases are net reductions in fuel use and are calculated by subtracting any small increase in energy use that may be occasioned by a program measure from the larger savings. For example:

- o Increased use of commuter vanpools, carpools, or mass transit will reduce vehicle miles travelled by removing a number of commuter automobiles from the road. Additional fuel consumed by vans, buses, remaining commuter autos with higher occupancy rates and by autos left at home as a result of the program must be subtracted in order to arrive at a net savings estimate.
- o Reduced lighting levels in some buildings will, during the heating season in some climates, slightly increase fuel requirements for heating and decrease them for cooling. These changes have been shown to be insignificant in terms of environmental impact. The net impact is beneficial.

Because the most tangible environmental effects are the residuals changes resulting from the reductions in fuel use, the most reasonable approach to an environmental analysis, here, is to stress these first order (residuals) changes. This is best done by specific fuel use within each energy use sector.

#### IV. Impacts

##### A. General

Energy savings to result from implementation of the Minnesota plan are estimated at 122.3 trillion BTU or 8.9 percent of the FEA baseline forecast for Minnesota, for 1980, of 1361.1 trillion BTU. However, not all of these savings are to result from program measures for which Minnesota is requesting approval or funding (total or partial) under provisions of the SECP. Table IV-B (appended) of the plan submission lists the SECP program measures and their related savings. These savings amount to 71.2 trillion BTU or 5.2 percent of the 1980 projection. Of this total, 17.4 trillion BTU (or 24.4 percent of savings) are attributed to the five required program measures; the remaining 53.8 trillion BTU are realized from some 14 additional measures. Of the 71.2 trillion BTU, 9.9 trillion BTU are electrical generation fuels saved (6.2 of coal and 3.7 oil); this is about 14 percent of primary fuel savings.

TABLE I

Minnesota Energy Consumption by Sector (1980)

| Sector         | Total<br>(Primary Fuels) |        | Net(End Use)         |        |
|----------------|--------------------------|--------|----------------------|--------|
|                | 10 <sup>12</sup> BTU     | %      | 10 <sup>12</sup> BTU | %      |
| Residential    | 241.33                   | 17.7   | 394.78               | 28.9   |
| Commercial     | 143.61                   | 10.5   | 233.94               | 17.1   |
| Industrial     | 228.40                   | 16.7   | 372.11               | 27.2   |
| Transportation | 367.40                   | 26.9   | 367.40               | 26.9   |
| Utilities      | 387.33                   | 28.3   | —                    | —      |
| Total          | 1,368.07*                | 100.1* | 1,368.23*            | 100.1* |

\* Rounding Error

TABLE II

Minnesota Energy Savings by Sector (1980)

| Sector                  | Total<br>(Primary Fuels) |       | Net(End Use)         |       |
|-------------------------|--------------------------|-------|----------------------|-------|
|                         | 10 <sup>12</sup> BTU     | %     | 10 <sup>12</sup> BTU | %     |
| Res/Comm.Bldg.          | 17.5                     | 24.6  | 23.7                 | 33.3  |
| Industrial              | 4.6                      | 6.5   | 8.3                  | 11.7  |
| Transportation          | 2.9                      | 4.1   | 2.9                  | 4.1   |
| Utilities               | 9.9                      | 13.9  | —                    | —     |
| Other & Cross-Sectoral* | 36.3                     | 51.0  | 36.3                 | 51.0  |
| Total                   | 71.2                     | 100.1 | 71.2                 | 100.1 |

The savings, measured across end use sectors, result in an absolute decrease in every environmental residual measured from each fuel consumed within each sector. The method of assessing the reduction in residuals was to compare the changes resulting from Minnesota's projected fuel savings with a set of residuals calculated (by sector, by fuel) against FEA's baseline consumption forecast. A summary of these calculations is appended. These reductions are fairly evenly distributed among all residuals measured. This reflects Minnesota's generally well balanced fuel consumption mix and the distribution of program measure impacts. While all residuals changes are beneficial, none is judged to be significant.

While certain potential adverse impacts can be postulated, none are expected to be significant.

- o Where quantification has been attempted of many adverse impacts (as with CO emissions incident to new lighting standards in the nationwide case), it has been found that residuals changes are well within the margin of error associated with the projections against which they are measured and the impacts are insignificant.
- o In other cases, small adverse impacts have been accounted for and subtracted out in the process of computing the benefit, e.g., fuels used by vans and cars left at home (as a result of carpooling and vanpooling) are subtracted from fuels saved prior to computing residuals changes.
- o An inflationary impact statement for the program was prepared and filed, in June 1976, with the Council on Wage and Price Stability. It stated that certain program measures, e.g., buildings insulation, vans, etc., may have an initial adverse economic impact in that the costs are front-end loaded (borne entirely at the time of purchase/installation) and the benefits are spread over a period of years. Over the life span of the improvement, however, all such investments identified were expected to produce beneficial economic impacts.
- o It will be noted that about 51 percent of Minnesota's energy savings come from a category listed on Table II, above, as "Other and Cross Sectoral. These are predominantly small, educational, public information, study grant, etc. kinds of measures. Each, by itself produces less than 1 trillion BTU of savings. None produces any measurable environmental impact. Taken as a group, they produce beneficial - but insignificant - impacts which are discussed under the sectoral headings in Section IV-B.

## B. Specific Impacts

Particular program measures are listed in Table IV-B (appended) of the Minnesota Plan. Table II, above, is based on Table IV-B and shows the likely impacts of the measures by sector. The only impacts of any potential significance will be those directly resulting from energy savings expected in a particular sector; these impacts will be the aggregate of many small savings measures affecting each sector.

### 1. Residential and Commercial Buildings

Minnesota's major potential for energy savings under the SECP is through program measures impacting the residential and commercial sectors. The residential and commercial sectors combined account (directly or indirectly) for about 46 percent of all fuels burned and about 28 percent of direct fuel input.

Of the total energy savings anticipated in 1980 from the implementation of Minnesota's plan, 33 percent can be attributed to program measures directly affecting residential and commercial buildings, such as mandatory lighting and thermal efficiency standards. Fifty-one percent is attributable to program measures (such as public information) indirectly affecting all sectors, or designed to bolster and reinforce the effects of the direct impact program measures.

Improvements in lighting and thermal efficiency involve some additional potential impacts as discussed below.

#### o Manufacture and Installation of Weatherization Materials

The impact of the actual installation of improvements and repair work will be insignificant. The aggregate environmental impacts can be divided into two major effects: environmental benefits associated with reduced fuel consumption, and small but possibly adverse environmental effects associated with the production of materials to retrofit the structures specified. The important consideration here is that while any adverse environmental effects will terminate when the program expenditures terminate, the environmental benefits will continue to accrue as long as the subject buildings are consuming heating fuel at a rate below their pre-retrofit levels.

- o Increased costs to building owners - either residential or commercial - resulting from increased insulation, more energy efficient equipment, etc., whether in the case of new construction or retrofit, appear to be negligible.

In fact, all information to date indicates that over a very short (5-to 10-year) period, these measures are extremely cost beneficial, i.e., the investment is more than offset by reduced fuel bills.

o Other Conservation Devices and Materials

The manufacture of devices such as clock thermostats may result in minor, but unquantifiable, emissions which, however, will be more than offset by the reduced emissions attributable to their use.

o Reduced Levels of Lighting and Heating

The nationwide case (Programmatic EA) referenced above makes note of the potential for minor, seasonal, increases (on the order of 0.01 percent) in CO as a result of increased heating needed in some buildings to offset heat loss when lighting levels are reduced.

Minnesota's method of assessment was to account for net fuel changes resulting from all program measures (and their interactions) within this area (lighting and heating). The environmental residual calculations which followed--based on these net fuel use changes--showed no quantifiable adverse impacts.

Health effects from reduced heating and cooling levels are expected to be negligible - and presumed to be, on the whole, beneficial, i.e., in most cases heating, cooling, and lighting levels with the proposed standards are thought to be more healthful than existing levels; in addition, the reduction in pollutants is beneficial.

2. Industry

In Minnesota the major conservation effort in the industrial sector is the industrial/commercial audit program which produces savings across both sectors of 13.5 trillion BTU. The change in residuals is beneficial but small.

To the extent that the industrial sector may experience adverse environmental impacts as an indirect result of increased demand, for example, for insulation materials or for vans attributable to other program measures, these impacts are discussed in the

sector where these program measures have their direct impact. The economic impact of such factors, of course, is beneficial to industry.

### 3. Transportation

While a significant amount of energy is consumed in the transportation sector in Minnesota (see Table I), major changes in transportation fuels use will occur only with infrastructure and vehicle efficiency changes which are (compared to other savings opportunities) slower, more capital intensive, and/or inter-rather than intrastate in character and therefore outside the scope of the SECP.

From the implementation of the required transportation program measures, Minnesota expects to realize an energy savings of 2.9 trillion BTU's in 1980, about 4 percent of the total savings expected from plan implementation. While relatively small, this reduction in fuel consumption and thus in environmental residuals will have a beneficial impact.

To the extent that public information programs may affect the driving habits of Minnesota's residents, further environmental benefits may be expected, though this impact is not quantifiable due to the uncertainties about the effectiveness of such programs in this regard.

The promotion of vans and carpools in Minnesota may have small adverse secondary impacts:

- o The fuel used by vans, as well as the increased consumption per auto when the number of occupants is increased, has been subtracted from fuel savings prior to estimating residuals changes. The net change is, in all cases, beneficial, but not significant.
- o The increased emissions from the manufacture of the vans have not been determined but are judged to be negligible when compared to reduced operating emissions from autos. This impact is likely as well to be offset by reduced auto manufacture.

### 4. Utilities

Utilities consume about 28 percent of fuel used in Minnesota. Fossil fuels account for about 78 percent (over 50 percent coal) of this total. No program measures in Minnesota's plan are aimed directly at the utility sector. However, as a result

of program measures affecting the consumption of electricity, 9.9 trillion BTU are expected to be saved in fuels for electrical generation. This represents roughly 14 percent of total fuels saved. The environmental impacts, while not significant, will be uniformly beneficial.

It should be noted that Minnesota's electrical purchases come from power generated both in and out of State. While the residuals change (percent and absolute) is accurate and is based on total fuel mix for all electricity purchased, the reductions will not all be in-State but will be regional in nature, i.e., a portion of the environmental benefits will be felt by exporting States.

#### V. Alternatives

Under EPCA, there are no alternatives to the five mandatory program measures other than a State's non-participation in the SECP. The "no-participation" alternative, in all cases, is adverse when compared to the implementation of any mix of these five measures.

There is little room within the SECP timeframe for major structural changes affecting the way energy is used. Nor does an individual state have much say over the energy intensity or efficiency of many products used within its borders but produced and sold on a national basis. Rather, the emphasis of the SECP is on greater efficiency of energy use within the short term constraints imposed by presently in place infrastructure, capital investment, land-use patterns, buildings, motor vehicle stock, and the like. Given this situation as well as current State-specific fuel distribution and use patterns, the reduction in residuals for any State program, including Minnesota's, will not be uniform across all residuals but will tend to be skewed in such fashion as to conform to current fuel uses and specific savings opportunities and the particular characteristics of the fuels affected. In all cases the net result will be beneficial.

#### VI. Conclusion

In summary, it is the determination of the FEA that Minnesota's Environmental Assessment of this program complies with the requirements of both NEPA and the SECP Guidelines as promulgated by FEA.

Based upon our review of this EA, the FEA has determined that actions now required to be taken to implement Minnesota's proposed energy conservation plan under Title III, Part C of the EPCA will not be "major Federal actions significantly affecting the quality of the human environment." (Section 102(2)(C), National Environmental Policy Act, 42 U.S.C. 4332(2)(C)). Consequently, no EIS preparation is contemplated for this action.

## Appendices

I. Residuals Baseline Case and Residuals Changes

II. Abstracts from Minnesota Plan

STATE ENERGY CONSERVATION PROGRAM (SECP)  
 ENVIRONMENTAL REVIEW  
 RESIDUALS TALLY SHEET  
 (AIR)

STATE NAME MINNESOTA

| Sector                   | Particulates | NO <sub>x</sub> | SO <sub>x</sub> | HC         | CO         | Aldehydes | CO <sub>2</sub>      |
|--------------------------|--------------|-----------------|-----------------|------------|------------|-----------|----------------------|
| Transportation           | 264E+04      | 171E+05         | 1.88E+04        | 9.09E+04   | 7.28E+05   | 2.85E+03  | 2.79E+07             |
| Industrial               | 4.14E+04     | 5.77E+04        | 3.81E+04        | 1.50E+04   | 1.05E+05   | 5.99E+02  | 1.58E+07             |
| Commercial               | 3.64E+03     | 2.47E+04        | 7.72E+03        | 1.73E+03   | 3.47E+03   | 8.95E+02  | 9.63E+06             |
| Residential              | 5.62E+03     | 2.64E+04        | 1.35E+04        | 3.56E+03   | 3.69E+03   | 1.65E+03  | 1.67E+07             |
| Utilities                | 1.44E+04     | 8.87E+04        | 8.69E+04        | 2.78E+03   | 4.91E+03   | 3.17E+02  | 2.52E+07             |
| Total Baseline Residuals | 9.146E+04    | 3.68E+05        | 1.6502E+05      | 1.1397E+05 | 8.4507E+05 | 6.311E+03 | 9.523E+07            |
| Reduction                | 2.385        | 14,715          | 6,405           | 2,268      | 15,853     | 373       | 4.43.10 <sup>6</sup> |
| % Reduction              | .026         | .0399           | .0388           | .0198      | .0187      | .0591     | .0465                |

**Footnotes:**

Entries given in scientific notation, e.g., 3.86 E04 equals  $3.86 \times 10^4$  or 38,600; ( ) denotes minus value.

Unit values are:

- For Air, Water, and Solid Waste: tons per year;
- For Thermal Rejection: BTU per year; and
- For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.

STATE ENERGY CONSERVATION PROGRAM (SECP)  
 ENVIRONMENTAL REVIEW  
 RESIDUALS TALLY SHEET  
 (WATER)

STATE NAME MINNESOTA

| Sector                   | Acids    | Bases      | Dissolved Solids | Suspended Solids | Non-Deg. Organics | B.O.D.    | C.O.D.    |
|--------------------------|----------|------------|------------------|------------------|-------------------|-----------|-----------|
| Transportation           | 0        | 0          | 1.46E+02         | 2.80E+02         | 8.86E+02          | 2.80E+02  | 1.71E+03  |
| Industrial               | 0        | 5.72E+01   | 1.68E+03         | 3.74E+02         | 1.31E+02          | 4.24E+02  | 2.48E+02  |
| Commercial               | 0        | 1.36E+00   | 4.99E+01         | 3.33E+01         | 8.24E+01          | 2.54E+01  | 1.55E+02  |
| Residential              | 0        | 2.60E+00   | 9.99E+01         | 7.21E+01         | 1.83E+02          | 5.70E+01  | 3.48E+02  |
| Utilities                | 2.78E+03 | 2.10E+02   | 1.37E+04         | 1.93E+03         | 2.78E+02          | 0         | 0         |
| Total Baseline Residuals | 2.78E+03 | 2.7116E+02 | 1.567E+04        | 2.6894E+03       | 1.5604E+03        | 7.864E+02 | 2.461E+03 |
| Reduction                | 75       | 7          | 420              | 77               | 59                | 16        | 96        |
| % Reduction              | .0269    | .0258      | .0267            | .0286            | .0378             | .0203     | .0390     |

**Footnotes:**

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- For Thermal Rejection: BTU per year; and
- For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.

**STATE ENERGY CONSERVATION PROGRAM (SECP)  
ENVIRONMENTAL REVIEW  
RESIDUALS TALLY SHEET  
(OTHER)**

STATE NAME MINNESOTA

| Sector                   | Thermal Rejection | Solid Waste | Occupation Deaths | Injuries   | Man-Days Lost |  |  |
|--------------------------|-------------------|-------------|-------------------|------------|---------------|--|--|
| Transportation           | 0                 | 1.76E+04    | 2.57E-01          | 1.79E+01   | 9.26E+02      |  |  |
| Industrial               | 1.21E+11          | 2.87E+05    | 4.50E+00          | 7.96E+01   | 6.35E+03      |  |  |
| Commercial               | 9.70E+10          | 1.35E+04    | 1.48E-01          | 6.57E+00   | 3.08E+02      |  |  |
| Residential              | 1.46E+11          | 1.64E+04    | 2.82E-01          | 1.18E+01   | 5.78E+02      |  |  |
| Utilities                | 5.29E+13          | 2.96E+06    | 1.62E+01          | 2.85E+02   | 2.06E+04      |  |  |
| Total Baseline Residuals | 5.3264E+13        | 3.2945E+06  | 2.1387E+01        | 4.0087E+02 | 2.8762E+04    |  |  |
| Reduction                | 1,569+E09         | 17,641E+01  | 0.6               | 11.5       | 2,790         |  |  |
| % Reduction              | .029              | .0535       | .0280             | .0286      | .0970         |  |  |

**Footnotes:**

Entries given in scientific notation, e.g., 3.86 E04 equals  $3.86 \times 10^4$  or 38,600; ( ) denotes minus value.

Unit values are:

- For Air, Water, and Solid Waste: tons per year;
- For Thermal Rejection: BTU per year; and
- For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.

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State Minnesota  
 Date March 28, 1977

PART IV-B - PLAN SUMMARY

| MANDATORY PROGRAM MEASURES  | 1980 ESTIMATED ENERGY Savings (in Btu's) | ESTIMATED COST OF IMPLEMENTATION (in \$000's) |        |        |        |
|---|--|---|--------|--------|--------|
|   |  | 1977  | 1978   | 1979   | 1980   |
| 1. Thermal Efficiency Standards   | $9.423 \times 10^{12}$                   | 130.00  | 130.00 | 125.00 | 120.00 |
| 2. Lighting Efficiency Standards  | $6.12 \times 10^{12}$                    | 106.00  | 110.00 | 110.00 | 110.00 |
| 3. Energy Efficiency Procurement Standards For State & Local Government | $0.162 \times 10^{12}$                   | 17.65   | 120.00 | 123.00 | 126.00 |
| 4. Carpool, Vanpool, Public Transportation Measures                     | $1.697 \times 10^{12}$                   | 150.00  | 150.00 | 150.00 | 150.00 |
| 5. Right-turn-on-red  | Not countable                            |   |        |        |        |
| <b>TOTAL</b>  |  |   |        |        |        |

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State Minnesota  
 Date March 28, 1977

PART IV-B - PLAN SUMMARY

| ADDITIONAL<br>PROGRAM MEASURES   | 1980<br>ESTIMATED ENERGY<br>Savings (in Btu's) | ESTIMATED COST OF IMPLEMENTATION<br>(in \$000's) |       |       |       |
|--|--|--|-------|-------|-------|
|  |  | 1977   | 1978  | 1979  | 1980  |
| PHASES 1 & 2<br><br>Inclusion of Energy Conservation<br>Questions on Driver's Test<br>(No. 27) | 1.19 x 10 <sup>12</sup>                        | 0.50   | 25.00 | 5.00  |       |
| Industrial Seminar<br>(No. 74)   | 0.2 x 10 <sup>12</sup>                         | 4.00   | 4.00  | 4.00  | 4.00  |
| Expansion of FEA Public Schools<br>Energy Workshops<br>(No. 25)                                | 0.045 x 10 <sup>12</sup>                       |  | 14.00 | 10.00 | 10.00 |
| Local Government Conservation<br>(No. 53)  | 0.78 x 10 <sup>12</sup>                        | 52.75  | 65.00 | 75.00 | 75.00 |
| Small Business Conservation<br>Seminars<br>(No. 23)  | 0.01 x 10 <sup>12</sup>                        |  | 6.00  | 6.00  | 6.00  |
| Expansion of "Big Three"<br>Workshop<br>(No. 29)   | 0.198 x 10 <sup>12</sup>                       |  | 10.00 | 10.00 | 10.00 |

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PART IV-B - PLAN SUMMARY

| ADDITIONAL<br>PROGRAM MEASURES                          | 1980<br>ESTIMATED ENERGY<br>Savings (in Btu's) | ESTIMATED COST OF IMPLEMENTATION<br>(in \$000's) |       |       |       |
|---|--|--|-------|-------|-------|
|   |  | 1977   | 1978  | 1979  | 1980  |
| Expansion of Project Conserve<br>(No. 24)               | 0.16 x 10 <sup>12</sup>                        | 9.00   | 7.00  | 7.00  | 7.00  |
| Expanded Conservation<br>Information<br>(No. 26)        | 0.15 x 10 <sup>12</sup>                        | 43.75  | 38.75 | 38.75 | 38.75 |
| "Heatloss"--Home Energy<br>Assessment Model<br>(No. 75) | 0.065 x 10 <sup>12</sup>                       | 10.00  | 10.00 | 5.00  |       |
| Industrial Arts Education<br>Seminars<br>(No. 78)       | 0.037 x 10 <sup>12</sup>                       | 10.00  | 10.00 | 10.00 |       |
| Earth Sheltered Buildings<br>(No. 113)                  | 0.018 x 10 <sup>12</sup>                       | 30.00  | 20.00 |       |       |

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State Minnesota  
 Date March 28, 1977

PART IV-B - PLAN SUMMARY

| ADDITIONAL<br>PROGRAM MEASURES                   | 1980<br>ESTIMATED ENERGY<br>Savings (in Btu's) | ESTIMATED COST OF IMPLEMENTATION<br>(in \$000's) |        |        |       |
|--|--|--|--------|--------|-------|
|  |  | 1977   | 1978   | 1979   | 1980  |
| PHASE 3  |  |  |        |        |       |
| Residential Energy Self Audits                   | 2.9 x 10 <sup>12</sup>                         | 100.00   | 75.00  |        |       |
| Residential Computerized<br>Weatherization       |  | 50.00  | 133.00 |        |       |
| Commercial Energy Self-Audit,<br>Manual          | 13.5 x 10 <sup>12</sup>                        | 30.00  |        |        |       |
| Industrial Energy Self-Audit<br>Manual           |  | 18.00  |        |        |       |
| Computerized Audits for<br>Industrial/Commercial |  | 55.00  | 170.00 |        |       |
| Identification of Qualified<br>State Auditors    |  | 25.00  |        |        |       |
| Maxi-Audist for Commercial/<br>Industrial        |  |  |        | 10.00  |       |
| Project Management                               | others   | 60.00  | 60.00  | 70.00  | 70.00 |
| Subgrant Program                                 | 34.57 x 10 <sup>12</sup>                       | 600.00   | 500.00 | 500.00 |       |

PLAN SUMMARY

State Energy Conservation Plan

| <u>Measure</u>                    | <u>1977<br/>Cost</u> | <u>Energy Savings<br/>1980 (10<sup>12</sup> Btu)</u> |
|-----------------------------------|----------------------|--|
| Thermal Efficiency Standards      | -0-                  | 9.4226   |
| Lighting Efficiency Standards     | \$ 6,000             | 6.120  |
| Transportation Measures           | -0-                  | 1.697  |
| Procurement Standards             | \$17,650             | 0.162  |
| Right Turn on Red                 | -0-                  | No counted   |
| <hr/>                             |                      |  |
| Mandatory Measures (Subtotal)     | (\$23,650)           | (17.4)   |
| <br>                              |                      |  |
| Phase 1 Measures                  | \$ 393,830           | 17.6   |
| Phase 2 Measures                  | 349,399              | 20.5   |
| Phase 3 Measures                  | 666,000              | 16.4   |
| Minnesota Energy Agency Programs: |                      |  |
| Completed                         | -0-                  | 14.936   |
| Current                           | -0-                  | 19.123   |
| Future                            | -0-                  | 10.86  |
| Other State Programs              | -0-                  | 5.46   |
| <hr/>                             |                      |  |
| Additional Measures (Subtotal)    | (\$1,409,229)        | (104.9)  |
| <br>                              |                      |  |
| Grand Total                       | <u>\$1,432,879</u>   | <u>122.3</u>   |

STATE ENERGY CONSERVATION PROGRAM (SECP)  
 ENVIRONMENTAL REVIEW  
 RESIDUALS TALLY SHEET  
 (OTHER)

STATE NAME MINNESOTA

| Sector                   | Thermal Rejection | Solid Waste | Occupation Deaths | Injuries   | Man-Days Lost |  |  |
|--------------------------|-------------------|-------------|-------------------|------------|---------------|--|--|
| Transportation           | 0                 | 1.76E+04    | 2.57E-01          | 1.79E+01   | 9.26E+02      |  |  |
| Industrial               | 1.21E+11          | 2.87E+05    | 4.50E+00          | 7.96E+01   | 6.35E+03      |  |  |
| Commercial               | 9.70E+10          | 1.35E+04    | 1.48E-01          | 6.57E+00   | 3.08E+02      |  |  |
| Residential              | 1.46E+11          | 1.64E+04    | 2.82E-01          | 1.18E+01   | 5.78E+02      |  |  |
| Utilities                | 5.29E+13          | 2.96E+06    | 1.62E+01          | 2.85E+02   | 2.06E+04      |  |  |
| Total Baseline Residuals | 5.3264E+13        | 3.2945E+06  | 2.1387E+01        | 4.0087E+02 | 2.8762E+04    |  |  |
| Reduction                | 1,569+E09         | 17,641E+01  | 0.6               | 11.5       | 2,790         |  |  |
| % Reduction              | .029              | .0535       | .0280             | .0286      | .0970         |  |  |

**Footnotes:**

Entries given in scientific notation, e.g., 3.85 E04 equals  $3.85 \times 10^4$  or 38,600; ( ) denotes minus value.

Unit values are:

- ° For Air, Water, and Solid Waste: tons per year;
- ° For Thermal Rejection: BTU per year; and
- ° For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.

STATE ENERGY CONSERVATION PROGRAM (SECP)  
 ENVIRONMENTAL REVIEW  
 RESIDUALS TALLY SHEET  
 (WATER)

STATE NAME MINNESOTA

| Sector                   | Acids    | Bases      | Dissolved Solids | Suspended Solids | Non-Deg. Organics | B.O.D.    | C.O.D.    |
|--------------------------|----------|------------|------------------|------------------|-------------------|-----------|-----------|
| Transportation           | 0        | 0          | 1.46E+02         | 2.80E+02         | 8.86E+02          | 2.80E+02  | 1.71E+03  |
| Industrial               | 0        | 5.72E+01   | 1.68E+03         | 3.74E+02         | 1.31E+02          | 4.24E+02  | 2.48E+02  |
| Commercial               | 0        | 1.36E+00   | 4.99E+01         | 3.33E+01         | 8.24E+01          | 2.54E+01  | 1.55E+02  |
| Residential              | 0        | 2.60E+00   | 9.99E+01         | 7.21E+01         | 1.83E+02          | 5.70E+01  | 3.48E+02  |
| Utilities                | 2.78E+03 | 2.10E+02   | 1.37E+04         | 1.93E+03         | 2.78E+02          | 0         | 0         |
| Total Baseline Residuals | 2.78E+03 | 2.7116E+02 | 1.567E+04        | 2.6894E+03       | 1.5604E+03        | 7.864E+02 | 2.461E+03 |
| Reduction                | 75       | 7          | 420              | 77               | 59                | 16        | 96        |
| % Reduction              | .0269    | .0258      | .0267            | .0286            | .0378             | .0203     | .0390     |

Footnotes:

Entries given in scientific notation, e.g., 3.86 E04 equals  $3.86 \times 10^4$  or 38,600; ( ) denotes minus value.

Unit values are:

- ° For Air, Water, and Solid Waste: tons per year;
- ° For Thermal Rejection: BTU per year; and
- ° For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.

STATE ENERGY CONSERVATION PROGRAM (SECP)  
 ENVIRONMENTAL REVIEW  
 RESIDUALS TALLY SHEET  
 (AIR)

STATE NAME MINNESOTA

| Sector                   | Particulates | NO <sub>x</sub> | SO <sub>x</sub> | HC         | CO         | Aldehydes | CO <sub>2</sub>      |
|--------------------------|--------------|-----------------|-----------------|------------|------------|-----------|----------------------|
| Transportation           | 264E+04      | 171E+05         | 1.88E+04        | 9.09E+04   | 7.28E+05   | 2.85E+03  | 2.79E+07             |
| Industrial               | 4.14E+04     | 5.77E+04        | 3.81E+04        | 1.50E+04   | 1.05E+05   | 5.99E+02  | 1.58E+07             |
| Commercial               | 3.64E+03     | 2.47E+04        | 7.72E+03        | 1.73E+03   | 3.47E+03   | 8.95E+02  | 9.63E+06             |
| Residential              | 5.62E+03     | 2.64E+04        | 1.35E+04        | 3.56E+03   | 3.69E+03   | 1.65E+03  | 1.67E+07             |
| Utilities                | 1.44E+04     | 8.87E+04        | 8.69E+04        | 2.78E+03   | 4.91E+03   | 3.17E+02  | 2.52E+07             |
| Total Baseline Residuals | 9.146E+04    | 3.68E+05        | 1.6502E+05      | 1.1397E+05 | 8.4507E+05 | 6.311E+03 | 9.523E+07            |
| Reduction                | 2,385        | 14,715          | 6,405           | 2,268      | 15,853     | 373       | 4.43.10 <sup>6</sup> |
| % Reduction              | .026         | .0399           | .0388           | .0198      | .0187      | .0591     | .0465                |

Footnotes:

Entries given in scientific notation, e.g., 3.86 E04 equals  $3.86 \times 10^4$  or 38,600; ( ) denotes minus value.

Unit values are:

- For Air, Water, and Solid Waste: tons per year;
- For Thermal Rejection: BTU per year; and
- For Deaths, Injuries, and Man-Days Lost: individual (single) occurrences.